Median Role of Technology Innovation Strategic Information Acquisition Capacity in the Relationship between Board Capital and Technology Innovation Strategy Decision-Making Quality

Jiaying Feng [1, a], Xiaoguang Luo [1, b*]

[1]School of Economics and Management, Harbin University of Science and Technology, Harbin, Heilongjiang, China

[a] email: fengjiaying1990@126.com, [b] email: Luoxg@126.com

[*]corresponding author

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Abstract: It is of substantial significance to explore the impact mechanism of board capital on technology innovation strategy decision-making quality to improve the quality of enterprise technology innovation strategy decision-making and maintain a competitive advantage. Based on the Resource-dependent Theory and Information Decision-making Theory, this paper proposed a conceptual model of the relationship between board capital, technology innovation strategic information acquisition capacity, and technology innovation strategy decision-making quality. The influence path of board capital on technology innovation strategy decision-making quality is explored. From the perspective of acquisition of innovation strategic information, this paper constructs the function routes of "board human capital—technology innovation strategic information acquisition capacity—technology innovation strategy decision-making quality" and "board social capital—technology innovation strategic information acquisition capacity—technology innovation strategy decision-making quality", and opens the "black box" between them.

1. Introduction

Technology innovation is the fundamental guarantee for the survival and development of contemporary enterprises, which has become the consensus of the industry. However, technology innovation has great risks. To reduce risks of technology innovation and increase the probability of technology innovation success, enterprises must grasp the direction of technology innovation strategically. Technology innovation strategy is the overall goal deployment of innovation activities, as well as the overall plan and fundamental countermeasures to achieve technology innovation goals. Whether the technology innovation strategic decision is correct or not determines whether the enterprise can win and maintain the competitive advantage by the promotion of technology innovation. Therefore, how to improve technology innovation strategy decision-making quality urgently needs theoretical guidance. As the main body of the enterprise's technology innovation strategic decision-making, the board of directors' participation in technology innovation strategy covers the entire process of formulating, implementing, controlling and evaluating technology innovation strategy. Board capital is a combination of various professional knowledge and vocational skills possessed by board members and the social network of the board. As the basis of the board's participation in technology innovation strategy, the relationship between board capital and technology innovation strategy decision-making quality is a hot issue in the research field of technology innovation strategy.

Many scholars put forward that board capital has a positive impact on technology innovation strategy decision-making quality through theoretical analysis and empirical evidence. For example, Westphal and Bednar [1] pointed out that board capital can provide enterprises with various resources, including suggestions and consulting, complementary technology, internal and external

environmental information and financial resources, which is conducive to the improvement of technology innovation strategic decision-making quality. However, some scholars hold the opposite view. For example, Camino et al. [2] found that when levels of board capitals are not very different, different enterprises have made technology innovative strategic decisions with different quality. Lin [3] conducted an empirical study on the relationship between board capital and technology innovation strategy decision-making quality, and found that the impact of board capital on technology innovation strategy decision-making quality is not significant. Some scholars even believe that the relationship resources of the board may be negatively related to the technology innovation strategy decision-making quality, because the relationship is a"double-edged sword", which brings resources and may also cause the organization to rely on other roles, thus subject to others.

At present, most researches about the impact of board capital on technology innovation strategy decision-making quality focus on the function of resource provision of the board in the process of technology innovation strategic decision-making, which directly discuss the direction of impact but without reaching a consensus conclusion. According to the theory of strategic cognition, the board of directors not only provides resources for technology innovation strategy, but also actively participates in the decision-making process of it, such as the analysis of the environment, the formation and evaluation of the plan of technology innovation strategic.The decision-making process of technology innovation is essentially a process of information flow. The board of directors is required to collect and sort out the information in each link of the strategic decision-making of technology innovation in order to support the effect of the strategic decision-making of technology innovation. The theory of cognitive behaviour points out that information acquisition is a process of thinking emotion and behaviour interaction of individuals, and individual differences such as knowledge reserve, experience and social network relationship of information collectors all affect information acquisition ability.Different boards of directors have different levels of capital, which means that there are differences in overall skills, experience and social relations of the board of directors, as well as the ability to obtain strategic information of technology innovation of them.

Therefore, on the one hand, this paper discusses the influence of board capital on technology innovation strategy decision-making quality; on the other hand, it tries to analyse the intermediary role of technology innovation strategic information acquisition capacity in the process of the influence of board capital on technology innovation strategy decision-making quality. The conclusion of this paper can not only deepen the understanding of the relationship between the capital of the board of directors and technology innovation strategy decision-making quality, but also provide valuable reference for the board to use its own capital to improve technology innovation strategy decision-making quality in management practice.

2. Relationship between Board Capital and Technology Innovation Strategy Decision-Making Quality

Hillman and Dalziel [4] first introduced the concept of board capital into the field of corporate governance in 2003. They proposed that board capital is the ability of the board to provide available resources for enterprises. Later, Wincent et al. [1] defined the connotation of board capital from the perspective of its existence form. They believed that board capital is the general term of experience, skills and social network relations possessed by board members, and divided board capital into two dimensions: human capital and social capital. Board human capital is the general term of intangible assets such as knowledge, skills, experience and reputation possessed by board members. Board social capital refers to the collection of connections between all members of the board and other members of the external organization. According to Wincent's point of view, this paper conducts the study from the two dimensions of board human capital and board social capital.

Methods, timing, and the amount of resources invested by enterprises in technology innovation constitute the content of strategic decisions for technology innovation. Scholars at home and abroad interpret the connotation of technology innovation strategy decision-making quality mainly based on six criteria of strategic decision-making quality evaluation proposed by Tilles, that is, whether

the strategic decision-making is consistent with the enterprise's objectives; whether the strategic decision-making is suitable for the key resources inside the enterprise; whether the strategic decision-making is consistent with the external environment of the enterprise; whether the risk of strategic decision-making is within the scope that the enterprise can bear; whether the strategic decision-making determines the appropriate time to achieve the goal; and whether the strategic decision-making achieves the expected effect. In this paper, integrating the existing research literature of theories on technology innovation strategy decision process, technology innovation strategy decision-making quality is defined as the degree that technology innovation strategy is consistent with the external environment, internal resources and capabilities of the enterprise, as well as the goal of technology innovation.

2.1. Relationship between Board Human Capital and Technology Innovation Strategy Decision-Making Quality

A high-quality strategic decision of technology innovation requires that it can match with the external environment and internal resource capacity, but most enterprises are often constrained by internal resources and cannot make technology innovation strategy to adapt to the external environment. Previous studies have shown that enterprises with stable supply of core resources have higher quality of technology innovation strategic decisions than those with scarce core resources. In the process of technology innovation strategy decision-making, the higher level of human capital and social capital of the board, the richer resources provided for enterprises, the less resource constraints on technology innovation strategy decision-making, and the more technology innovation strategy decision-making schemes formed, which can improve the freedom of technology innovation strategy choice, and then improve technology innovation strategy decision-making quality. Based on the above analysis, this paper proposes the following assumption.

H1a: Board human capital (BHC) is positively related to technology innovation strategy decision-making quality (DQ).

2.2. Relationship between Social Board Capital and Technology Innovation Strategy Decision-Making Quality

Resource dependence theory points out that a large number of valuable resources related to the survival and development of an organization need to be obtained from the external environment. The board is an important contact mechanism between the enterprise and the environment, which can help the enterprise to obtain resources.According to Ma and Peng [5], the more abundant of board human capital, the higher level of technical ability, knowledge and experience of the board, which can promote the legitimacy and reputation of the enterprise. A higher corporate reputation can improve the recognition of external investors for technology innovation behavior and help the enterprise obtain financial resources. In addition, many scholars found that board social capital can build a bridge for effective communication between enterprises and external organizations. The relationship between the board and the stakeholders in the supply chain, such as manufacturers, customers, suppliers, distributors, strategic partners, etc., is conducive to the effective communication between the enterprise and its partners, the rapid establishment of a common language and the promotion of the enterprise's access to external information, technology, knowledge and other resources. The relationship between the board and financial institutions helps to improve the financial institutions' understanding of the enterprises, so as to help enterprises obtain bank loans. The relationship between the board and the government is conducive to communication between enterprises and the government, so that enterprises can enjoy the convenience in government preferential policies, financial support and loan services. Based on the above analysis, this paper proposes the following assumption.

H1b: Board social capital (BSC) is positively related to technology innovation strategy decision-making quality (DQ).

3. Relationship between Board Capital and Technology Innovation Strategic Information Acquisition Capacity

The concept of technology innovation strategic information acquisition capacity originated from the field of library and information. Information acquisition capacity was defined as “the capacity to use information resources in work after training”. With the increasing importance of information in strategy decision-making, the concept of information acquisition capacity has gradually penetrated into the strategic field.Some scholars believe that the capacity to acquire strategic information refers to the ability to acquire, query, exchange, disseminate, absorb and process information under the stimulation of external information sources in order to meet the information needs of strategy decision-making. On the basis of these studies, combined with the role of technology innovation strategic information ability, this paper holds that technology innovation strategic information acquisition capacity of the board is the capacity to effectively discover the needs of technology innovation strategy information, and specifically retrieve, judge and organize technology innovation strategy decision-making information.

Based on the theory of cognitive behavior, individual differences such as the interaction between individuals and the environment and the experience accumulated by individuals in the course of life can affect cognitive ability. The cognition and expression stage of information needs, the selection stage of information sources and the absorption stage of information are all cognitive related activities, and cognitive ability plays a unique and important role in the process of information acquisition. Different boards of directors have different levels of capital, which means that overall skills, experience and social relations between them are different, the cognitive ability of the board of directors will be different, as well as their information acquisition ability of the technical innovation strategy.

3.1. Relationship between Board Social Capital and Technology Innovation Strategic Information Acquisition Capacity

Jermias [6] divides the state of information demand into three levels: “objective state of demand”, “cognitive state of demand” and “expression state of demand”. If the objective information needs are not consciously, accurately and completely expressed, and are in a “potential”state, then the information acquisition behavior cannot be carried out. The process of potential information demand transformation is deconstruction of individual’s original cognitive model and construction of new cognitive model. Learning factors are “catalysts” in the cognitive process of transformation of potential information demand. If board human capital is high, it means that the overall memory capacity of the board is high, and it is easy to accept new necessary knowledge, then the board will quickly convert the potential strategy decision-making information demand of technology innovation into the actual strategy decision-making information demand of technology innovation. With the clearly expressed demand for technology innovation strategic information, the board of directors needs to select the path to obtain technology innovation strategic information and then conduct “behavioral interaction” with the information source to obtain the information provided by the information source. In the process of “behavioral interaction”, it is accompanied by the “cognitive interaction” of the individual's inner world, that is, conscious thinking and information in the sense of informatics. From the perspective of information processing, cognitive psychology proposes that the rational knowledge of information users directly affects the results of cognitive interaction. The higher board human capital, the richer the rational knowledge of the board members as a whole, the stronger their thinking ability, and the better cognitive interaction effect with the information source. The board of directors can make a comprehensive, reasonable and objective judgment on each feedback information of the information source, and accordingly construct the next information behavior strategy purposefully and step by step. Based on the above analysis, this paper proposes the following assumption.

H2a: Board human capital (BHC) is positively related to technology innovation strategic information acquisition capacity (IAC).

3.2. Relationship between Board Human Capital and Technology Innovation Strategic Information Acquisition Capacity

The cognitive structure of a cognitive object fundamentally determines the direction of understanding the object information. From this point of view, cognitive structure plays a decisive role in the absorption and transformation of information. Individuals cultivate their knowledge and skills through interaction with others in the environment, and enrich their cognitive structure. The daily social interaction activities and processes of board are actually the process of interaction with the environment, which is a process of cognition and learning. Maere [7] pointed out that the higher the board social capital, the more frequent and close the communication between board members and social network members, the more opportunities for information and knowledge sharing, and the deeper the communication, which helps to improve the level of acquisition, integration and utilization of knowledge, especially invisible knowledge. O'Hagan and Green [8] found that the higher board social capital, the more members of the social network who interact with the board of directors, and the more types of strategic environmental information, knowledge or other indirect experience the board of directors obtains. Therefore, the higher board social capital, the more complex the understanding structure of the board members as a whole, the more information they can receive from the object, the more comprehensive the knowledge they form, and the stronger the ability to respond appropriately to the stimulation of the object information and to process it. Based on the above analysis, this paper proposes the following assumption.

H2b: Board social capital (BSC) is positively related to technology innovation strategic information acquisition capacity (IAC).

4. Relationship between Technology Innovation Strategic Information Acquisition Capacity and Technology Innovation Strategy Decision-Making Quality

Information decision theory points out that market information, technology information, policy information, and other technology innovation strategic information, as an intangible resource, is very important to the process of technology innovation strategy decision. However, the strategic information of technology innovation is not a continuous variable, which has the characteristics of complexity and dynamic. There is no historical model or outline to be referenced, and it is typical blind information. The board ability to obtain strategic information of technology innovation determines the level of strategic information of technology innovation, and then affects technology innovation strategy decision-making quality.

The influence of technology innovation strategic information acquisition capacity of board on technology innovation strategy decision-making quality is mainly reflected in the following three aspects: first, the board strong acquisition ability of technology innovation strategic information can improve the accuracy of technology innovation strategy environment assessment. According to the assumption of limited rationality of human, it is impossible for decision makers to have insight into all aspects of the internal and external environment of the organization, which is likely to cause the limitations of decision makers' understanding. The strong technology innovation strategic information acquisition capacity can obtain perfect strategic decision-making information of technology innovation, enrich the knowledge structure of directors, reduce the cognitive deviation of the board on the internal and external situation of the enterprise, and improve the accuracy of the assessment of the strategic environment of technology innovation. Secondly, the strong technology innovation strategic information acquisition capacity can improve the flexibility of technology innovation strategy. The environment of technology innovation strategy is highly uncertain and dynamic. The stronger technology innovation strategic information acquisition capacity, the faster access to the strategic information of technology innovation. On this basis, more alternative schemes of technology innovation strategy are designed to improve the flexibility of technology innovation strategy. Thirdly, the strong technology innovation strategic information acquisition capacity can improve the ability of decision-making and evaluation of technology innovation strategy. The stronger board has access to technology innovation strategic information, the more abundant the board of directors has access to technology innovation strategic decision-making information. A comprehensive and objective evaluation of the strategic plan can ensure that a

higher quality strategic plan can be selected from a number of strategic decision-making plans for technology innovation. Based on the above analysis, this paper proposes the following assumption.

H3: Technology innovation strategic information acquisition capacity (IAC) of the board is positively related to technology innovation strategy decision-making quality (DQ).

5. Median Role of Technology Innovation Strategic Information Acquisition Capacity in the Relationship between Board Capital and Technology Innovation Strategy Decision-Making Quality

Board human capital determines the overall memory capacity and rational knowledge depth of the board. Board social capital enriches the cognitive structure of the board. Both of them promote the acquisition ability of the strategic information of the board of directors, which makes them have more accurate, perfect and timely strategic information when making strategic decisions, and then make a high-quality strategic decision of technology innovation. It can be concluded that the impact of board capital on technology innovation strategy decision-making quality is to a certain extent realized through the influence on technology innovation strategic information acquisition capacity, that is, technology innovation strategic information acquisition capacity plays a median role between board capital and technology innovation strategy decision-making quality. Based on the above analysis, this paper proposes the following assumptions:

H4a: Technology innovation strategic information acquisition capacity (IAC) plays a median role in the relationship between board human capital (BHC) and the technology innovation strategy decision-making quality (DQ).

H4b: Technology innovation strategic information acquisition capacity (IAC) plays a median role in the relationship between board social capital (BSC) and the technology innovation strategy decision-making quality (DQ).

Based on the above research assumptions, the conceptual model is shown in Figure 1.

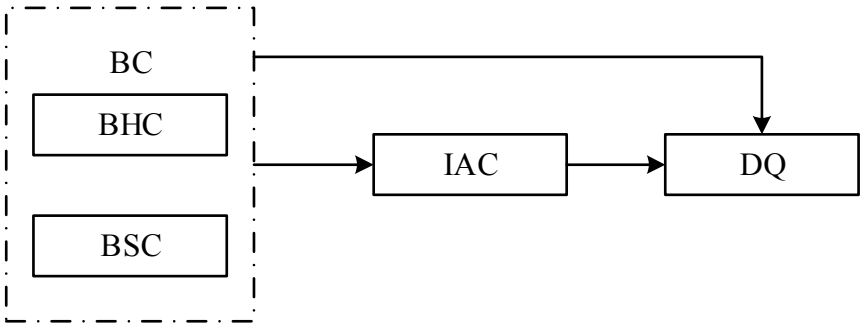

Figure 1. The conceptual model

6. Implications and Research Limitations

6.1. Management Implications

Management implications of this study are: (1) The board should fully accumulate human capital and social capital. Members of the board shall actively participate in the training and continuous learning to improve the stock and quality of board human capital; at the same time, they shall also take the initiative to strengthen social exchanges with relevant organizations outside the enterprise, including not only traditional customers, suppliers or partners, but also government departments, scientific research institutions, consulting institutions and financial institutions, in order to provide important support for making strategic decision of high-quality innovation. (2) The board should fully recognize the important role of technology innovation strategic information acquisition capacity. The members of the board should sum up experience in practice, strengthen the awareness of information, cultivate the ability to transform the demand for strategic information of innovation, the ability to select strategic information of innovation, and the ability to absorb and utilize strategic

information of innovation, so that the board capital can be continuously transformed into the improvement of the quality of strategic decision-making of innovation.

6.2. Research Limitations and Future Prospects

Although this study has some contributions, there are still some limitations. This paper only proposes a conceptual framework, Empirical test can verify the correctness of the existing conceptual framework and lay the foundation for future research. Therefore, if conditions permit, the relevant empirical research should be carried out to test the conceptual framework proposed in this paper in order to improve it.

This paper finds that technology innovation strategic information acquisition capacity acts as a part of intermediary, which shows that the relationship between board capital and the technology innovation strategy decision-making quality is quite complex, and there may be other influencing factors, such as the cognitive ability of the board and the strategic decision-making ability of innovation. In the future, we can continue to explore other relationship mechanisms from above perspectives. hope you find the information in this template useful in the preparation of your submission.

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