

The Impact of Network Lock-in on Firms

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Abstract

In the process of innovation and development, enterprises will use resources to acquire resources and accelerate innovation. However, studies have shown that enterprises embedded in the network also have negative effects, forming a network lock-in effect. Once social capital is formed, its natural closure and exclusivity will restrict the entry of external information, resources and talents, making the internal network lack the innovation of new technology and the upgrading of structure. Firstly, the article combs the concept and classification of network locking. Then, the article analyzes the reasons for enterprises to form network locks in the network. And then, the article dialectically analyzes the impact of network lock on the enterprise. Finally, the article proposes to companies and managers to avoid the negative effects of network lock-in.

Keywords

Network lock-in; Negative effects; Innovation network.

1. CONCEPT AND CLASSIFICATION

1.1. Concept of Network Lock-in

In order to obtain resources, enterprises join innovation networks or value networks. As time goes by, the network structure becomes rigid and loses vitality. This effect is called locking effect (Y.C. Wang, 2003), It hinders the exchange of network and foreign resources and information, and makes a large amount of information redundant in the dense network, and lacks access to new information (Y. Huang et al., 2010). At the same time, in order to avoid the operational risks brought about by environmental uncertainty, enterprises will self-reinforce and finally lock in the specific path relationship of acquiring resources through social network relations under the influence of inertia (Y.M. Yin et al., 2011). This locking effect can occur in innovative networks or other value networks.

1.2. Types of Network Lock-in

Relationship locking and structure locking. According to the social network theory, the excessive embedding of social network relationships means that the relationship between the subjects maintains a high degree of relationship strength and frequency of contact within a certain period of time. On the one hand, the individual relationship between networks is too tight and the exchange resources are relatively fixed, which hinders and restricts the flow of information and resources across borders; secondly, the excessive embedding of social network relationships will form a strict social network structure. The relationship has continued to change over time, the concentration has increased, and the social network relationship has gradually formed (W.G. Dyer., 2013). On the other hand, enterprises are more inclined to cultivate subjects with key resources, resulting in a decrease in network size and network heterogeneity. The locking of the social network structure has gradually formed (Y. Liu, 2018).

Functional locking, cognitive locking and political locking. Grabher (1993) divides the locking effect into three categories: (1) functional lock-ins: locking the relationship between local

enterprises; (2) cognitive lock-ins: think there will be a long-term tendency of cyclical downturn; (3) political lock-ins: a strong institutional organization that retains the original traditional industrial structure, affecting the local endogenous potential and creativity. Therefore, the measurement of the risk of locking enterprises in cluster enterprises is also carried out from these three dimensions (Y. Huang et al., 2010).

Technology innovation cost lock-in, knowledge transfer lock-up, market lock-in and technical standards development. Enterprise technology innovation is limited by the scale of capital and cost, which is called the cost of technology innovation. Excessive reliance on prior knowledge by companies can lead organizations to lose access to new knowledge through "learning by doing" and create a lock-in effect of knowledge transfer. Market lock-in has two meanings: one is customer lock-in, and the other is excessive competition lock-in. The technical standard lock refers to the transfer cost of the manufacturer from one technical standard to another. The transfer cost is high and the transfer is uneconomical. Only when it comes from this technical standard. Exit lockout may occur when the transfer cost of the exit is less than the transfer gain (Z.N. Yang et al., 2013).

Positive locking effect and negative locking effect. There is an invisible force hidden in the value network to lock the enterprise into a competitive advantage or disadvantage for a long time. Scholars call it the lock-in effect. Li Heng et al (Y. Li & Y. Liu, 2001) believe that when the utility of the enterprise cannot be satisfied or the relationship between investment and return is not equal for a long time, the enterprise will be implicated by the value network, resulting in the continuous decline of the competitive advantage. Called the negative lock-in effect (Labianca, G. & Brass, DJ, 2006); conversely, when companies work closely together within a value network, they can bring utility satisfaction or relationship investment a higher rate of return than At the market average, the network has a positive effect on the enterprise, namely the positive lock-in effect (Q.H. Meng et al., 2011).

Technology lock. According to the path dependence theory, there is usually an effect of increasing returns in the process of technological innovation. The first developed technology has the advantage of preemption and self-enhancement, and it can occupy market share continuously, and then the more advanced technology developed may be trapped in the predicament of not having enough supporters. Formed a "technical lock" (M. Zhang et al., 2019).

2. THE CAUSE OF NETWORK LOCK-IN

2.1. Cost Perspective

From an economic point of view, it takes time, energy, financial resources and manpower to build, maintain and disarm network partners. These are the cost inputs of enterprises in the network. The enterprise's sunk cost/opportunity cost and conversion cost are the three factors of high-low-end locking in the network and the "binding" of the enterprise by the network. (Q.H. Meng et al., 2011). The sunk cost and the opportunity cost are the resource inputs and potential losses accumulated for embeddedness in a certain network relationship, and the conversion cost is the various costs that the network members have to pay off at any time.

Sunk costs. The sunk cost refers to the cost that has been paid and cannot be recovered. For the innovation network, the sunk cost refers to the relationship-specific investment that the enterprise has to build and maintain the relationship, including time, manpower, material and capital costs. The key to the lock-in effect of sunk costs is the unrecoverable and unrecoverability of relational investments (R.S. Fang & L. Yang, 2002). The reason is that relation-specific assets have the characteristics of "specialization and uniqueness", and the possibility that the relational assets are used for other purposes after the relationship is released is very low. The greater the sunk cost, the deeper the enterprise is locked by the network.

Opportunity cost. Opportunity costs refer to future potential gains that companies lose when they leave an innovation network. When enterprises choose to leave the innovation network, they mean that they will lose the benefits that the innovation network may bring; mature innovation networks often have the nature of increasing scale returns (D.H. Yu & M.J. Yan, 2005), that is, with the network embeddedness of enterprises. As the number continues to increase, the value distribution of the company will continue to increase. Dissolving the relationship with the value network means lowering the future revenue. The greater the opportunity cost, the deeper the enterprise is locked by the network.

Conversion costs. Value cost means that enterprises will spend a lot of money to switch between innovation networks. Enterprises need to make a new round of relationship investment when they join the new innovation network [to overcome the huge mobile barriers, this kind of new construction the cost of the value relationship prevents the company from leaving the original innovation network. At the same time, the removal of certain value relationships means that many important suppliers, markets (customers) and certain key resources (information, technology, etc.) may be lost (Q.H. Meng et al., 2011). The greater the conversion cost, the more the company is locked by the network. Deep.

2.2. Embedding Angle

Excessive embedding in the innovation network will cause the “blocking” effect, which is reflected in the three aspects of economic blockade, institutional blockade and social blockage (Y.P. Yang, 2012).

Economic blockage. The solidified partnership between local suppliers and manufacturers of the innovation network prevents companies from accessing outside information and resources.

Institutional blockade. In the innovation network, the geopolitical and rural relationship between the government, associations and intermediaries led to the joint maintenance of the existing network structure, hindered the entry of foreign competitors, and ultimately led to the solidification of the innovation network-related enterprises and administrative relations.

Social blockage. Too close social relationships within the innovation network limit corporate innovation. Excessive embedding on the basis of intimate friendships and lasting relationships can also lead to irrationality in business operations, thus limiting effective innovation.

2.3. Behavioral Angle

In an innovation network, an enterprise is locked in a fixed pattern or path due to behaviors such as trust, inertia, and dependence. The factors have two aspects: excessive trust and path dependence (Q. Zhang, 2015).

Excessive trust. In the long-term frequent contact and cooperation, each member of the innovation network gradually forms social capital and generates trust. This trust can bring mutual benefits to each member and has relative stability; and in order to obtain such mutual benefit continuously Reciprocity, the members of the network must continue to carry out maintenance and investment, and slowly generate some inertia. The likelihood of network population adjustments due to stability and inertia is reduced, and corporate or member behavior is locked into a single behavioral path.

Path dependent. In the process of accumulation and development of social capital, enterprises will tend to be homogenous with other members. Innovative network internal enterprises gradually produce certain norms and unique practices. Enterprises within the network cooperate according to certain modes and generate path dependence. Under this role, imitating and following strategy is the rational response of many enterprises within the network, and enterprises are locked. In a fixed cooperation mode.

3. IMPACT OF NETWORK LOCK-IN

Dialectically examining the impact of network lock-in on enterprises, it has both positive and negative effects on enterprise development. Appropriate locking can play a role in mutual win-win among members and the overall innovation effect of the network. Over-locking may be due to structural lock-up, relationship lock-up leading to information occlusion, breeding innovation inertia, and hindering innovation (Y.P. Yang, 2012).

3.1. Positive Effects

The construction of a win-win relationship. Positive locking benefits from the construction of a win-win relationship. In the information age, the speed of information acquisition and cost reduction have increased the uncertainty of the relationship between enterprises and enterprises, enterprises and customers, and the use of innovative networks to build a stable win-win relationship can effectively reduce these risks; The efficient innovation network has the characteristics of "increasing economies of scale, decreasing costs and positive feedback between the final product value and the number of users", and enterprises can obtain differentiated and low-cost advantages (M.M. Jin & X.C. Lu, 2008).

Bring excess returns to the business. Positive locking is closely related to the excess revenue from the innovation network. W. Jiang (W. Jiang, 2005) and other believe that the additional benefits brought by the innovation network can also be called relationship rents. The relationship rent has both the Ricardian rent that emphasizes the scarcity of resources and the Schumpeterian rent, which emphasizes the ability to innovate. Enterprises invest in the innovation network through "highly resource-capacity complementarity and continuous relationship investment. Relationship management, effective relationship management, and full knowledge sharing.

3.2. Negative Effects

Structure locks down negative effects. The lock on network structure leads to organizational inflexibility and path dependence, hindering knowledge transfer and innovation (Weber, C., & Weber, B., 2011), ultimately affecting business performance. Previous studies have discussed the negative effects of structural embedding from both structural and closed networks.

First, occupying the center of the network may also hinder the improvement of corporate performance. In high-density networks, network-centricity can negatively impact innovation performance (Uzzi, 1997). The advantage of network structure location can bring the resources, knowledge and information to the enterprise. In a highly dense network, it is easy to generate similar knowledge situations, which is not conducive to providing external heterogeneous knowledge. Therefore, the lock on the network structure will limit the creation of diverse technologies and product innovation. Second, a tightly connected network reduces organizational adaptability and forms a dependency-oriented culture (Eklinder-Frick et al, 2011), which hinders firm flexibility and organizational innovation. Excessive network embedding can lead to a lack of structural holes in the network, limiting enterprises to acquire new knowledge. Finally, a closed network will hinder the network entity from innovating and starting a business, and it is difficult for network members to overcome the closed network boundary and establish contact with other external entities to obtain resources and information. This suppression may hinder the new enterprise to obtain the heterogeneous resources needed from the external network. Generate innovative ideas.

Relationship locks down negative effects. Strong relationships prevent new network members from joining. Network knowledge homogenization hinders innovation performance. Relationship maintenance costs increase in three ways.

First, under stable network conditions, strong interactions are beneficial for resource sharing and reducing uncertainty, while blocking other people outside the network from participating in network activities. Strong internal interaction preferences within the network will limit startups from acquiring additional heterogeneous knowledge from other organizations not on the network. Secondly, strong interactive networks have advantages in knowledge, resource acquisition and search, but strong relationship network environments form similar knowledge situations, and network knowledge homogenization hinders innovation performance. As time passes, the diffusion channels of information and technology are relatively fixed. In the partnership network, network participants can no longer provide complementary heterogeneous knowledge. Only the technical knowledge between the entities in the network is transmitted and exchanged. Gain heterogeneous knowledge, homogenize knowledge to ineffective activities to solve complex problems, and reduce entrepreneurial companies to develop new technologies and product performance (Q. Zhang, 2015). Finally, while social capital brings information benefits, it also increases the cost of verifying, developing, and maintaining relationships. In establishing relationships with internal and external network entities, entrepreneurial enterprises need to invest the necessary time and resources. Maintaining a large number of relationship networks will inevitably increase the cost of maintaining enterprises, and ultimately become a burden on enterprises and reduce corporate performance (Adler & Kwon, 2002).

The competitive advantage of enterprises is lost. First of all, due to the improper maintenance of relationship maintenance, the value creation efficiency of the innovation network is continuously reduced, and the relationship between enterprises is changed from cooperation-led to competition-oriented. The profitability of network members is sometimes even lower than that of enterprises outside the network, and the competitive advantage is continuously weakened. Secondly, the similarities and differences of network positioning lead to the uneven profit level of network members, leading to the phenomenon of "high/low locking" (F.C. Lu & P.B. Hu, 2008). The long-term low-end locked enterprise interests are continuously squeezed, resulting in the loss of competitive advantage. Finally, there is excessive competition in the network, which allows other manufacturers to obtain low profit margins and lack of economies of scale. This makes manufacturers lack innovation and cannot make technological innovations and track transitions (A.D. Li & D.H. Zhu, 2016).

Organizational flexibility is reduced. As the external environment changes and competition intensifies, companies need to make timely adjustments in technology, talent, research and development, and services. Companies are more inclined to rely on partners to gain more common knowledge base, which will hinder new companies to create new ideas, because new companies and partners regularly interact, absorb and develop a common knowledge base, and the locking interaction between network partners is reduced. Organizational flexibility (J.F. Yuan Jianfeng & Z. Xu, 2017). faced obstacles to institutional rigidity, unable to adjust in time to adapt to changes and make production locked in sub-optimal choices (Q. Zhang, 2015), and restrictions with those not in the network The main body in the establishment of a cooperative relationship.

4. CONCLUSIONS AND PROSPECTS

4.1. Countermeasures and Recommendations

The relevant conclusions of this study also have certain practical guiding significance for the management practices of government departments and manufacturing enterprises.

First, companies need to maintain the appropriateness of social network relationship embedding, focusing on limited time and energy to identify high-quality resources and

effectively avoid network lock-up, play a "relationship advantage", avoid "relationship traps", and thus obtain more quality resources.

Secondly, enterprises need to know exactly what innovation "obstacles" they encounter, how these "obstacles" make enterprises locked in the old technological track and unable to make a smooth transition, and judge and choose the appropriate innovation strategy according to their own technological characteristics, competitive environment and locking effect.

Finally, cultivate the openness of businesses and entrepreneurs within the network. On the one hand, encourage entrepreneurs to dare to abandon those relations that hinder development, break through the locking effect, and promote the effective flow of various resource elements; on the other hand, encourage them to broaden their horizons, actively communicate and cooperate with external enterprises, and open their minds. To face the competition inside and outside the innovation network.

4.2. Research Outlook

By combing and analyzing the classification, causes and effects of enterprises entering the network lock in the innovation network, the article discusses that the embedded innovation network of enterprises is affected by the negative response of network lock-in. It is found that future research can be based on this theory and perfected by means of empirical research.

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