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The Path Mechanism of Government Behavior Promoting the Construction of Innovation Chain of Leading Enterprises

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Abstract: Promoting the construction of innovation chains in leading enterprises has become a crucial focus in China's new development stage. The government plays a pivotal guiding role in advancing this process. Based on government behavior theory, this study conducts an in-depth analysis of the representative case where Hefei municipal government facilitated BOE's innovation chain development, aiming to reveal the impact mechanisms of governmental actions on the formation of innovation chains in technology-leading enterprises. The findings demonstrate that: First, the construction of innovation chains in leading enterprises encompasses three dimensions - formation of internal links, establishment of external links, and creation of interconnected relationships between internal and external components. Second, the government constitutes the core driving force through three empowerment mechanisms: strategic guidance, innovation resource allocation, and institutional environment optimization. Third, key mediating factors include the government's role as chain coordinator, industry-academia collaborative projects, and digital innovation platform development. These conclusions provide theoretical foundations and practical pathways for optimizing governmental innovation chain governance models and improving industrial innovation chain cultivation mechanisms, contributing to both academic research and policy-making in innovation ecosystem development.

Keywords: Government Behavior; Construction of Leading Enterprise Innovation Chain; Path Mechanism; Case Study
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1.Introduction

As primary drivers of market economic activities, enterprises constitute pivotal forces in propelling technological innovation. Within the new developmental paradigm, China's innovation-driven development strategy is undergoing profound transformation, marked by a critical transition of its innovation system from scale expansion to quality enhancement. Serving as cornerstone entities within the national innovation ecosystem, leading enterprises have assumed increasingly vital roles in the global technology competition landscape. These enterprises not only possess proprietary control over core technologies but also function as benchmark leaders in international industrial competition, with their developmental trajectories directly determining the progress and efficacy of national innovation initiatives [1]. The high-quality evolution of innovation chains in leading enterprises has emerged as a strategic imperative for leveraging scientific innovation to catalyze industrial advancement and cultivate next-generation productive forces in the new era [2].However, confronted with evolving global economic and political dynamics, China faces "chain fragmentation" risks in critical technology domains due to

innovation inadequacies. The misalignment between technological innovation outputs and industrial demands has hindered the manufacturing sector's ascent within global value chains. Fundamentally, the operational discontinuities in innovation chains and coordination failures across industrial ecosystems stem from inefficiencies in translating knowledge innovations into practical applications [3]. Disruptions in inter-phase connectivity not only impede the continuity of innovation processes but also significantly degrade the operational efficiency of holistic innovation systems [4].The contemporary open innovation paradigm has fundamentally reconfigured the competitive logic of leading enterprises, manifesting in three transformative dimensions:Competitive Entity Evolution: Shift from individual firms to value chain ecosystems, progressing toward business ecosystem architectures;Innovation Paradigm Transition: Replacement of closed proprietary innovation models with open innovation systems emphasizing multilateral collaboration;Organizational Architecture Restructuring: Transformation from decentralized internal resource dependency to chain-structured innovation frameworks centered on leading enterprises as pivotal nodes.Under policy mandates to strengthen national strategic technological capabilities, constructing efficient innovation chains for leading enterprises has become an urgent priority for industrial modernization, bearing profound implications for realizing innovation-driven development strategies.

Although the current government has strongly promoted the innovative development of the transformation of scientific and technological achievements [5], existing research has shown that local governments, as important guiding entities in the innovation chain, possess the ability to command and coordinate the forces and resources of all aspects of society [6], and play a crucial role in constructing the innovation chain of leading enterprises and promoting the sound development of the innovation chain of leading enterprises [7]. However, relevant research on issues such as the government's behavior patterns, effects, and the mechanisms by which the government promotes the construction of the innovation chain of leading enterprises remains insufficient. Clarifying the path of how government behavior constructs the innovation chain of leading enterprises is an important question that this study needs to answer.

Therefore, in order to address the above issues and make up for the deficiencies of existing theories, this study takes leading enterprises as the research subject and explores the path of how government behavior constructs the innovation chain of leading enterprises. This is conducive to giving play to the functions of an effective government, strengthening the status of leading enterprises as the main body of innovation, and promoting the effective formation of the innovation chain. To explore the path of how government behavior constructs the innovation chain of leading enterprises, this paper conducts research from the following three aspects: First, it analyzes the relevant research on the innovation chain of leading enterprises and the collaborative innovation between the government's guidance and the innovation chain of leading enterprises; Second, it explores the path mechanism of how government behavior constructs the innovation chain of leading enterprises by combining practical cases; Finally, it summarizes the research conclusions of this paper, and puts forward management implications and policy suggestions, providing theoretical support for accelerating the construction of the innovation chain of leading enterprises, and also providing useful inspiration for local governments to formulate relevant industrial policies.

2.Literature review

2.1 Leading enterprise innovation chain

The existing literature still shows insufficient systematic research on the innovation chain of leading enterprises, and a relatively unified definition has not yet been formed. A leading enterprise is an enterprise that has a significantly leading position in a certain industry or field and is a leader in the industry that can lead the progress of industrial technology and achieve breakthroughs in key and core technologies [8]. The innovation of leading enterprises covers the whole process from new scientific discoveries to the industrialization of high technologies [9], involving innovative activities with chronological correlations such as basic research, applied research, technological development, and industrialization. The sequential collection of all these activities can be represented by an innovation chain [10]. Regarding the definition of the innovation chain of leading enterprises, some scholars define the innovation chain of leading enterprises as a process in which, with leading enterprises as the main body and around the common innovation goals, various innovation entities couple innovation resources through a certain relationship to generate value-added]; some research also believes that the innovation chain of leading enterprises is a hybrid organization composed of actors adhering to different institutional logics. Although there are

differences in the conceptual definitions of the innovation chain of leading enterprises in the academic community, relevant research highlights the leading role of leading enterprises in the innovation chain, and it is unanimously believed that as the leaders of the innovation chain, leading enterprises can achieve the value-added of the innovation chain of leading enterprises only through collaborative innovation with multiple entities of industry, university, research institute, and application such as universities, scientific research institutions, customers, and suppliers[11]. Therefore, based on the existing research, this paper defines the construction of the innovation chain of leading enterprises as a process in which leading enterprises, as the main enterprises of the innovation chain, play a leading role. Through the formation of the chain connection relationship between the internal and external links of the innovation chain, the innovation needs are further met, and multiple innovation entities divide labor and cooperate to form a process of innovation value-added.

Some scholars have conducted preliminary explorations on the models and structures of the innovation chain of leading enterprises based on specific case analyses. Scholars such as Yang Zhong[12] summarized the characteristics of the innovation chain of leading enterprises in different situations from the perspectives of the structure and operation of the innovation chain, and refined four models of the innovation chain of leading enterprises, namely: the "symbiotic open type", the "linear open type", the "symbiotic aggregative type", and the "linear aggregative type". Xu Sen and Sun Jiayi [13] used the qualitative meta-analysis method to construct a "4×4" classification of innovation chain models, dividing 30 Chinese leading enterprises into three grades with a total of 12 innovation chain models. Scholars Shao Jiyou and Sheng Zhiyun [14] conducted a case study on the operation of Huawei's innovation chain and found that the construction of Huawei's innovation chain presented a nested structure. Some other scholars have found that under the operation mechanism of the innovation chain of state-owned leading enterprises, there are relationships of conflict, dislocation, consistency, and complementarity between institutional logics, which affect the core attributes of the innovation chain[7].

2.2 The government guides the collaborative innovation of the leading enterprise innovation chain

When the government intervenes in the innovation activities within the innovation chain in different ways, its mechanisms of action and effects also differ accordingly. Therefore, the influence of government behavior on innovation activities has always been at the center of research by scholars both at home and abroad. Currently, scholars mainly hold the view that the government's role in the innovation chain of leading enterprises is shifting from a "dominant" one to a "guiding" and "connecting" one, and is transitioning from being institution-driven to market-driven [6]. Scholars like Song Jian et al. believe that tax preference policies can significantly enhance the innovation capabilities at all links of an enterprise's innovation chain, and the government should be encouraged to further increase the intensity of tax preferences for enterprises [15]. Scholars such as Yang Zhong believe that the central government plays a leading role in the operation of the innovation chain of state-owned leading enterprises [7]. Some studies have pointed out that the government's formulation of innovation policies, as well as its support and participation, play an important facilitating role in the innovation input, innovation output, and transformation of technological achievements within the innovation chain [16-17]. Most of these studies contend that there are inherent flaws in the market mechanism, necessitating the government's participation in innovation activities to make up for the market's failure in allocating innovation resources. Hong et al. [18] and Greco et al. [19] have pointed out that the government's presiding over and participating in the research and development of basic knowledge and common technologies creates a favorable knowledge environment for enterprises to carry out commercial and practical research and development activities, which is conducive to the formation of the innovation chain. Throughout the process of the government guiding the collaborative innovation of the innovation chain of leading enterprises, the government should assume the role of an "architect", leveraging the "pioneer" demonstration effect of leading enterprises to drive other enterprises to generate a "following effect", thereby promoting the collaborative innovation of the entire innovation chain of leading enterprises [20].

In conclusion, scholars have currently conducted exploratory research on theories such as the construction of the innovation chain of leading enterprises and the collaborative innovation of the innovation chain of leading enterprises guided by the government, laying a solid theoretical foundation for this study. However, there are still the following aspects that require further exploration: Firstly, there is a lack of dimensional analysis of government behavior. Most existing studies start from a macro perspective, exploring the relationships and behaviors among various independent participants within a large system,

without attempting to distinguish the government from other entities, thus failing to clarify the specific role played by the government. Secondly, as the dominant force in the innovation chain of leading enterprises, the "black box" of how leading enterprises organize the collaborative innovation among the innovation entities from industry, academia, research institutions, and users has not been opened yet. Although scholars have conducted relevant research on the collaborative innovation among industry, academia, and research institutions, there is still a lack of analysis of the construction path of the innovation chain of leading enterprises.

3.The path mechanism and influence effect of government behavior on the construction of innovation chain of leading enterprises

3.1 Construction of leading enterprise innovation chain

The innovation chain of leading enterprises is a whole-chain, multi-subject, and multi-link collaborative innovation system constructed by leading enterprises in the process of promoting technological research and development, achievement transformation, and industrial application, spanning from basic research to industrialization and commercialization. Its core is to organically integrate innovation elements such as knowledge, technology, capital, and talent, forming an innovation activity process from original innovation to industrial application, so as to achieve technological breakthroughs, product iterations, and industrial upgrades. This paper argues that the innovation chain of leading enterprises has a structure formed by the chain connection relationship between internal and external links. It is manifested in that the leading enterprise, as a whole, is the leader of the entire macro innovation chain. At the same time, the leading enterprise has built a relatively independent and complete micro innovation chain internally. The multi-level participants in the internal system, following the logic of specialized division of labor, dominate the innovation activities at each link of the innovation chain. In the basic research stage, it is mainly the BOE Laboratory that participates, conducting basic research and development of semiconductor display technology, providing the theoretical knowledge required for technological innovation, investing in applied basic research, and assisting downstream departments in technological development; the product research and development center interfaces with the laboratory, absorbs the results of basic research and development, and transforms them into product technologies; in the stages of technological development and industrialization, the product trial production department completes the product trial production to realize new products or services, and the marketing department provides product marketing services. In the external links, the leading enterprise, through constructing a supply-demand coordination and matching system for internal and external technological innovation resources, establishes a resource adaptation mechanism according to the characteristics of task requirements during the process of internal subjects dominating innovation activities at each stage, systematically screens external subjects with special resource endowments to integrate into the innovation network, and forms a task-oriented collaborative innovation model. External participants show significant characteristics of phased embedding in the innovation chain on the entire macro innovation chain. Specifically, in the links of basic research and applied research, academic organizations represented by universities and scientific research institutions achieve innovation collaboration through forms such as establishing joint laboratories with the BOE Research and Development Center and setting up scientific research strategic alliances, so as to achieve complementary innovation capabilities and innovation demands. Judging from the distribution law of the innovation chain, academic organizations are more deeply embedded in the basic research link, while industrial subjects such as customers (demand-oriented relationship), suppliers (production complementary relationship), and competitors (competitive cooperation relationship) are mainly concentrated in the stages of technological development and industrialization. This subject embedding model based on the differentiation of innovation links not only ensures that each innovation subject can focus its capabilities in its advantageous fields but also promotes the continuous leap of technological innovation in the BOE innovation chain through the effective integration of specialized resource endowments.

As a leading enterprise in the semiconductor display industry, the successful construction of BOE's innovation chain is inseparable from the support of the government's strategic planning and effective measures. Specifically, the Hefei Municipal Government has clarified the direction for the overall development of the semiconductor display industry through top-level design and promoted the organic combination and interaction between the knowledge innovation system and the economic

system with the help of a series of innovation policies and strategic plans.

Optimizing the orientation of strategic planning, innovation resources, and the innovation institutional environment is not only an inevitable requirement for improving the overall effectiveness of the national innovation system but also the main working line for the government to implement the innovation-driven development strategy in the coming period. In the process of driving the formation of BOE's innovation chain, the Hefei Municipal Government has not only carried out in-depth strategic planning and effective innovation guidance but also paid special attention to the possible problem of insufficient resources in the innovation chain. To this end, the government has taken a variety of measures to enhance the capabilities of the innovation chain, including but not limited to the injection of human resources, scientific and technological resources, and financial resources. These measures have greatly enriched and improved the various resources required by the innovation chain. In addition, in order to create a more favorable development environment for BOE's innovation chain, the Hefei Municipal Government has actively committed to creating a fair competitive market environment, broadening financing channels, and continuously optimizing the business environment, thus providing a more complete institutional guarantee. Such a series of actions have effectively supported the growth and development of BOE's innovation chain. Therefore, this paper argues that government behavior promotes the construction of the innovation chain of leading enterprises through strategic guidance empowerment, innovation resource empowerment, and institutional environment empowerment.

3.1.1 Strategic guidance empowerment:

The government conducts strategic planning and innovation guidance for the innovation chain of leading enterprises. According to the local market environment, the government precisely provides innovation guidance for the innovation chain of leading enterprises through relevant strategic planning. Leading enterprises should actively comply with the guidance of national industrial policies and play a leading role in the entire industry. In the case, Hefei's home appliance industry has long occupied a leading position in the country, gathering many related enterprises and accumulating rich technologies, resources, and market shares. However, restricted by factors such as relatively backward production technology, especially the shortage of screen supply, the further development of the home appliance industry has been restricted. The development path of the traditional home appliance industry is not sufficient to support Hefei's long-term development, and it is necessary to implement an innovation-driven development strategy. In response to this situation, the Hefei Municipal Government has introduced a series of policy measures aimed at strongly supporting the breakthrough and upgrading of new display industry technologies and actively attracting related enterprises to settle in, so as to promote the overall prosperity and development of the home appliance industry. For example, "in terms of industrial development, the Hefei Municipal Government is clearly aware that the development path of the traditional home appliance industry is not sufficient to support Hefei's long-term development, and it is necessary to implement an innovation-driven development strategy to develop the strategic emerging industry - the new display industry." Therefore, based on the above analysis, the government's active strategic planning and innovation guidance for the industry where leading enterprises are located helps to accelerate the development of the innovation chain of leading enterprises. Thus, this study believes that the government's strategic guidance empowerment, that is, strategic planning and innovation guidance, is a prerequisite for the construction of the innovation chain of leading enterprises.

3.1.2 Innovation resource empowerment:

It refers to the behaviors of providing human resources, scientific and technological resources, financial resources, etc. through direct or indirect means. Existing research has shown that the government's scientific and technological innovation policies are an important guarantee for the rational allocation of innovation resources and the improvement of enterprise innovation performance [21]. Hefei is one of the four major science and education bases in the country and has unique element advantages such as science and technology and talent. For example, the University of Science and Technology of China and BOE jointly established a joint laboratory to train high-end talents in fields such as display technology and materials science in a targeted manner. Moreover, the government has introduced a number of talent introduction policies, trained high-end technical talents, and guided enterprises to connect with universities to jointly train professionals with relevant majors. The government has also actively mobilized scientific and technological resources, including introducing advanced technologies, supporting key technological breakthroughs, and promoting the transformation of scientific and technological achievements.

On the basis of gathering scientific and technological resources, Hefei continues to promote the transformation of scientific and technological innovation achievements into real productive forces, and the "big scientific and technological achievement transformation model" has been selected as a national typical case. The Hefei Municipal Government has increased the investment in financial resources through policy measures such as financial subsidies and tax preferences, thereby stimulating the innovation vitality of leading enterprises. These investments not only provide the necessary financial support for the construction of the innovation chain of leading enterprises but also reduce the research and development costs of enterprises, making enterprises more willing and capable of carrying out research and development innovation activities. The Hefei Municipal Government has guided and encouraged BOE to increase innovation investment through a series of policy measures, such as setting up research and development innovation funds and providing research and development innovation tax preferences. These policy measures not only improve the self-research and development innovation capabilities of leading enterprises but also promote the construction of the innovation chain of leading enterprises. Research and development innovation investment enables enterprises to introduce advanced technologies, equipment, and talents, carry out research and development and innovation of cutting-edge technologies, and thus promote technological breakthroughs and upgrades in the industry. This is particularly important for leading enterprises because they need to maintain technological leadership and market competitiveness. Based on the above case analysis, the government's active provision of human resources, scientific and technological resources, and financial resources can provide various innovation resources for the innovation chain of leading enterprises, facilitate the smooth progress of innovation activities, and thus completely construct the innovation chain of leading enterprises. Therefore, this study believes that the government's innovation resource empowerment, that is, providing human resources, scientific and technological resources, and financial resources, is a necessary condition for the construction of the innovation chain of leading enterprises.

3.1.3 Institutional environment empowerment:

The government improves the market economic system, creates a more fair and open market environment for enterprises, broadens financing channels, and optimizes the business environment, attracting more innovation subjects to join the innovation chain of leading enterprises and providing the empowerment behavior of the institutional environment required for the construction of the innovation chain of leading enterprises. A good innovation market environment is an important guarantee for promoting the cultivation and development of scientific and technological talents, the germination and expansion of innovation subjects, the implementation and transformation of innovation achievements, and the deep integration of the innovation chain and the industrial chain and the feedback to scientific and technological innovation [22]. Optimizing the institutional environment of the innovation chain of leading enterprises and endowing it with a good innovation environment can effectively promote the construction of the innovation chain of leading enterprises. The Hefei Municipal Government can effectively provide the required institutional environment for the innovation chain of leading enterprises by broadening financing channels, increasing financing methods, and creating a good business environment. For example, "the Hefei Municipal Government has created a new model of government investment and investment attraction, explored and adhered to a new path that conforms to its own development positioning. It has directly invested in strategic emerging industries that conform to the industrial development direction and national policy orientation by adopting models such as equity investment and follow-up investment, giving full play to the leverage role of state-owned capital, leveraging social capital to follow the investment, and forming an investment attraction model of investment driving attraction and state-owned capital leading the investment." Based on the above case analysis, the government's provision of a good market environment, broadening of financing channels, and optimization of the business environment for leading enterprises are conducive to the construction of the innovation chain of leading enterprises. Therefore, this study believes that the government's institutional environment empowerment, that is, creating a fair competitive market environment, broadening financing channels, and optimizing the business environment, is an important guarantee for the construction of the innovation chain of leading enterprises.

3.2 The path mechanism of government behavior on the construction of innovation chain of leading enterprises

The above analysis shows that government behavior plays a promoting role in the construction of the innovation chain of leading enterprises. To clarify how government behavior promotes the construction of the innovation chain of leading enterprises, based on an in-depth analysis of case materials and combined with relevant literatures on government behavior and the innovation chain of leading enterprises, this paper analyzes the path mechanism by which government behavior promotes the construction of the innovation chain of leading enterprises. The following are its construction mechanism and specific practical paths:

Government behavior helps to promote relevant government personnel to play the function of the chain leader. Through policy innovation and institutional design, the Hefei Municipal Government identifies the orientation of strategic goals, actively explores and deepens the "chain leader system" of the industrial chain, promotes the deep integration of the industrial chain and the innovation chain through systematic reforms, and has formed the "Hefei Model" with a national demonstration effect. The core of the chain leader system in Hefei lies in the model of "government guidance + market-oriented operation". To promote the construction of the innovation chain of leading enterprises, Hefei City has explored the "chain leader" system of the industrial chain, and designed a series of institutional plans with the goals of strengthening, supplementing, consolidating, and extending the chain. Moreover, the chain leader is not only the leader of the industrial chain but also the leader of the innovation chain. Due to the complex process of the formation of the innovation chain, the innovation chain of leading enterprises requires the main leaders of the Hefei Municipal Government to play the function of the chain leader. The chain leader guides the construction of the innovation chain of leading enterprises. As the leader of the innovation chain of leading enterprises, the main leaders of the Hefei Municipal Government, as the chain leaders of the innovation chain, should cooperate closely with the main enterprises of the innovation chain, that is, the leading enterprises, divide the work reasonably, jointly improve the overall efficiency of the innovation chain of leading enterprises, and maximize the jointly created value. Focusing on BOE's core business, the Hefei Municipal Government plays its function as the chain leader, introduces upstream and downstream enterprises through "chain-based investment attraction", forms an industrial cluster, and further promotes the formation of BOE's innovation chain. For example, after introducing BOE, the Hefei Municipal Government attracted enterprises such as Corning and the Rainbow Group, as well as key material suppliers such as Jiangfeng Electronics, forming an all-industry innovation chain ecosystem covering "chips, screens, and terminals". This model enables BOE to obtain local supporting support, shortens the supply chain cost, and accelerates technological collaborative innovation. Therefore, this study believes that playing the function of the chain leader plays a mediating role between government behavior and the construction of the innovation chain of leading enterprises.

Government policies are an important driving force for promoting industry-university-research cooperation [23]. Through policy design, resource supply, and institutional innovation, government behavior systematically promotes leading enterprises to carry out joint project cooperation with universities, scientific research institutions, and enterprises on the chain, forms a closed loop of the innovation chain of "basic research - applied research - technological development - industrialization", and further promotes the construction and development of the innovation chain of leading enterprises. Industry-university joint project cooperation enables enterprises to share the latest technological achievements and R&D experience, thus promoting technological exchanges and cooperation. Such exchanges and cooperation help leading enterprises obtain more innovation resources and technical support and promote the formation and development of their innovation chains. Existing research has shown that jointly building industry-university consortia and increasing the openness of industry-university cooperation can effectively improve enterprise innovation performance[24-25]. And industry-university joint project cooperation enables enterprises and universities/scientific research institutions to jointly carry out R&D and innovation activities and achieve collaborative innovation. This collaborative innovation helps leading enterprises break through technical bottlenecks and enhance their independent innovation capabilities, thus promoting the efficient operation of the innovation chain of leading enterprises. Therefore, this study believes that industry-university joint project cooperation plays a mediating role between government behavior and the construction of the innovation chain of leading enterprises.

The digital innovation platform refers to a new type of platform that uses digital technology to integrate innovation resources, provide innovation services, and promote exchanges and cooperation among innovation subjects. By setting up special funds

for digital innovation platforms, optimizing the innovation environment, etc., the government guides and encourages leading enterprises and other innovation subjects to jointly build digital innovation platforms, improves the innovation capabilities and service levels of the platforms, and promotes the digital transformation of enterprises. At the same time, the government also provides all-round support and guarantees for the construction of digital innovation platforms by independently building digital cooperation platforms and providing technical support. The digital innovation platform, by integrating innovation resources, including talents, technologies, funds, information, etc., provides leading enterprises with rich innovation elements. These elements are the foundation for the construction of the innovation chain of leading enterprises and help leading enterprises carry out activities such as R&D of cutting-edge technologies, product innovation, and market expansion. The digital innovation platform promotes mutual benefit and win-win results between leading enterprises and other innovation subjects by constructing an open, shared, and collaborative innovation ecosystem. The government has introduced a number of talent policies, introduced core technical talents in the new display industry, and built a digital exchange and cooperation platform to guide enterprises to cooperate with universities to train professionals with relevant majors. The Hefei Municipal Government has promulgated policies to actively promote the construction of major experimental infrastructure and build a basic R&D platform for digital technology to ensure that leading enterprises can form close cooperative relationships with other enterprises, universities, scientific research institutions, etc., and jointly promote the construction and development of the innovation chain of leading enterprises. Therefore, this study believes that the construction of the digital innovation platform plays a mediating role between government behavior and the construction of the innovation chain of leading enterprises.

4.Conclusions and implications

4.1 Research conclusions

Based on the existing research and from the perspective of government behavior, through the combination of case studies, the following findings are obtained: (1) The innovation chain of leading enterprises has a structure formed by the chain connection relationship between internal and external links. Manifested as a whole, the leading enterprise is the leader of the entire macro innovation chain. At the same time, the leading enterprise has built a relatively independent and complete micro innovation chain internally. The multi-level participants in the internal system, following the logic of specialized division of labor, dominate the innovation activities at each link of the innovation chain. In the external innovation system, the leading enterprise, by constructing a supply-demand coordination and matching system for internal and external technological innovation resources, establishes a resource adaptation mechanism according to the characteristics of task requirements during the process of internal subjects dominating innovation activities at each stage, systematically screens external subjects with special resource endowments to integrate into the innovation network, and forms a task-oriented collaborative innovation model. External participants show significant characteristics of phased embedding in the innovation chain on the entire macro innovation chain. (2) To achieve industrial upgrading and accelerate the formation of the innovation chain, the government's actions must be strategic, that is, various means considering time and place should be adopted under the conditions of clear goals and principles. Government behavior mainly promotes the construction of the innovation chain of leading enterprises through behaviors such as strategic guidance empowerment, innovation resource empowerment, and institutional environment empowerment. Strategic guidance empowerment is a prerequisite for the formation of the innovation chain of leading enterprises. Innovation resource empowerment can provide resource guarantees for the innovation chain of leading enterprises, and the government's institutional environment empowerment is an important guarantee for the construction of the innovation chain of leading enterprises. (3) Playing the function of the chain leader, industry-university joint project cooperation, and the construction of the digital innovation platform all play a mediating role in the process of government behavior promoting the construction of the innovation chain of leading enterprises. Through the case exploration of the Hefei Municipal Government's promotion of the construction of the innovation chain of leading enterprises, this paper reveals the specific mechanism of the construction of the innovation chain of leading enterprises, enriches the research perspective of the innovation chain of leading enterprises, and can provide a reference for other local governments to realize the transformation of functions, promote the construction of the innovation chain of leading enterprises, and further promote high-quality economic growth.

4.2 Management Inspiration

First, local governments should construct a trinity empowerment system of "strategy-resource-institution" to enhance the empowerment ability of government behavior, precisely support leading enterprises in high-tech industries, and improve the government's strategic guidance ability. They should formulate medium- and long-term strategic plans for local industrial innovation, clarify the goal orientation and the boundaries of rights and responsibilities at each stage of the innovation chain, and strengthen the leveraging role of innovation resources in technological innovation research and development. At the same time, improve the intellectual property protection system and the fault-tolerance mechanism, and establish a market-oriented evaluation system for innovation achievements to ensure the adaptability of the institutional environment.

Second, the innovation chain of leading enterprises should establish a collaborative innovation optimization system to strengthen the internal and external collaborative innovation capabilities. To promote the formation of the chain connection relationship between the internal and external links of the innovation chain, it is recommended to set up a special fund for basic research to enhance the participation of universities and scientific research institutions, implement the "industry-university-research-application" joint project cooperation plan, and promote the precise docking between research entities and industrial needs. The government should play the role of the main enterprise of the chain and establish the responsibility system of the main enterprise of the chain, endow leading enterprises with the right to allocate innovation resources, and construct a digital collaborative innovation platform that includes innovation entities such as scientific research institutions, suppliers, and customers. The government should issue management measures for the innovation of leading enterprises, improve the knowledge sharing and benefit distribution mechanism, and explore a value co-creation model of "risk sharing and benefit sharing".

4.3 Research deficiencies and future prospects

Firstly, the influence mechanism of government behavior on the construction of the innovation chain of leading enterprises in this paper is an exploratory research result. In the future, it is possible to construct an index system to collect relevant data and conduct a quantitative study on the relationship between government behavior and the construction of the innovation chain of leading enterprises. Secondly, the single-case study in this paper has inherent limitations. Although a single-case study can provide in-depth analysis of complex phenomena, and this paper conducts a multi-dimensional analysis based on reliable data on the typical sample of BOE, due to the particularity of the individual case situation, the generalizability of the research conclusions should be further tested. Finally, this study has explored the practice of the successful case where the Hefei Municipal Government has boosted BOE's innovation chain. However, it is undeniable that there are many practices of unsuccessful cases in reality, which leads to limitations in this study in distinguishing between successful and unsuccessful cases. Future research can attempt to select more cases of local governments promoting the construction of the innovation chain of leading enterprises for study, so as to supplement the existing research conclusions.

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