Research on Joint Development Strategy of High-tech Enterprise

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Abstract: In the context of the rapid development of technology in China, high-tech listed enterprises companies have become an important research object. Based on the existing research on the joint development of high-tech enterprises by scholars at home and abroad, this paper explores a series of problems faced by domestic high-tech enterprises and listed companies in the development of joint development, such as difficult of synchronization of thinking and understanding, unified management, distribution of patents, and easy leakage of secret technology, and gives corresponding countermeasures for the four main problems encountered in joint development. This paper uses literature research method, case study method and comparative analysis method to study and draw a conclusion on the influence of joint development of listed high-tech enterprises. The results show that: First, joint development can significantly enhance the innovation willingness of high-tech enterprises; Second, joint development has a positive effect on enterprises' breakthrough and innovation; Third, joint development sometimes hampers innovation in high-tech companies.

Key words: high-tech enterprises; Enterprise innovation; Joint development; Enterprise cooperation

Introduction

In today's economic globalization, high-tech enterprises have formed alliances and cooperation to carry out joint development because of the need of competition. With the continuous development of technological research, the depth of knowledge in various fields are increasing, the research and development of new technologies are becoming more and more complex, and the characteristics of cross-sectoral are more obvious, so the complementarity between various technical disciplines and fields is becoming important. In this context, it's hard for ordinary enterprises in high-tech industries to achieve all innovation goals by relying on their capital resources, human resources, production knowledge and production capacity. The implementation of joint development aims to achieve complementary technological resources, reduce the development risks and investment costs of individual enterprises, so as to be in a favorable position in competition. The success of joint development of high-tech enterprises lies in their integration of higher resource utilization efficiency, more sophisticated instruments and mature technology through new business models and new strategies, which helps enterprises participating in joint development to take the lead in the market. With the deepening of reform and opening, especially the approaching of China's accession to the WTO, China's economy will be integrated into the world economic tide, which will certainly throw Chinese enterprises into more intense competition. In this context, the joint development of enterprises, as an effective way of competition, is showing a new development trend in our country, and this kind of alliance will become a trend, if enterprises want to survive better or go further, joint development is a good choice.

However, the process of joint development is not as smooth as imagined, and some of the results of joint development are not in line with expectations. In fact, the joint development of high-tech enterprises in China is still in the stage of development, not perfect, but there are many problems. In order to help China's high-tech enterprises to carry out joint development more smoothly and inject energy into scientific and technological research, this paper will explore and sort out these possible problems and give corresponding strategies for these problems.

1. Literature Review

Joint development refers to the partnership formed by enterprises, research institutes, universities, industry foundations, governments, and other organizations in order to overcome the high investment and uncertainty in R & D, avoid risks, shorten the R & D cycle of products, cope with the threat of emergencies and save transaction costs. It aims at cooperative innovation and is based on the common interests of its members. On the premise of complementary superior resources, R & D organizations are voluntarily formed through joint action under the constraints of contracts or invisible contracts. After the formation of the organization, it has clear cooperation objectives and cooperation deadlines, and jointly abides by the rules of cooperative behavior, results distribution and risk-taking stipulated in the contract. There are various forms of joint development, such as cooperation in the form of capital, talent and achievements, cooperation in the form of capital equity, cooperation among technology suppliers, technology intermediaries and technology demanders, etc.

Liu Xiaoyan and Pang Yaru (2023) explored how joint development is more conducive to technology integration by taking AI multi-layer patent network as an example and concluded that technology heterogeneity and innovation heterogeneity are conducive to technology

integration under the joint development mode. Yang Zhen and Wang Wenna (2023) examined the impact of joint development on innovation performance based on the World Bank's micro survey database of Chinese manufacturing enterprises. Heterogeneity analysis shows that joint development can promote the innovation performance of small and medium-sized enterprises, enterprises with low market development and non-export enterprises. Enterprises participating in joint development can improve their capabilities in all aspects to a certain extent, obtain resources in this process, and form local experience, knowledge, and technology.

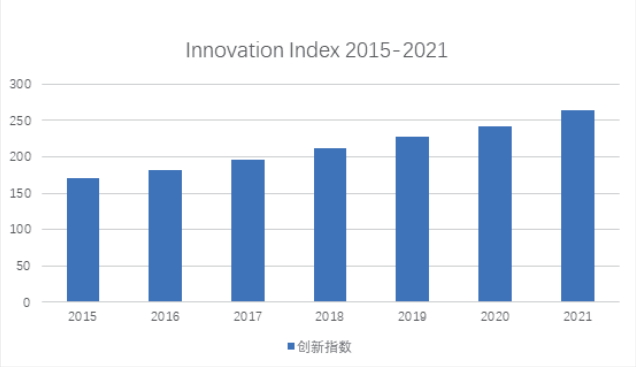
After consulting the relevant data at home and abroad, it is found that such alliances are not always beneficial, and in some cases, such as improper leadership, enterprise conflicts and so on, they will also hinder the development of innovation. Many scholars in China believe that "how to do" is the top priority of joint development of high-tech enterprises. According to the current situation of China's market, Huang Zuocai (2023) suggested that high-tech enterprises must establish a mechanism for joint development and sharing of science and technology and gave four specific countermeasures. Wang Xin (2023) and others focus on how high-tech enterprises establish links and interactions with cooperative enterprises in the field of R & D under the double-cycle development pattern. Lu Zhiping (2023) and others studied the R & D investment decision of battery cooperation in the supply chain of new energy vehicles and proposed that both sides of the joint development need to pay more attention to sales and make common concessions to profits in the development process.

The joint development of high-tech enterprises has become one of the most important development paths in the world today, and it has an irreplaceable position. By sorting out the relevant literature at home and abroad, it is found that most scholars have affirmed the achievements brought by joint development to enterprises and the impact on innovation progress and have high expectations for the future development of high-tech enterprises. Listed companies in China, especially those listed on the Science and Technology Innovation Board, should take advantage of the convenience brought by joint development, seize the opportunity of cooperative development, and promote the rapid development of enterprises on the road of innovation.

2. Current situation of joint development

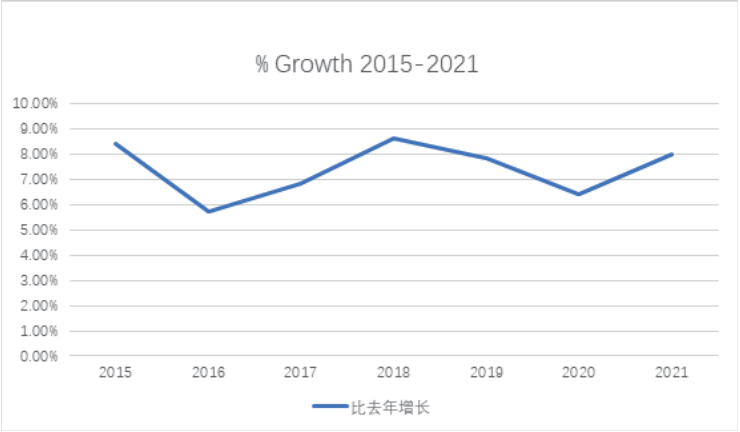
Joint development is a strategic orientation for high-tech enterprises to jointly participate in market competition with their partners to achieve their respective strategic objectives. This strategic situation can enable them to cooperate with each other, complement each other's advantages, and solve many problems arising from insufficient resources and capabilities. Joint development first appeared in the automotive industry. China's 2004 edition of the Development Policy of the Automobile Industry points out that joint development and commissioned development are regarded as part of independent development. At the same time, independent development will enjoy preferential policies. Later, joint development appeared in the real estate industry with the highest frequency, and all kinds of residential areas were crowned with the name of joint development. Recently, with the rapid development of science and technology in China, the unpredictable market has higher and higher requirements for high-tech enterprises, many enterprises cannot afford the cost of research, so all kinds of high-tech enterprises have begun to seek opportunities to cooperate with other enterprises for joint development. Joint development has become an inevitable trend in the development of high-tech industries. At present, the leading high-tech enterprises in various industries in China are actively looking for enterprises with the same strength as themselves to carry out joint development, which is authoritative enough to prove that the significance of joint development strategy for enterprises is positive.

Although China's innovation index is rising every year, the Outline of National Innovation-Driven Development Strategy in 2016 points out that China has weak independent innovation capability and weak core competitiveness of enterprises, which requires R & D cooperation among high-tech enterprises to enable innovation and development.



Source: National Bureau of Statistics

Figure 2 Histogram of China's Innovation Index from 2015 to 2021 (Innovation Index in 2005 is 100)



Source: National Bureau of Statistics

Figure 3 China's innovation index growth rate from 2015 to 2021%

The technological progress of high-tech enterprises will drive the progress of various industries and have an important impact on economic development. For example, Unicorn enterprises quickly obtain capital and market recognition through their own advantages, and gain market occupation. Rainbow chain redefines the layout of supply chain and enlivens the whole industry. The reason why we choose to study the joint development of high-tech enterprises is that a country's high-tech enterprises are an important factor affecting whether its economy can develop healthily, and the necessary strategy for high-tech enterprises to develop healthily is joint development. As an economic power, China should pay more attention to the development of science and technology, regard the construction of a powerful country in science and technology as the goal, and use science and technology to further promote economic development.

3. Problems in Joint Development

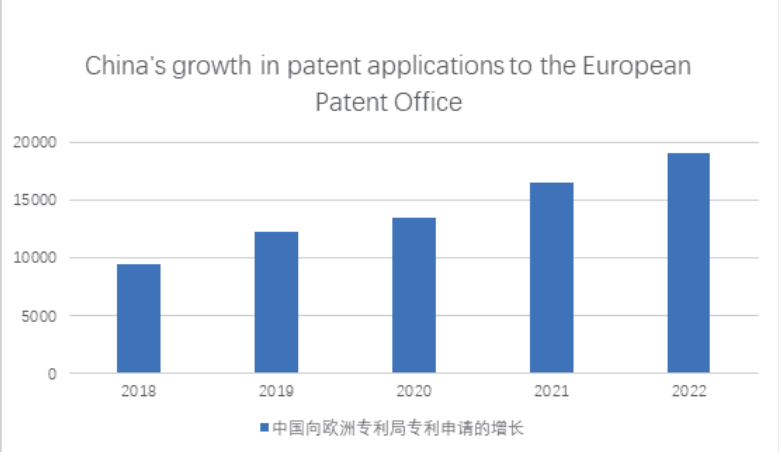
Some leading enterprises in the high-tech industry organize alliances for joint development□use their respective advantages to supplement their disadvantages, and produce products with high performance and efficiency□ which are highly sought after by users. From the external point of view, joint development is easy to cooperate, but in fact, there are still many problems in joint development that enterprises need to worry about, as follows:

First, it is difficult to synchronize ideological understanding. Growing up in different social environments, different companies have different corporate cultures. When some cultures that can't be integrated collide, it will inevitably affect the process of development. For example, Haiguang firm and Anheng firm, although the result is the strong joint release of the safety island privacy computing machine (Ma Liang, 2023), but the process is not smooth, the reason is that there are some differences in views. There will also be differences in management methods and business models among enterprises, and there will be great differences in the control and bearing capacity of market environment and business risks, which will affect the promotion of production and business activities to a certain extent. Li Fei (2018) pointed out that some enterprises are bureaucratic culture, and some enterprises are innovative culture. Liu yuan (2019) believes that Lenovo and Huawei are the most typical examples. Lenovo is a state-owned enterprise founded by the Chinese Academy of Sciences, focusing on business operation, and winning by trade. Huawei is a private enterprise founded by individuals, which attaches great importance to technological innovation and wins by technology. The degree of activity of the two is different, the path of development is different, the depth and width of the problems considered will be different, lack of scientific and effective communication mechanism, it is difficult to achieve cooperation.

Second, unified management is difficult. When the R & D teams of two enterprises carry out joint development, it is inevitable that the two teams need to accept unified management. Although the enterprise has a certain understanding of its own employees, the managers of the enterprise do not know enough about the employees of another company, which leads to the failure to fully consider its feasibility in terms of business philosophy, ideas and decision-making. When the degree of tightness and working hours of employees on both sides are different, some people will have unbalanced psychology, and when the degree is serious, there will be the phenomenon of disobedience or strike.

Third, patents are difficult to allocate. Liang Tianjiao (2022) said that China is a big patent country. According to statistics, from January 2021 to January 2022, China authorized a total of million 484.16, and foreign countries granted a total of million 14.19. China ranks fourth in the European Patent Office with 19041 applications, after Japan (21576), Germany (24684) and the United States (48088). Among

the top 20 countries in the number of patent applications, China has the highest growth rate in the number of patent applications. China is far ahead in the number of patents. Unlike general tangible property, patents cannot be directly allocated according to quantity. When the number of patent output is large, disputes over various patents become a common thing. Different from the patent license contract, in the patent cooperative development contract, both parties pay more attention to the distribution of rights and obligations of "development", but the provisions of rights and obligations after "development" are not detailed enough, which is easy to cause contract loopholes and make the distribution of rights, obligations and interests of both parties unclear. Yuan Man (2016) made an in-depth analysis of joint development based on the ownership of intellectual property rights. Li Jingyi (2016) deeply analyzed the ownership of intellectual property rights in international multi-party joint R & D and the protection of rights and interests in the transfer of property rights and put forward corresponding countermeasures for scientific research institutions and enterprises in China. Part of the patent disputes of joint development have been exposed, and China has a long way to go in patent protection.



Source: PR Newswire

Figure 4 China's growth in patent applications to the European Patent Office

Fourth, secret technology is easy to leak. Common manifestations of technical secrets are design drawings, product process, manufacturing process, raw materials, computer programs, implementation parameters and so on. These manifestations are easy to be stolen or seen, and the relationship between partners is close, and the technical know-how can easily be leaked to partners. Guangzhou Tianci Company and Jiujiang Tianci Company reported that several people of Anhui Newman Company had violated their "Cabo" manufacturing technology secrets. Huamou signed a contract with Guangzhou Tianzhi Company but sent the secret technology in the form of mail many times. Jointly developed enterprises or platforms may become competitors in the future, even if they are partners for the time being. Once the technical secrets are obtained by a third party, competitors will emerge in a short time to directly participate in the competition in the corresponding market, which may directly lead to the elimination of enterprises.

4. Countermeasures and Suggestions

Put forward suggestions for different problems.

First, put forward suggestions in view of the difficulty of ideological understanding. Corporate culture is a kind of enterprise state accumulated in the long-term social development and life development (Li Fei, 2018). In the early stage of joint development, scientific and effective communication is very necessary. Establish a communication mechanism between the two sides to ensure timely communication in place, so that problems can be clearly found. The second step is to solve the problem, the key lies in see the differences and purposes between the two sides. The third step is to find common ground, which is to separate the differences to achieve a common direction. Finally, they agreed on a way to focus on common goals to pursue better results of joint development.

Second, put forward suggestions for the difficulty of unified management. Firstly, choose a good team leader. The higher the leadership quality and the stronger the leadership ability, the more obedient the team will be (Wang Hao, 2023). The second point is that the management personnel should conduct in-depth exchanges to indicate their respective requirements in the cooperative work, set clear objectives and responsibilities, unify all standards, and then clarify the responsibilities of all participants and assign them to each employee, so that each employee can avoid overlapping work and unclear responsibilities. Then they should analyze the personnel structure of the team, check whether the staffing is reasonable, and make timely adjustments to the problematic situation. But the management is not

omnipotent, the core of the team is the staff, in the joint development only rely on the wisdom of the leader is not enough, communication is the bridge of team management (Zhang Di, Wang Yanfang, 2019), so we should also develop a communication feedback system (Chen Xiaoyan, 2019). Improve the sense of participation and belonging of employees, so that they can actively participate in the work and obey the arrangement, and at the same time, they can timely understand the work situation and needs of employees. In addition to assigning tasks and improving enthusiasm, they must avoid contradictions between employees on both sides, so they need to deal with the problem of internal distribution of interests, inform employees in advance of distribution according to work, and make the working hours and results of employees transparent, so as to facilitate supervision and distribution of interests.

Third, put forward suggestions for the difficult distribution of patents. There are two main reasons: on the one hand, because the results of cooperative development are uncertain, there is a risk of unsuccessful research and development, so the parties to the contract will not be too specific about the distribution of benefits of the research results that have not yet been determined; On the other hand, the strong cooperative party intentionally leaves loopholes in the key clauses, and if it encounters disputes, it will use its dominant position to force the contract counterpart to compromise (Liu Xin□2020). For the second situation, it often occurs in the cooperation between enterprise partners with capital advantages and universities or scientific research institutions. The "exclusive use" clause is a seemingly general but very important clause, which may lead to contract risks if it is not treated carefully. Therefore, in order to avoid disputes, when signing the cooperative development contract, both parties should clarify their rights and obligations (He Peiyu, Jiang Qimeng, 2018), especially the ownership and benefit distribution of the cooperative development results, so as to avoid the unhappiness of cooperation caused by the unbalanced distribution of rights and interests (Zhou Yanping, 2021). Especially for such non-standard clauses as "exclusive use", both parties should, in line with the principle of honesty and fairness (Liu Xin, 2020), refrain from using such non-standard clauses as "exclusive use" in the patent cooperative development contract concluded. Although the "exclusive use" clause is only a clause in the cooperative development contract, it will endanger the performance of the whole contract, so both parties to the contract should treat every clause of the contract with caution. In a word, only by jointly developing and sharing the benefits of achievements, can scientifically research cooperation and development maintain vigorous vitality.

Fourthly, some suggestions are put forward for the leakage of secret technology. It is advocated that enterprises should take the distribution of technical secrets as an important part of enterprise knowledge management, and the management of technical secrets should be considered from two aspects in the practice of enterprises. On the one hand, how to effectively build barriers to the protection of technical secrets and reduce the risk of obtaining technical secrets by the partners; On the other hand, it is how to legally use other people's technical secrets in order to avoid inadvertently falling into disputes (Sun Jiquan, 2022). In the process of research and development, we should strictly implement the protection principle of technical secrets: strictly control the scope of knowledge and dissemination channels of technical secrets and apply for patents as soon as possible for the layout of key cards. When technical secrets are leaked, legal weapons should be used to protect themselves. Looking at the relevant litigation data of the whole country, we can find two phenomena: it is difficult to file a criminal lawsuit, and the success rate of controlling the infringer before the diffusion of technical secrets is low; In civil litigation, the plaintiff's winning rate is very low, and the amount of compensation for infringement is far lower than the actual loss. In judicial practice, there are the following difficulties in the judgment of technical secret infringement cases: the defendant has many ways of relief, and the evidence is easy to provide, which leads to the low winning rate of the plaintiff. For example, "proving that the existing achievements have their own research and development records" and "the same technical solutions exist in other ways that the public can know" can be exempted from infringement charges. Because to control the scope of diffusion, technical secret infringement litigation needs to pay attention to effectiveness. That is to say, the smaller the time window of damage, the better. Although the use of judicial relief cannot make up for the actual losses, it can alert many enterprises and employees with bad intentions.

Conclusion

This paper mainly takes high-tech enterprises as the research object, analyzes the joint development strategy of listed companies in China, studies the current situation and problems of joint development, gives suggestions and countermeasures, and summarizes the following conclusions:

First, joint development can significantly enhance the innovation willingness of high-tech enterprises. On the one hand, joint development is an effective way to obtain external innovation resources, enhance the ability of independent innovation and market competitiveness. This strategy can re-integrate resources and provide more efficient innovation resources for high-tech enterprises in the fierce market competition. On the other hand, joint development is an important step in the strategic layout of enterprise innovation and an important symbol of high-tech enterprise innovation. Cooperative R & D of high-tech enterprises responds to the call of the state, helps

enterprises to get more attention and support from the government, and has the opportunity to cooperate with the government, which can greatly reduce the risk of innovation.

Second, joint development has a positive effect on the breakthrough and innovation of enterprises. The resources and technologies owned by a single enterprise are too single to meet the needs of breakthrough innovation, while the diversity of R & D partners in joint development means that there are many technologies and resources, and joint development can also draw on the wisdom of the masses to provide a variety of methods and ideas for innovation. Therefore, high-tech enterprises need to form R & D alliances with external enterprises to expand resource advantages and improve technological level, so as to achieve breakthrough innovation.

But sometimes joint development can also hinder the innovation of high-tech enterprises. The first reason is "make up a number without active work". When multiple companies cooperate in R&D, if any company relaxes its standards for itself, thinks of opportunism, and relies on other teams, even if it eventually obtains R&D results with other cooperative companies, it will inevitably hinder its own innovation and development. Second□joint development has higher requirements for technology, capital, information and so on, which means that enterprises need to spend more energy and resources to study, and it is very difficult for immature enterprises. Moreover, the cooperation between enterprises requires enterprises to change the original way of communication and R & D to form a common model for both sides, and it takes a long time for enterprises with distinctive styles to adapt to this change.

Generally speaking, the joint development of high-tech enterprises and listed companies has more advantages than disadvantages. In terms of joint development, various high-tech enterprises still have a lot of room for development, requiring high-tech enterprises to develop their own technological innovation capabilities, not rest on their laurels, enlarge their development vision to the global market, and keep pace with international leading enterprises. In joint development, high-tech enterprises should foster strengths and circumvent weaknesses, take the strengths of each enterprise, make up for deficiencies, improve R & D efficiency, and promote enterprise innovation.

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