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The Mechanism of Independent Innovation Based on Knowledge Transfer

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Abstract—It is of great importance to carry out independent innovation national strategy for constructing innovation country, but at home and abroad lacking research or making consensus of the mechanism of independent. Based on the perspective of knowledge transfer, this paper firstly does define the concept of the independent innovation. Secondly, analyzes on the circulate process of knowledge transfer. Lastly, according to the process of knowledge transfer, we dissect the mechanism of independent innovation minutely, having certain realities and theoretical significance.

Keywords—knowledge transfer; independent innovation; mechanism

I. INTRODUCTION

The literatures for the interaction between knowledge innovation, knowledge transfer, innovation model and independent innovation at home and abroad, mainly from the level of industrial chain level[1], the level of multinational companies[2], organizational point of view[3] and their internal model of innovation in companies[4], and product innovation in knowledge transfer[5], focus on the relationship between knowledge transfer and knowledge innovation, the relationship between knowledge transfer and innovation model and the relationship between innovative models and independent innovation, but the studies about the relationship between independent innovation and knowledge transfer, only confine to the interior or exterior in organizations, and there are few research on how the independent innovation happen in an organization. Therefore, based on the core elements of organizational innovation—knowledge, from the perspective of knowledge transfer between organizations and within the organization, this paper analyses the mechanism of independent innovation, which has theoretical research value and practical significance.

II. INDEPENDENT INNOVATION BASED ON KNOWLEDGE TRANSFER

There are many literatures about the general model of knowledge innovation and knowledge transfer, mainly describing the object and the manner of knowledge transfer, and the relationship between knowledge transfer, knowledge creation and innovative model. However, few models in these literatures discuss from the perspective of knowledge transfer which combines with innovative models.

A. The Concept of Independent Innovation Based on Knowledge Transfer

Teece put forward the idea about knowledge transfer; he thought enterprises can accumulated a large number of cross-border applied knowledge through the international transfer of technology [6]. Davenport & Prusark considered that knowledge transfer is a process in which the source of knowledge transfers to other organizations and departments. Sue Newell said knowledge transfer was recycled process of knowledge which was created by individuals or groups in the organization. Vito Albino (1998) summed up the four knowledge transfer framework: the main body of transfer, the transfer situation, transfer contents and transfer media [7]. Szulanski thought knowledge transfer in certain situations was information dissemination process from the knowledge from source cell to cell to accept. Wu Jie (2006) suggested from the source of organizational knowledge point of view, knowledge transfer can be divided into two levels. The first layer from knowledge transfer within organizations, such as knowledge sharing and creation, transfer and learning in research and development departments, process design, manufacturing sector, supply and sales department and between departments above-mentioned, was the micro-level of organizational knowledge transfer; the other layer from knowledge transfer between the organization and the outside , including knowledge transfer which happens between enterprises, universities, research institutions, or countries, belonged to the macro-level of organizational knowledge transfer[8]. The knowledge transfer referred to above, is one-way transfer process from source cell to cell to accept in the organization level or within the interior of organization, but knowledge transfer of independent innovation is cycled process between inter-organization and within the organization.

In the 16th Fifth Plenary Session, it is definitely suggested to put enhancing the ability of independent innovation as a national strategy, which is committed to building an innovation-oriented country. We should vigorously develop key technologies and core technology of our own intellectual property rights, and strive to improve the ability of the original innovation, integrated innovation and the introduction-
digestion-absorption re-innovation. Professor Fu Jia-ji (1998) pointed out that independent innovation strategy treats independent innovation as the basic goals. The so-called independent innovation is the innovation activities that enterprises produce technological breakthroughs, break through technical difficulties through their own efforts, and rely on their own innovation capacity to drive the follow-up session, then complete the commercialization of technology, gain commercial profits, and achieve the desired objectives [9].

In this article, independent innovation based on knowledge transfer are some innovation activities that organizations rely on their own strengths and attain continual competitive advantage through internal knowledge creation in organization and knowledge transfer between insides and outside of organization. The purpose of independent innovation is to win the continual competitive advantage, namely, whether through organized the original innovation, integrated innovation or the introduction-digestion-absorption re-innovation, the innovative technology and results formed in the end do not depend on others, but is produced by their own independent innovation, otherwise, it is impossible for independent innovation. In addition, knowledge creation of organizational interior is usually described by the original innovation; the knowledge creation through knowledge transfer between inside and outside of organization and in the interior of organization is apt to introduction-digestion-absorption re-innovation; integrated innovation mainly is integrated by the organizational external transfer and internal knowledge.

B. The Knowledge Transfer Process of Independent Innovation

Based on the realistic observation of knowledge transfer process, many scholars have put forth a theory model of knowledge transfer, one of them is the four-stage model proposed by Szulanski (1996): the initial stage, the implementation phase, the phase of adjustment and integration phase [10]. Based on Szulanski’s study, Vito Albino (1999) proposes the four-part analysis framework of knowledge transfer: the main body of transfer, the transfer situation, transfer contents and transfer media [7]. According to the characteristics of the activities of knowledge innovation, Nonaka advances the well-known “SECI” model, which divides the activities knowledge innovation into four modes: commonage (the individual to the individual, the hidden to the hidden), presentation (the individual to the group, the hidden to the dominant), association (groups to organizations, the dominant to the dominant), internalization (the individual to the organizations, the dominant to the hidden). Jeffery&Bing-Sheng Teng (2003) proposed a simplified model on the basis of the previous knowledge transfer research, the model includes four parts: the source of knowledge, the receptors of knowledge, the transfer of knowledge and the scenarios of transfer. On the basis of research of Hansen (1999) and Szulanski (2000), M.Millie Kwan&Yak-Keung Cheung (2006) proposed the four-stage model of knowledge transfer: motivation, matching, implementation and retention [11].

According to comprehensive analysis about the models of knowledge transfer and the characteristics of independent innovation, we believe that knowledge transfer based on independent innovation is a cycled process through internal and external demand, matching, absorption, integration, creation and application in market conditions. The cycled process includes the cycle of inter-organization and the knowledge cycle within the organization on market conditions. As shown in Figure 1:

1) Knowledge Demand

Szulansk explicitly pointed out knowledge transfer process started in the discovery of knowledge gaps; Gilbert found that knowledge transfer began in discovering new knowledge. Garavelli implicated that "knowledge transfer began in demand for knowledge". Knowledge gap refers to the gap between the existing knowledge and required goal knowledge to complete a task or reach a certain level [11]. In this article, knowledge demand in the process of independent innovation is caused by the intersection of internal and external knowledge gaps of organizations. On one hand, it is triggered by the knowledge gap laying in organizational external market, that is, the gap between market demand for products and services or the knowledge demand of innovation partners and with existing supply for goods and services, which belongs to a pull-up demand. On the other hand it is caused by the knowledge gap within the organization, that is, the gap between organization's own knowledge and required innovation knowledge to achieve certain goals, which belongs to push-type demand. Only the intersection of the two knowledge gap occurs, the knowledge demands of independent innovation have the conditions to happen.

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Knowledge transferred, and create new knowledge, the reliance mainly on their own ability to absorb and integrate knowledge and the provision of new products and services. After a series of knowledge transfer, although organizations put the new created things into commercialization, and then into market.

### Knowledge Matching

Knowledge matching is the process that organization search appropriate knowledge or absorbing objects of knowledge for knowledge demand. In the process of independent innovation, knowledge matching and knowledge demand is an interactive process, both in equal status. Unlike other forms of knowledge transfer process, knowledge matching emphasizes that knowledge demand in the organization passively accept external knowledge to a certain degree. However, in the process of independent innovation, it is stressed that knowledge matching is more objective to seek external knowledge. Knowledge transfer doesn’t enter into the next phase until knowledge demand is met by repeated matching.

### Knowledge Absorption

Knowledge absorption is the process that individuals who create knowledge digest the knowledge matched co responsively according to innovative goals of the organization. Knowledge which enters this stage though knowledge matching carries on digestion and absorption integrating innovative ways of independent innovation. For example, individuals go on digestion and absorption according to the fundamental objectives of the original innovation, integrated innovation and introduction-digestion-absorption re-innovation of independent innovation and the individual absorption ability, which make its purpose more clearly.

### Knowledge Integration

Knowledge integration is the process that knowledge creation teams make the knowledge absorbed by individuals into consecution according to the goals of independent innovation. There are two ways of knowledge integration, one is a systematic way through the optimal mix of knowledge various parts, in order to form knowledge with a better function on the whole; the other is the way through the digestion and absorption of knowledge to become structured. The integration in different ways affects the type of knowledge creation in the next phase.

### Knowledge Creation

Knowledge creation mentions that organizations deal with integrated knowledge to create new things by using the mode of independent innovation. The new things created by knowledge include new knowledge, the prototype of new products, and the prototype of new services. This phase can be said to be a process in which organizations conceptualize the new integrated knowledge according to the organizations' innovative requirements combined with the knowledge of individual, the team even the organization, and then form a new knowledge, products, services and their prototypes.

### Knowledge Application

Application of knowledge is the process in which organizations put the new created things into commercialization relying on their own ability of independent innovation. This process includes the exchange of new knowledge and the provision of new products and services. After a series of knowledge transfer, although organizations rely mainly on their own ability to absorb and integrate knowledge transferred, and create new knowledge, the prototype of new products and services, but the most important step in the process of independent innovation is to put new created things into commercialization, and then into market.

### ANALYSES ON THE MECHANISM OF INDEPENDENT INNOVATION BASED ON KNOWLEDGE TRANSFER

From the knowledge transfer based on the process of independent innovation in the analysis, we can see that independent innovation is inter-organizational cycled process within the organization and on market conditions. Strictly speaking, it is impossible to divide independent innovation process into the various stages clearly, each stage is a certain order in the logic, and each stage has more reciprocity and cross-cutting. in practical application.

The process of independent innovation is caused by the intersection of two knowledge gaps firstly on market condition, that is, knowledge demand. One knowledge gap occurs between organization's own knowledge and required innovation knowledge to achieve certain goals, the other knowledge gap occurs in the environment of main bodies associated of innovation and pubic innovation environment (1). The main body associated of innovation is cooperation partners in the process of organization’s independent innovation. It can include other companies, universities, research institutes, intermediary organizations and even government departments. The environment in which main bodies associated produce symbiosis is called as the innovation environment associated. Other external environment organizations to support the promotion of organization’s independent innovation is call as the public innovation environment, such as the support policies and regulations of independent innovation awarded by the government, market demand for products and services, and so on.

Knowledge demand formed in the process of independent innovation is to be a prerequisite to move knowledge from the outside to inside of organization. However, phase mark of the beginning of knowledge transfer is knowledge matching (2) stage. Knowledge matching play a substantive role as the "filter", in this stage, the interaction between knowledge demand and knowledge matching lies in knowledge communication between individual and individual in the internal and external environment of organization. if specifically mentioning the innovation environment associated, Knowledge matching is not only the critical stage in which main bodies and organizations associated innovate independently and transfer knowledge, but also the substantive beginning for knowledge transfer cycle in the interior of organization. After the knowledge matching, the knowledge goes into the inside of the organization essentially.

The main part of Independent innovation is three different ways of independent innovation, the individuals of independent innovation assimilate and digest knowledge according to the manner and purpose of independent innovation and the absorptive capacity of individuals (3) and form the knowledge of innovative team, and put the assimilated knowledge into integration (4), then send it to the knowledge base of organization, and form a coherent knowledge which is easier and more suitable for organizations to create knowledge. After
accumulating coherent knowledge in a certain degree, organizations create new things in the interaction of its own innovation knowledge (5), at the same time, organizations classify new things based on the external market demand and the follow-up innovation demand inside. On the one hand, some of the new things get access to external application (6) stage based on market demand of organizations, that is, created knowledge is put into commercialization, and form new products and services. On the other hand, some of the new things get access to the internal circulation of knowledge transfer for maintaining sustained competitiveness. The analysis of the mechanism of independent innovation based on the knowledge transfer is as shown in Figure 2:

Figure 2: The mechanism of independent innovation based on knowledge transfer

A. The Mechanism of the Original Innovation Based on Knowledge Transfer

We believe that the original innovation based on knowledge transfer has always been a new source of independent innovation and pushed independent innovation to a new climax. The process of original innovation begins at knowledge gap. The knowledge gap of the original innovation combined with the target to form the organizations’ continued competitiveness and generate the knowledge demand as power sources. By the way, the knowledge demand is mainly caused by the knowledge gap within the organization. At the same time, after the matching, “filters”, the knowledge assimilated in the two ways of integrated innovation and introduction-digestion-absorption re-innovation comes in with the primary original innovation knowledge and integrates into new innovative resources, begins knowledge creation, and update the primary ability of original innovation and contributes to new knowledge gaps and promote the application of knowledge. Contribution to new knowledge gap is the power source of the follow-up independent innovation and brew new round of independent innovation, this operation form a cyclic process within the organization; in the process of the application of knowledge, commercialization and exchange of knowledge will enable independent innovation to the greater cycle, break the cycle within the organization, expand to the cross-organizational cycle under the market conditions. From this perspective, the original innovation is not only an extension of the innovative cycle, but also opens a new innovation and sets off a new round of innovative upsurge.

B. The Mechanism of the Integrated Innovation and Introduction-digestion-absorption Re-innovation Based on Knowledge Transfer

Original innovation, integrated innovation and introduction-digestion-absorption re-innovation as the three ways of independent innovation, are not absolutely separate innovative activities. On the mechanism of innovation, the integrated innovation and the introduction-digestion-absorption re-innovation have certain similarities and differences in the process of knowledge transfer. Similarities will not be repeated again, the differences can be analyzed as follows:

1) The differences in the power sources which produce knowledge demand.

Knowledge demand of independent innovation is produced by the interaction between the knowledge gap of the inside and outside of the organization. but the original innovation focuses more on the knowledge gap caused in the innovative environment within the organization; integrated innovation focuses more on knowledge gap or demand produced in the innovative environment of public market; the introduction-digestion-absorption re-innovation focuses more on the knowledge gap produced by the innovative main bodies associated in the innovative environment associated. After all, knowledge demand derives from the knowledge gap from different sides, but their main power sources have different emphasizes.

2) Differences in the purpose and ways of knowledge absorption and knowledge integration.

From the angle of innovative approach, introduction-digestion-absorption re-innovation is the protagonist in the process of knowledge absorption, the absorption of original innovation and integrated innovation at this stage is reflected in
the absorption of knowledge innovation individual, preparing the corresponding conditions for innovation, without a clear purpose like introduction-digestion-absorption re-innovation, which has been clearly demonstrated in knowledge matching stage. Introduction-digestion-absorption re-innovation links strongly to knowledge demand when it chooses main bodies in the innovative environment associated, that is, it is very careful to choose targets of knowledge absorption. The integration objective of integrated innovation is to gain a more systematic and coherent knowledge which is relevant to knowledge module associated with the innovation target and better embodies the system function. However, introduction-digestion-absorption re-innovation focuses more on innovation goals and integrates completely when assimilating knowledge, not just stay in the combination on the basis of integration.

3) The difference of dominant position in the innovative stage.

From the perspective of the innovation stage, we analyzed the original innovation is the power source of innovation in the innovation stage of independent innovation, and open a new innovation and push it to the climax of innovation; integrated innovation pays more attention on the stage of the application of knowledge, that is, the stage to put created new things into the commercialization. the integrated innovation is reflected in the integration on the basis of the existing and available innovative results or products and service, therefore, integrated innovation is more direct to provide the new products and services in the commercial stage; the results of original innovation are apt at the exchange of knowledge and the fundamental knowledge technology; introduction-digestion-absorption re-innovation in innovative stage between these two innovations, in the stage of application of knowledge, new products and services make certain contributions to the exchange of knowledge. So in the innovative stage, the dominant position of the three approaches of independent innovation is different.

In a word, the original innovation, integrated innovation and introduction-digestion-absorption re-innovation reflect the corresponding similarities and differences in various sectors, the similarities and differences in the innovative mechanism are based on the similarities and differences of the knowledge transfer.

IV. CONCLUSIONS

The process of independent innovation based on knowledge transfer is focused on the cycled process in the inside and outside of organizations. From the perspective of knowledge transfer, the article study the mechanism of independent innovation, and tell us how to take appropriate approach of independent innovation according to the allocation of resources in the organization’s innovative environment, associated innovation environment and public innovation environment or how to adopt the mechanism of knowledge transfer which is helpful for independent innovation. It was also indicated that the three approaches of independent innovation in the organization don’t operate in their respective independent manner, but run in a corresponding innovative manner or an innovation-oriented manner selected by integrating all kinds of innovative manners based on the combination of the innovated purpose and resources. But in nature, three innovative ways are the original innovation in three different levels, and the original innovation will always be the source of independent innovation and push it to a new climax, so that the research about the independent innovation transfer on the basis of knowledge transfer nail down the appropriate innovative ways of independent innovation and maximize the effectiveness of innovation, efficiency, therefore, this article has a theoretical research value and practical significance.

References