

EXPLORATION OF THE FORMATION PATH OF KEY CORE TECHNOLOGY CAPABILITIES OF HIDDEN CHAMPION MANUFACTURING ENTERPRISES

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ABSTRACT

Against the background of the acceleration of economic globalization and the increasingly fierce competition of manufacturing enterprises, the key for hidden champion enterprises, as manufacturing enterprises that are not well known to the public but can occupy a leading position in a certain industry segment or market, is the importance of core technology in their development. The exploration of the formation path of the key core technological capabilities of hidden champion manufacturing enterprises has reference significance for the development of general manufacturing enterprises in China and promotes the transformation and upgrading of manufacturing enterprises. The survey revealed that the development path of the formation of key core technologies of hidden champion manufacturing enterprises often faces problems such as insufficient policy support, a varied market environment, strong technology dependence, and imperfect enterprise management methods. The formation of the key core technical capabilities of the hidden champion manufacturing enterprise is not accomplished overnight but rather through a process of gradual construction and optimization on the basis of the integration of resources and strategic layout. On the basis of the above problems, the internal paths are explored from the three perspectives of the environment, technology, and management to enrich the theoretical system of the formation of key core technologies. The key core technologies should be gradually created and enhanced, providing a new development perspective for the transformation and upgrading of the hidden champion manufacturing enterprises in fierce market competition.

Keywords: hidden champion; core technology capability; manufacturing enterprise; path exploration

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INTRODUCTION

In recent years, China's economy has been generally stable, the economic structure has been continuously optimized, and the development of manufacturing enterprises has made great achievements. The Eighteenth National Congress of the Communist Party of China noted that China's economy has shifted from a stage of rapid growth to a stage of high-quality development and that China's economic development in the new era must be based on high-quality development. With the acceleration of economic globalization and increasingly fierce competition in the global manufacturing industry, an increasing number of enterprises have begun to seek unique competitive advantages. Among them, hidden champion manufacturing enterprises have become leaders in the manufacturing field because of their high market share and unique technological advantages. These companies have unique and strong competitiveness in their respective market segments, and their success is often inseparable from the support of key core technical capabilities. . The in-depth development of the global market and the rapid iteration of technology have guided enterprises to constantly innovate themselves, and at the same time, they must have sufficient technical capabilities as support. The rapid development of new generation information technologies such as artificial intelligence, big data and the Internet of Things has created a broader development space for manufacturing enterprises. Broadening the path of development and overcoming global challenges drove us to conduct in-depth research and explore how the hidden champion manufacturing enterprises form key core technology capabilities. Exploring the formation path of the key core technologies for the success of hidden champion manufacturing enterprises will help guide the subsequent transformation and upgrading of manufacturing enterprises. The concept of the “hidden champion” was proposed by Professor Herman Simon in 1986. The proposal of this concept has aroused great repercussions in the manufacturing field. Some scholars have conducted research and analysis on the growth mechanism, success factors and identification methods of key core technologies of hidden champion enterprises and produced a series of research results. In his research report, Chengda Liu noted that hidden champion enterprises have unique capabilities in the manufacturing field. These capabilities include product R&D and innovation, technology transformation, market application, etc., in which R&D innovation is the only way to create champion enterprises (Chengda Liu, 2019). In the process of continuously improving the core competitiveness of the hidden champion manufacturing enterprises, the formation of key core technological capabilities often follows certain paths and patterns (Bai et al., 2023). How to form and consolidate key core technologies is still a matter of unclear puzzle; few scholars have systematically collated and analyzed the formation of the key core technological capabilities of the hidden champion manufacturing enterprises. Enterprises constitute the main body of breakthroughs in key core technologies (Yangzhen, 2023). Some existing studies have made breakthroughs in key core

technologies from a multilevel understanding and believe that key core technologies not only point to a specific technology but also constitute a systematic technology system formed around this core technology (Yang, 2023). Moreover, the formation of key core technologies plays a dominant role in the industrial chain, making replacement by other technologies difficult and adversely affecting other technologies in the industrial chain. It has a supporting role (Zhao and Liang, 2024). The mastery of this technology is critical for the development of an enterprise and can help the enterprise stand out in market competition and achieve long-term stable development. In this context, revealing the source of the core competitiveness of hidden champion manufacturing enterprises can provide beneficial help in the exploration of key core technological capabilities. In general, the formation of the key core technological capabilities of hidden champion manufacturing enterprises is a systematic project, which requires enterprises to have a comprehensive layout and continuous promotion of technology, management, and talent. To address the above problems, the present study analyzes the practical experience of enterprises in terms of technological innovation, talent training, organizational optimization, strategic choice, etc., to summarize the growth mechanisms and success factors of hidden champion enterprises and explore the role of hidden champion enterprises in the formation of key core technological capabilities in the development process, providing a beneficial reference for promoting the restructuring and upgrading of manufacturing enterprises and promoting high-quality economic development.

PROBLEMS ENCOUNTERED BY THE HIDDEN CHAMPION ENTERPRISES IN THE DEVELOPMENT OF KEY CORE CAPABILITIES

(1) Insufficient policy support and a varied market environment

On the road to continuous economic development in China, the upgrading of key core technologies of the hidden champion enterprises is a complex and systematic process. From the perspective of policy support, the relevant policies formulated by the government play a vital role in the healthy development of enterprises, supporting and guiding various industries to continue to soar. Currently, a prominent problem we are facing is insufficient policy support. Specifically, there is a clear shortfall in capital investment in some industries or fields, making it difficult for companies in these fields to obtain the necessary nutrients to support their growth, and preferential policies are not obvious enough to prevent companies from receiving enough funding when faced with market competition. The degree of implementation of the policy also needs to be improved, especially the government's protection of intellectual property rights, which prevents some enterprises from truly enjoying the benefits brought by the policy. These problems have weakened the promoting role of the

policy to a certain extent and affected the further development and growth of the enterprise. From the perspective of market environment changes, since Sino-US trade frictions, the international market environment has become more complex and changeable. In particular, the blockade of China's key core technologies has caused China's manufacturing industry to face more problems related to the security of the supply chain and industrial chain. risks and challenges (Shi et al., 2021), and diversity characteristics have become increasingly prominent. On the one hand, this change in the market environment has brought more opportunities to the enterprise; on the other hand, this change has also brought unprecedented challenges to the enterprise, requiring the enterprise to have greater adaptability to cope with market development. constant change. This is undoubtedly a larger test, especially for those smaller companies with fewer resources.

(2) Strong dependence on technological innovation, and the “stuck neck” phenomenon is obvious

Improving the technological innovation path has become an important part of measuring the competitiveness of hidden champion manufacturing enterprises and ensuring the improvement of their key core technological capabilities. In comparison, the hidden champions in Japan always control the R&D of core technology capabilities at home. R&D center teams are mainly internal teams, enabling companies to grasp core technologies firmly (Shi et al., 2021). In contrast, China's hidden champions are pursuing technological innovation. On the road of overreliance on external resources, there is a lack of independent research and development capabilities. This overreliance on external resources makes Chinese enterprises susceptible to the influence of external forces in the face of changes in the international market. From the perspective of the geographic distribution of hidden champion enterprises, the regional distribution of these enterprises in China is relatively scattered. The distribution of hidden champion enterprises in Zhejiang Province is taken as an example. Among the list of 80 hidden champion enterprises announced in 2023, most enterprises are concentrated in cities at the frontier of development in Zhejiang Province, such as Hangzhou and Ningbo, while fewer cities are located in other cities. The technical exchanges between enterprises around the world reduce the possibility of cooperative R&D, which is apt to cause the insufficient tapping of the potential of each enterprise. With respect to the industry distribution of the hidden champions, most companies still focus on traditional manufacturing and have not fully developed technology products in such forward-looking fields as new energy, biomedical treatment, and artificial intelligence, leaving enterprises with a poor reputation in key technologies and core components. It is controlled by others, there are risks in the industrial and supply chains, and the so-called "stuck neck" phenomenon occurs. This phenomenon is tantamount to putting shackles around the necks of enterprises, limiting the possibility of their free development and posing a potential threat to the overall security of China's economy. Therefore, we

must take measures to improve the independent innovation capability of Chinese enterprises, reduce their dependence on external resources, strengthen the ties among Chinese enterprises, fully tap the potential of enterprises, and ensure the independence of Chinese enterprises in key core technologies.

(3) Enterprises encountering bottlenecks in the improvement of their management model

In the process of pursuing high-quality development of the hidden champion enterprises, the continuous optimization of the management model is an important way to enhance the internal efficiency and external competitiveness of the enterprise. However, in the process of pursuing improvements in the management model, China's hidden champion enterprises have encountered development bottlenecks. First, the shortage of talent is a major challenge facing China's hidden champion enterprises. In multiple fields, including technological innovation and enterprise management, a high-quality talent team has a decisive impact on the sustainable development and innovation ability of an enterprise. However, China's current supply of excellent talent cannot meet the needs of enterprises. Research by Peng Yang on the development of hidden champion enterprises in Zhejiang Province revealed that these enterprises face a large gap in innovative talent and high-quality talent in talent training. Given the large gap and the obvious talent siphoning phenomenon (Peng, 2019), the loss of brains undoubtedly severely limits the pace of technological innovation in hidden champions. Second, the imperfect organizational structure is also a key factor affecting the development of China's hidden champion enterprises. The organizational structure of an enterprise is directly related to the efficiency of internal staffing and the rational allocation of resources. If there are deficiencies in the organizational structure, the efficiency of staffing within the enterprise will be affected, thus slowing the pace of development of the enterprise. The organizational structure problems of the hidden champion enterprise are affected by the scale and culture of the enterprise, which is reflected mainly in the insufficient implementation of the development plans at all levels of the enterprise. This leads to poor interaction and the low ability of each department to execute tasks, which causes deviation between the enterprise's development plan and the actual implementation and affects the enterprise's development plan. Resource allocation efficiency. Third, the traditional operation methods also have some restrictions on the development of the hidden champion enterprises, so the optimization of the enterprise's operating model is critical for the open development of the enterprise. In summary, the reasons why China's hidden champion enterprises have difficulty making breakthroughs in key core technologies lie in the obvious talent gap, the neglect of the importance of organizational structure optimization in the achievement of long-term strategic goals, and the role of improving the operating model in promoting the transformation and upgrading of hidden champion enterprises. China's hidden champion enterprises need to further improve the enterprise management

model, improve the efficiency of internal personnel allocation, and prevent the backward management model from becoming a stumbling block in the process of breakthroughs in key core technologies of enterprises.

THE FORMATION PATH OF THE KEY CORE TECHNOLOGY UPGRADING OF THE HIDDEN CHAMPION ENTERPRISES

(1) Strengthening policy support and adapting to changes in the market environment

The environment is an important factor affecting the development of key core technologies of hidden champion enterprises, including changes in national policies and changes in the market environment. From the perspective of adapting to environmental changes, the comprehensive improvement in key core technological capabilities of hidden champion enterprises is inseparable from strong government support and the adaptability of enterprises to market changes. Therefore, this not only requires all regions to actively respond to national policies but also requires enterprises to embrace the concept. The development of key core technologies according to the trends in time and local conditions.

1. Strengthening targeted support from the government

To promote the upgrading of key core technologies of the hidden champion enterprises, the government needs to further strengthen targeted support. First, the key areas of policy support should be clarified, targeted support for strategic, innovative and growth enterprises should be provided, and the connection between the hidden champion enterprises and the upstream and downstream industries should be promoted to form a more complete and efficient industrial chain. Second, fiscal capital investment should be increased, and support for the R&D and innovation activities of the invisible champion enterprises should be increased to provide a solid funding guarantee for the technological innovation of enterprises. At the same time, the government should improve preferential tax policies, strengthen the positive response of local governments to national preferential policies, formulate tax credits with local characteristics, reduce the R&D costs of hidden champion enterprises, stimulate the innovation vitality of enterprises, and help the high-quality development of the regional economy. In the process of targeted support, the government should give full play to its guiding role, improve the business environment for enterprises, rely on the government's credibility to publicize invisible champion enterprises, enhance the commercial value of enterprises in society, and promote the formation of a policy environment that is conducive to the technological innovation of enterprises. Through the establishment of technological innovation funds, the establishment of high-quality industry standards, and the provision of technology transfer and achievement transformation services,

collaborative innovation between hidden champion enterprises and innovation resources such as universities and scientific research institutions is encouraged to form an innovation system that integrates industry, university, and research institutions. In addition, the government should strengthen the intellectual property protection of enterprises to ensure that their innovations can be fully protected and applied. Notably, the incentive effect on enterprises through the improvement of intellectual property protection law is far from sufficient. It is even more necessary to implement laws and regulations so that innovators can truly feel the enthusiasm for innovation brought about by property rights protection. Moreover, the government should pay attention to the negative moderating effect of an excessively high level of intellectual property protection on innovation to prevent protection from hindering the exchange and interaction of information and inhibiting the generation of technological innovation.

2. Clarify market orientation and strategic choice

Hidden champion manufacturing companies often have unique strategic visions and market orientations in market competition. Therefore, market orientation and strategic choice are important factors through which hidden champion companies form key core technological capabilities. They jointly act on the enterprise's technology research and development and market development process, pushing the enterprise to continuously break through the technological bottleneck, forming a unique technological advantage. First, enterprises need to clearly define their market positioning, keenly capture changes in market demand, analyze consumer behavior and market trends, clarify their product positioning, and formulate a forward-looking product R&D strategy. The hidden champion manufacturing enterprises have clear development goals, which are helpful for the formation and improvement of key core technologies. Therefore, seizing market opportunities, understanding industry development trends, competitive patterns and potential advantages, and adjusting business strategies in a timely manner have become major advantages of the hidden champion enterprises in upgrading key core technologies. Only by continuously expanding this advantage can they cope with market changes and improve their performance. Core competitiveness. In addition, the strategic positioning of an enterprise should lie in depth rather than breadth. The smaller the market is, the more able it is to cultivate a hidden champion enterprise (Xin Yu, 2020). When formulating strategic objectives, an enterprise should take into account its actual situation; consider the long-term planning of the enterprise; start with the price, demand, quality, and practicability of the products; clarify market positioning; focus on its own industries; and upgrade product technologies. In addition, quality helps establish a good reputation in this field, forming a brand advantage. At the same time, this strategic goal should be measurable and achievable, matching the enterprise's core competitiveness. In terms of strategic choice, hidden champion manufacturing enterprises usually adopt a differentiation

strategy and form unique technological advantages and brand effects through specialized operations. This type of specialized management is usually a process of dediversification. Therefore, in terms of strategic choice, the enterprise must be able to focus its resources on solving key technical problems and establish a competitive advantage that is difficult to imitate rather than being included in basic competition due to the small market. The enterprise is also constantly consolidating and expanding its technological leadership through continuous R&D investment and innovation capability improvement. This market-oriented strategy not only helps the enterprise determine the direction of technological innovation but also ensures that the R&D resources invested by the enterprise can be turned into core technologies that meet the market demand.

3. Close to customer groups

Understanding customer needs is the key to the success of an enterprise, so we must establish a customer-centric corporate culture. While setting strategic goals, an enterprise also needs to be close to customers and understand their needs, which helps to establish a good corporate image, improve brand awareness and reputation, and thus attract more potential users. The organizational distance between the hidden champion companies and their customers is much shorter than that of the general manufacturing companies. They advocate the corporate culture of “market first, customer second” and regard the close relationship with customers as their greatest advantage (Wenkai Sun, 2023); through independent marketing and listening to customer needs, they establish direct contact with customers. Moreover, it has strengthened employee training to improve the service awareness and innovation ability of employees to achieve efficient communication with customers and to maintain customer relationships in their own hands. has achieved a strong brand advantage in market segments. To address the low frequency of communication between most companies and their customers, companies should be close to their customer groups and provide them with targeted products and services to form an effective mechanism for jointly developing “customized” products with customers and helping improve customer satisfaction. A stable customer group is formed, and the costs and risks of the enterprise in the transaction process are reduced. Moreover, focusing on market demand helps enterprises better fulfill their social responsibilities and creates more value for society. While mastering the key core technologies, the manufacturing enterprise needs to focus on the customer groups, tap its potential customers, establish long-term and stable relationships with customers, explore in-depth product technologies and customer needs, and optimize product and service quality according to the needs to satisfy customers. constantly changing needs, thus improving the profitability of the enterprise.

(2) Technological capabilities and development models of innovative enterprises

The core competitiveness of the hidden champion enterprises lies in their innovation ability. The hidden champions have a clear advantage in market competition, which is derived from the continuous innovation and improvement of the enterprises themselves. Some studies have reported that the product R&D expenditures of hidden champion enterprises are twice those of general manufacturing enterprises. Only by engaging in continuous R&D and innovating products can they maintain their leading position in key core technology areas, which is critical for the development of enterprises. .

1. Strengthening technology R&D and knowledge management

Technological innovation is an important driving force for the formation of the key core technological capabilities of hidden champion manufacturing enterprises. The hidden champion enterprises have a high proportion of technical R&D personnel, who provide technical support for the development of the enterprise and become the solid backing of the enterprise. They focus on in-depth cultivation in segmented fields and, through continuous R&D investment, continuously promote product innovation and process improvement, thus creating unique technological advantages. However, even with the limited fund supply, attention must also be paid to the rational allocation of R&D funds to maximize the use of resources. With the support of internet technology, hidden champion enterprises can more quickly identify changes in consumer needs, adjust the direction of research and development, and ensure that their technological achievements can accurately meet market needs. The emphasis on the practical value of products and the continuous iterative improvement of existing technologies to meet market needs through continuous investment in technology research and development have enabled hidden champions to grasp key core technologies firmly, form competitive advantages that are difficult to imitate, and maintain technological leadership in market segments. Leading position. This is one of the reasons why they can win the trust of customers even though their business scope is narrow. However, in the current Chinese market in various fields, most of the key core technologies are restricted by other countries. Therefore, to gain an advantage in market segments, enterprises need to persist in technological innovation and increase investment in R&D. By summarizing the accumulation of core technologies of enterprises in other countries, we should break through technical barriers and achieve the goal change from a technology “learner” to a technology “leader” to possess “skill in a particular skill”, maintain the market share of the enterprise and play a role in the constant development of technology. In the process of upgrading, we discover and master the key core technologies. Moreover, we also need to focus on the transformation and application of technological innovation outcomes and the rational use of new technologies such as big data and the internet in the product research and development process to ensure that production efficiency and production quality are improved and that technological

innovation can truly be turned into the core competitiveness of enterprises. . Specifically, the role of core technology innovation in the manufacturing industry is reflected in the following aspects: first, improving product performance and quality to meet the increasingly diverse needs of consumers; second, reducing production costs and improving production and operation efficiency; third, promoting industrial upgrading and the development of the manufacturing industry in the intelligence, greening and service-oriented directions; and fourth, enhancing the ability of enterprises to resist risks and maintain stable development in complex and volatile market environments. In addition, knowledge management plays a key role in the process of technological innovation, and effective property rights protection helps to increase innovators' enthusiasm for R&D. Through the establishment of a sound knowledge management system, the hidden champion enterprises create a scientific research atmosphere of excellence within the enterprise and effectively accumulate, integrate and share the knowledge, experience and lessons generated in the research and development process. This not only helps knowledge inheritance and technology accumulation within the enterprise but also promotes cross-departmental and cross-field innovation cooperation through knowledge sharing and accelerates the transformation and application of technological innovation outcomes. In summary, technological innovation and knowledge management are two indispensable aspects for the formation of the key core technological capabilities of the hidden champion manufacturing enterprises. They interact with each other to encourage the enterprise to maintain the leading position in fierce market competition.

2. Adhere to cooperation and open innovation

In the process of exploring the formation and upgrading of the key core technical capabilities of the hidden champion manufacturing enterprises, cooperation and open innovation play critical roles. These enterprises usually focus on establishing close cooperative relationships with upstream and downstream industrial chains, scientific research institutions, and universities to promote both technological innovation and industrial upgrading. Through cooperation with upstream and downstream companies in the industrial chain, hidden champions can more accurately grasp market demand and industrial development trends and adjust product structure and R&D direction in a timely manner. With the steady advancement of the “One Belt, One Road” initiative, enterprises’ development in overseas markets has broad development prospects. This cooperation model also helps companies reduce R&D costs, improves R&D efficiency, and accelerates the commercialization of new technologies. The use of external resources, the establishment of industry-university-research cooperation with universities and scientific research institutions, the creation of an integration model of industry and education, the introduction of external knowledge and technology, and the enhancement of own technological innovation capabilities are also reflections of the key core technical

capabilities of hidden champions. This open innovation model not only helps companies obtain more diversified innovation resources but also reduces innovation risk and improves innovation efficiency through cooperative R&D, providing strong technical support and talent guarantees for hidden champion enterprises. The hidden champion enterprises also focus on exchanges and cooperation with advanced international enterprises, learn from the advanced technology and management experience of foreign enterprises, and accelerate the pace of their own technological upgrading and industrial upgrading. However, compared with foreign hidden champion enterprises, China's hidden champion enterprises have a lower degree of globalization and little brand influence. Faced with this problem, Chinese champion enterprises should standardize their advanced technologies in the international market and, through cooperation with other enterprises, be able to acquire the latest scientific research results and technical information and use their talent advantages to overcome key technical problems jointly, develop into the global market, compensate for current technological deficiencies, achieve scale development in market segments, reduce development costs and enhance the core of enterprise competitiveness.

3. Focus on professional management

Dedication and professionalism are two synonymous with hidden champion enterprises. They are limited to cooperating with some fixed clients. Although they are not well known to the public, this has become the core strategy of the hidden champions. In the wave of diversified development, the hidden champions adhere to professional management philosophy and focus on the core area of a certain market segment, commit to R&D and innovation, focus on R&D, defeating competitors, making products and services increasingly larger and stronger, developing their own comparative advantage, and striving to stand out from competition. This management philosophy is also key for the success of the hidden champions. Even though there are certain risks in this "all or nothing" business model, under the guidance of focused and professional experience, they have an in-depth understanding of market needs, provide highly specialized solutions, enhance the level of core technologies, and grasp key issues. to acquire a monopoly position in a certain market segment through the acquisition of core technological capabilities. Therefore, manufacturing enterprises, when faced with the contradictory choice of whether to seek diversified development, can weigh the different interests brought by diversification and specialization according to their own business philosophy and strategic objectives and choose the appropriate development path. It becomes increasingly larger. At the same time, enterprises should actively explore core technologies and strengthen their core competitiveness to adapt to constant changes in the market and achieve the harmonious unity of diversification and specialization to remain invincible in fierce market competition.

(3) Improving the enterprise's management model

For the development of the hidden champion enterprise, improving the enterprise management model is also critical. While emphasizing the building of a talent team and the optimization of the organizational structure, we should also focus on improving the enterprise's optimized operation model to achieve long-term development.

1. Adhering to the building of the talent team and the optimization of the organizational structure

In hidden champion manufacturing enterprises, the construction of a talent team is the cornerstone of ensuring the maintenance and promotion of key core technical capabilities. An efficient, professional and innovative team can not only quickly capture market changes but also provide strong support for the enterprise's technological innovation and product R&D through technology R&D and the transformation of results, pushing the enterprise to maintain its leading position in the competition. Selecting talent with innovative thinking and practical ability and providing training and development opportunities for employees can help teams research and develop key core technologies to keep pace with the development of the industry. Corporate culture is the spiritual pillar of an enterprise and the values and codes of conduct that all employees abide by. In corporate management, stable personnel are highly important for the inheritance of corporate culture and spirit. If an enterprise wants to develop stably in the long term, the first thing it needs to have is team cohesion. The hidden champion enterprises pay attention to the construction of the talent team, encourage employees to participate in professional skills training, and provide them with diversified career development opportunities to expand the horizon of employees, stimulate the potential of employees, and realize the transformation from objective theoretical knowledge to practical application, which provides benefits to the enterprise. Contributing to long-term development. The management of the enterprise should improve the enterprise management model, adopt a construction model that combines talent training and talent introduction in the process of talent team building, optimize staff allocation, pay attention to talent training and team building, and create a model for the "introduction" and "introduction" of talent. The "lead out" channel (Wang, 2022), to stimulate employees' enthusiasm for work, establish appropriate incentive mechanisms, establish open and transparent communication channels, allow employees to freely share their thoughts and suggestions, strengthen teamwork ability, and cultivate positive corporate innovation, China should create a good innovation atmosphere and improve innovation efficiency (Li et al., 2015). Accordingly, the optimization of organizational structure also has a significant effect on the formation of key core technical capabilities. A flat organizational structure can shorten the decision-making path, which is beneficial for enterprises to respond more flexibly when encountering crises. In the face of a complex and changeable industry situation, a flexible and flat organizational structure can speed up information

flow and decision-making efficiency and is conducive to the rapid incubation of new technologies and new ideas (Chen, 2024). Through cross-departmental and cross-field collaboration mechanisms, knowledge sharing and complementarity among talent with different professional backgrounds can be promoted, further stimulating the vitality of innovation. Therefore, manufacturing enterprises should pay attention to the construction of talent teams and the continuous optimization of organizational structure in their internal management to adapt to the constantly changing market environment and technology trends.

2. Optimize the enterprise's operating model

In the development process of an enterprise, product quality and corporate reputation undoubtedly play decisive roles. An efficient operation model can make the enterprise more resilient and adaptable. The hidden champions focus on a particular segment, but they are not rigid in their thinking. Even though long-term focus on a particular field is likely to saturate the domestic market and affect the development of enterprises, the hidden champions actively conform to the development trend of the times and carry out reform and innovation in their operation models to reduce the operational risks encountered in the process of the digital transformation of enterprises. Therefore, in the era of globalization and the surge of wave of globalization, enterprises should firmly grasp the era dividend brought by the internet, have the courage to innovate their operating strategies, and actively embrace the global market. Building a stable supply chain network, seeking extensive customer resources, and constantly expanding the boundaries of the international market are the only ways for enterprises to adapt to the changing market environment, develop core technologies, and provide excellent products and services. Through the optimization of the enterprise's operation mode, the achievement and development of the enterprise can be effectively promoted.

CONCLUSIONS AND PROSPECTS

In summary, through an analysis of the problems and influencing factors encountered in the upgrading of key core technologies of hidden champion manufacturing enterprises, the intrinsic causes of the formation of key core technology capabilities of hidden champion manufacturing enterprises are explored from the three directions of the environment, technology and management. Path: Give play to the stimulating role of government support for enterprise innovation, enhance the adaptability of the enterprise itself to changes in the market environment, strengthen the supporting role of enterprise technological innovation and knowledge management in the transformation of innovation outcomes into actual productivity, and adhere to cooperation and open innovation to broaden acquisitions for enterprises. We provide channels for technical resources and market information and focus on professional operation to pave the way for the future development of the enterprise; through adhering



to the construction of the talent team, the optimization of the organizational structure and the optimization of the operation model, the internal management model of the enterprise is improved to create a more favorable environment for the development of key core technologies. A good internal environment. These aspects are intertwined and together constitute the complex path for the formation of the key core technological capabilities of the hidden champion manufacturing enterprises. Reviewing the existing research results, the present study still has certain limitations in the study of key core technology promotion: starting from the theoretical level only, focusing on qualitative analysis, and the conclusions lack relevant data support; the successful cases of relevant hidden champions are not incorporated. We conducted in-depth research and analysis, and the conclusions were too general and failed to reflect the characteristics of the hidden champion enterprises in the upgrading of key core technologies. In the future, the depth and breadth of technological innovation will continue to expand, interdisciplinary and cross-field integration research will become a new hot topic, and sustainable development and green development will also become key research directions. Future research can start from actual data on the above development trends, use empirical research methods to improve research methods, and combine quantitative analysis to reveal the complexity and dynamics of the formation path of key core technologies in an all-round way and in a wide range of fields, with a focus on green technologies. R&D and the application of low-carbon technologies promote the development of the manufacturing industry in a green, low-carbon and circular direction.

REFERENCES

- [1] Liu Chengda. Research on the impact of R&D investment on enterprise performance of manufacturing single-champion enterprises--Heterogeneous threshold effect based on enterprise size[J]. Research and Development Management,2019,31(01):33-43.
- [2] Shi Dongmei, Liu Nano Long, Zhen Zijian. Market and technological innovation experience of Japan's stealth champion enterprises and the inspiration for China[J]. Technology and Management,2021,23(03):17-25.
- [3] Peng Yang. Research on the development of hidden champion enterprises in Zhejiang Province[J]. Value Engineering,2019,38(08):59-61.
- [4] Yang Z. Key core technology: multi-level understanding and its breakthrough[J]. Innovative Science and Technology,2023,23(01):14-24.
- [5] SUN Wenkai,ZHANG Wenkai. Development experience and inspiration of hidden champions[J]. China Market Regulation Research,2023,(01):76-80.
- [6] ZHAO Jian,LIANG Shuang. Research Progress of Key Core Technology Identification Methods[J]. Journal of Intelligence,2024,43(04):68-77.
- [7] BAI Quan Quan,ZHANG Ruying,WANG Dongxu,et al. Research on the Evaluation of Enterprise Core Technology Innovation Capability Based on Rooting Theory[J]. Innovation Technology,2023,23(04):61-71.
- [8] CHEN MUN Xuan. Research on the path and effect of enterprise digital transformation to realize value creation[D]. Inner Mongolia University of Finance and Economics,2024.
- [9] Wang Guanghai. Research on the Implementation Path of SMEs' Innovation Capacity Improvement in Yunfu City by Science and Technology Service[J]. Journal of Guangzhou City Vocational College,2022,16(03):79-83.
- [10] LI Lianshui, ZHANG Qianqian, WANG Changkai. Research on driving factors of scientific and technological innovation capacity of Chinese manufacturing industry[J]. Research Management,2015,36(10):169-176.
- [11] Yu Xin. The business approach of “invisible champions”[J]. Leadership Science,2020,(06):94-96.