

Review and Prospect on the Intellectual Property Risk in Cooperative Innovation

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Abstract: Intellectual Property risk is the main risk in the cooperative innovation process, increasingly attracting the attention of enterprises and scholars. Based on the research of the related literatures at home and abroad, the author did research on the status quo, as well as the prospect of intellectual property risk in cooperative innovation including its definition, causes of risk, intellectual property risk identification and evaluation and protection measures.

Keywords: Cooperative innovation, Intellectual property risks, Evaluation, Prevention control

1 Introduction

With fierce market competition increasing, technological innovation becomes an important guarantee for the sustainable development of enterprises. However, for independent innovation, there are difficulties including high cost, high risk and high complexity, etc. Therefore, more and more enterprises will shift its strategic focus to cooperative innovation. Cooperative innovation not only enables companies to reduce costs and risk, it is also an important way for enterprises to acquire external knowledge and expertise. The study found that compared with non-cooperative company's internal research yields, collaborative research yields are increased by nearly 150 percent. Now a growing number of research groups and companies are choosing to cooperate with potential competitors. ^[1] Narayanan research suggests that knowledge transfer between partners is very important in the process of cooperation innovation. Cooperative innovation needs effective knowledge exchange between enterprises. Partner companies use each other's knowledge and ability as leverage to enhance the vitality of cooperative innovation and competitiveness. However, cooperation members face both cooperation and competition. In the process of cooperation, it will inevitably lead to conflicts and risks. Guo Yonghui proposed that cooperative innovation and intellectual property are contradicted. The intellectual property rights are the constraint mechanism and benefit balance mechanism in the cooperation. ^[2]

Related studies have found that cooperation and innovation failure rate is as high as 40%-70%. Among main risk factors that lead to the failure of cooperative innovation, intellectual property risk is in the first place. Most reasons for failure can be attributed to lack of trust between co-members, opportunistic tendencies as well as the protection of intellectual property. One of Mansfield's surveys showed that: In the survey sample, more than 60% of the technical secrets and patents within four years are all imitated. The intellectual property risk in cooperative innovation is not only a risk on the legal aspects, but it also means the potential negative affect or incident on the current and prospect gains as well as the intellectual property rights as a result of partnership and knowledge sharing rule. ^[3] If the risk of intellectual property can not be effectively controlled, it could lead to the ultimate failure of cooperation and innovation and enterprises could even lose the core competitiveness. The intellectual property risk in cooperative innovation has increasingly attracted people's attention.

In accordance with the above-mentioned connotation of the intellectual property risk in cooperative innovation, our research is done from three aspects: the root causes of risk, risk identification and assessment, prevention and control of risks. It gives an overview of the current research status related to the intellectual property risk in cooperative innovation.

2 Roots of Intellectual Property Risks in Cooperative Innovation

Cooperative innovation is a complex innovation behavior. It involves multiple cooperative enterprises, a

number of researchers as well as a variety of intellectual property rights, each link contains a variety of risk factors. Enterprises participating in cooperative innovation are independent of each other, their business goals and positioning are different. There are many differences in the aspects of thinking, organizational culture, philosophy, leadership style, and office process and management methods. At the same time the responsibility division, cost sharing, risk sharing and the distribution of outcomes and benefits will also create disagreement. Therefore, in the process of cooperative innovation, it will inevitably have some contradictions and conflicts, and intellectual property risks are inevitable. Based on the research of the literatures, it is noted that most scholars mainly research from three aspects: the knowledge characteristics, cooperative innovation subject characteristics and the protection of intellectual property policy environment to analyze the root causes of intellectual property risk.

2.1 Risks caused by the intellectual property characteristics

Wang Zhong proposed that the inherent characteristics of intellectual property such as the invisibility and spillover of knowledge, timeliness and regionalism of intellectual property, promptness and concealment of infringement increase the intellectual property risk of knowledge sharing. So risks of infringing other's intellectual property or intellectual property infringed, unfair competition, knowledge resources plundered, loss of intellectual property and inequitable distribution of intellectual property rights are inevitable. ^[4] Liu Xinxue believes that during knowledge sharing, there exist fuzziness of knowledge, knowledge dependency of the core competence of the enterprise, asymmetric information and opportunism. Enterprises will use shared knowledge to create the private interests, or even directly violate the core competence and competitive advantage of partners, so it is necessary to protect Enterprises' intellectual property. Song Wei and Shi Jingjuan pointed out that intellectual property is exclusive and proprietary is a proprietary right of owner. However, intellectual property also has the attributes of public goods such as knowledge, easy to spread, spillover and shared. Cooperative innovation can rely on the attributes of public goods of intellectual property to reduce the cost of providing and preserving the shared knowledge, but this is easy to bring conflict of intellectual property. ^[5]

2.2 Risks triggered by the main object of cooperative innovation

Innovation can be cooperated between enterprises only and also can be cooperated between enterprise, research institutes or universities and even people. Different cooperative combinations have different advantages and risks. Partners' ability in learning and absorbing, partners' credibility, enterprise employees confidentiality consciousness, degree of technical knowledge sharing all of these are intellectual property risk factors based on the features of cooperative innovation main body. Ren Suhong, Huang Ruihua proposed differences in cooperation main body's comprehension of innovation activities, different styles of innovation as well as the other personality traits such as cooperative motivation, learning and absorptive capacity, overlapping degree of competition, technical confidentiality management, and enterprise management to employees, employee loyalty. Internal innovation characteristic such as specific ways of cooperation and mutual trust will also lead to intellectual property risks. ^[6]

The researchers also analyzed the risk sources from different angles. Oxley suggested that cooperation and innovation are highly complex, difficult to fully bound by contract so as to allocate all of the knowledge exchange and cooperation in the process of innovation. Opportunist will take advantage of it. ^[7] Ding Xiuhao suggested that inappropriate selection of knowledge transfer media is a risk source of knowledge intellectual property in collaborative innovation. Then, it analyzes the forms of intellectual property risks in detail from the perspectives of feedback, language variety, multiple cues and personal focus. ^[8] Qi Hongmei proposed intellectual property risk is due to the asymmetry of partners' R&D actions and efforts and the essence of which is the moral hazard of appropriating the intellectual property in the name of sharing and communication. ^[9] Zhou Rongfu, Chan Yingjie, Wu Yuwen from the perspective of game theory analysis, point out that cooperative enterprise will hide important technical information affecting the goals. Both parties of cooperation want to be "free rider" and are not willing to invest more knowledge assets. So cooperation can only maintain a lower level of output, the two sides will fall into a "prisoner's dilemma". ^[10]

2.3 Risks caused by the policy context

Policy environment is also an important factor affecting the risk of intellectual property cooperation and innovation. Fitzgerald points out that inadequate legal protection or enforcement will lead to the enterprise intellectual property theft. ^[11] Cannicea's study suggests that inadequate protection of intellectual property in developing countries still prevails. Therefore multinational corporations are often only willing to transfer non-core technology during the international technology transfer. ^[12] Wang Zhong states that China's intellectual property protection is relatively weak. Many domestic enterprises, to varying degrees, have insufficient awareness of intellectual property, limited ability to turn to the intellectual property system and turn their knowledge into property. ^[4] Huang Ruihua has also proposed that the commercial secret in law has regional characteristics. It is only valid in the country granted the right, beyond the scope which will be lack of legal protection. Through the transfer of tacit knowledge, the knowledge receiver of other countries will obtain commercial secrets and independently use it, so that the knowledge sender's rights are infringed. ^[13]

3 Identification and Evaluation of Intellectual Property Risks in Cooperative Innovation

Eric c. Osterberg divided intellectual property risk into five categories: execution risks, title risks, risk of infringement, investment risk, storage, maintenance and dissemination risks. ^[14] Kimberly K. Cauthom analyzed intellectual property risks from five aspects: Implementation costs, wastage and losses, the legal cost and compensation of tort and ownership issues. ^[15] In aspect of recognition of intellectual property risks in cooperative innovation, Li Gang divided the intellectual property risks of collaborative innovation into: Incomplete contract risk, delay of knowledge transfer risk, the risk of knowledge leakage and breakage, the risk of knowledge imitated, the risk of abuse and misappropriation of knowledge, loss of talents and unreasonable income distribution risk. ^[16] Ren Suhong has constructed a planar structure influencing factor system of intellectual property risk from two aspects of understanding and category. He divided the technical secrets risks of intellectual property risk into four categories: leakage risk, the risk of theft, loss risk and failure of chased after sharing. ^[6] He Ruiqing, based on the causes of intellectual property risk, divided intellectual property risk into moral hazard risk, incomplete contract risk, risk of adverse selection, knowledge spillover risk. ^[3]

The researchers also apply different methods and models to evaluate and analyze intellectual property risks. Su Shibin from the angle of the sender of tacit knowledge, the risk characteristics of transferring tacit knowledge in collaborative innovation, and the risks of tacit knowledge transferring in collaborative innovation by risks matrix are studied. Meanwhile, it simulates impact rating and the occurrence probability of various risks of tacit knowledge transferring in collaborative innovation by MonteCarlo method. Then, the risk rating of difference risks is drawn the result provides basement to eliminate important risks. ^[17] Zhang Keying, Li Yangdong, Guo wei analyze the influence of intellectual property risk on cooperative behavior on the basis of effective investigation data of 243 companies with structural equation model (SEM). This analysis is helpful for enterprise to guard against different kinds of intellectual property risks dynamically. ^[18] Zhai Yunkai built the risk conduction model of cooperative innovation and mathematical analysis model based on knowledge transfer, so as to analyze static and dynamic elements in risk conducting. And he summarized the laws of the objectivity, directivity, dependence, superposition and complexity of risk conduction. Qi Hongmei, Wang Sen made the conceptual model of the effect among the risk of intellectual property rights, the sense of co-opetition, technology absorptive capacity and innovation performance. And this paper analyzes the influence of intellectual property risk on innovation performance through 203 survey questionnaires from 300 enterprises. ^[19]

4 The Prevention of and Control Over the Intellectual Property Risks in the Cooperative Innovation

In order to avoid intellectual property risks in the process of the cooperative innovation to the greatest extent and ensure the smooth progress, it is necessary to make the study of the prevention and control of intellectual property risks. Enterprises should incorporate the protection of the intellectual property right into the daily operation and management, take effective control measures to protect and encourage its knowledge innovation, reduce knowledge loss in cooperative innovation, prevent the illegal occupation of the intellectual property right to help the enterprise's knowledge capital operating in the best state and with the biggest vitality and improve the efficiency and benefit of knowledge capital resources.

Das and Teng pointed out that in the cooperative innovation cooperation, one party must have enough confidence to the other party, and this confidence came from two aspects-trust and control. ^[20] Yu Ping et al. analyzed the characteristics of virtual enterprises in the cooperative innovation, and studied the intellectual property ownership and risks in the strategic alliance mode, and put forward countermeasures such as perfecting the contract system, building equitable sharing mechanism and establishing the legal platform against risks. ^[21] Li Donghong proposed prevention and control countermeasures against the research and development risks in the enterprise cooperation: clarifying enterprise gains and losses in the process of cooperative research and development; strengthening the technology protection consciousness of personnel participating in the cooperative research and development; making protections according to the different nature of technology; having control over these two stages-establishment and cooperation in cooperation relations and prohibiting the employment of other employees during the cooperation period and several years after the cooperation. ^[22] Diao Lilin studied the evolving game process of intellectual theft and protection of cooperative enterprises under three situations: in non-punishment system, in punishment system and when considering the future cooperation benefits, and she analyzed the evolutionary equilibrium and its stability, and proposed that only with the punishment mechanism and the check on the future cooperation benefits can the opportunism behavior be fundamentally eliminated. ^[23] Meng Xiangjuan, Shi Bin put forward that systems related to the intellectual property right in China's laws showed two characteristics-respecting the due party's will and building the balance mechanism, and the key to solve the problem of the intellectual property right in the industry-academy-research alliance is to consider interests of industry, academy and research, its internal staff as well as the state. ^[24] Guo Yonghui established the governance model for intellectual property based on game theory. With this model, the governance mechanisms including trust mechanism, contact mechanism, interest distribution mechanism and government governance mechanism are proposed to solve effectively the problem of intellectual property. ^[25] In addition, choosing close partners in terms of the geographical position and perfecting related laws and regulations of the intellectual property right and patent license are also considered conducive to knowledge transfer of the enterprise cooperation.

To summarize the research results of the researchers, we can conclude the prevention and control strategies against the intellectual property risks in the cooperative innovation into the following three points: perfecting the contract system and establishing the trust mechanism; selecting partners and establishing equitable sharing mechanism; strengthening the awareness of knowledge protection and establishing the protection mechanism.

5 Conclusion and Prospect

With the further promotion of the cooperative innovation mode, studies about risk management of the cooperative innovation intellectual property both at home and abroad have made considerable development and gained rich research results. But the present theoretical research is still insufficient to give effective theoretical support to the cooperative innovation practice. From the study of the relevant literatures both at home and abroad, we can see that the existing studies on intellectual property risks in

the cooperative innovation are mainly theoretical studies and qualitative studies, and the researchers list directly intellectual property risk factors of the cooperative innovation by empirical analysis, which lacks study from the angle of quantitative analysis and the scientific empirical test. Secondly, the existing study lacks the analysis of the conduction mechanism of the intellectual property risks in the cooperative innovation, the researchers usually study the intellectual property risks in the cooperative innovation as a static system, however, the risk factors in the process of the cooperative innovation do not exist isolation, and the risk factors interact with each other and jointly impact on the success of enterprise cooperative innovation. In addition, the study of the control over intellectual property risks in the cooperative innovation mainly focuses on the prevention of the loss and diffusion of the knowledge, technology, personnel and capacity of the cooperative enterprise and the lack of studying the control over intellectual property risks from the whole process of the cooperative innovation. Therefore, as for the intellectual property risks in the cooperative innovation, the researchers should pay more attention to the practical applications of the study, carry out the empirical researches as much as possible, and make the statistical analysis by quantitative methods and make a comprehensive analysis of quantitative indicators of all risk factors to provide quantitative basis and practical guidance for the knowledge management and the control over intellectual property risks in the cooperative innovation.

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