

# Research on Industry-University-Institute Cooperation Innovation in China from Perspective of Ambidexterity Theory

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Received: November 1, 2011

Accepted: November 26, 2011

Published: February 1, 2012

doi:10.5539/ass.v8n2p42

URL: <http://dx.doi.org/10.5539/ass.v8n2p42>

*This paper is sponsored by Natural Science Foundation of China (Grant NO.71073151)*

## Abstract

From view of ambidexterity theory, this paper studied the base, impetus and characteristics for industry-university-institute cooperation entity to achieve ambidexterity crossing boundaries, and discussed the causes and obstacles of ambidexterity ability construction in Industry-University-Institute Cooperation. We found that there should be distinct knowledge process and ambidextrous mode in China different cooperation forms and if industry-university-institute cooperation entities explored comparative advantages of each other, they should supply suitable factors according to different ambidextrous mode.

**Keywords:** Ambidexterity, Industry-university-institute cooperation, Cross-boundary, Innovation

## 1. Introduction

Nowadays, the development environment of enterprises becomes dynamic and complex. In order to adapt, the enterprises should not only develop the ability of using the existing knowledge, but also need to explore new technical knowledge and develop new products to build the capacity for future development (Simsek, 2009, pp.597-624).

Ambidexterity of the Organization is a research focus of the management science in recent years and becoming widely used in strategic alliances, technological innovation, new product development, market development and other research areas. This theory is likely to become a main research paradigm (Raiseh, 2008, pp.375-409). Some scholars have studied the nature, content, building mechanisms, consequences and the adjust variables of

the ambidexterity (Raiseh, 2008, pp.375-409; Zeki, 2009, pp.864-894). But these researches focused on a single organization. Only a few studies put emphasis on the cross-organization or use the ambidexterity theory to study the Industry-University-Institute Cooperation. Therefore, this paper attempted to provide a new research perspective and a new interpretation for study of Industry-University-Institute cooperation with ambidexterity theory, and some policy proposals for the promoting of the cooperation and innovation were made.

## **2. Ambidexterity and ambidextrous organization**

The Ambidexterity can be understood as the hands of a person, and a man can use his hands to deal with two matters effectively at the same time, and it also means that organization can implement two different or even competing activities at the same time. The two activities can be exploration and development (Simsek, 2009, pp.597-624). Duncan (1976, pp.167-188) firstly used the ambidexterity to study the organization and he claimed that part of the organization should be focus on the exploration, and other part should be focus on the development to response in the complex environment (Duncan, 1976, pp.167-188). March (1991, pp.71-87) described the learning on the exploration and the development systematic. Tushman and O'Reilly (1996, pp.8-30) made a further development on the research of ambidexterity. They thought that the capabilities, the systems, the incentive processes and the culture must be match to the sub-unit of the organization (Tushman, 1996, pp.8-30).The development use the existing knowledge and capacity to provide services to the existing markets and customers. But the exploration builds the new knowledge, capacity and products to provide services to new market or potential customers (March, 1991, pp.71-87; Tushman, 1996, pp. 8-30; Levinthal, 1993, pp.95-112). Long-term success organizations are often Ambidextrous, and they have not only the ability to compete in the current market but also the ability to reconstruct the assets and organization to adapt to new markets (O'Reilly, 2008, pp.185-206; Tushman, 1996, pp.8-30). According to the channels of be ambidextrous, we proposed the structure-based ambidextrous organization, context ambidextrous Organization and leadership perspective ambidextrous Organization.

### *2.1 Structure-based ambidextrous organization*

There are two types of sub-units in the organization, and one part of the sub-units is responsible for exploration and the others are responsible for the development. The two types of the sub-units have different strategic objectives and operational system, but they are tightly coupled in the level of the entire organization (Benner, 2003, pp. 238-256).

### *2.2 Context ambidextrous organization*

The organization designed the context to achieve the Ambidextrous, and it requires the establishment of the system, the processes and the beliefs that matched with the organization to encourage and shape individual behavior. And this allowed the employees to decide how to deal with the allocation of time between exploration and development (Gibson, 2004, pp.209-226). High performance and high social support will encourage the optimal allocation of time and the ambidexterity of the organization.

### *2.3 Leadership perspective ambidextrous organization*

The leaders of the organization can mediate the ambidextrous conflict. The organization can be implemented in exploration and development by making decisions on the organization, culture, and resource allocation (Smith, 2005, pp.522-536). The leadership capacity is the key factor that the organization achieve the ambidextrous ability (Simsek, 2005, pp.69-84). The leadership characteristics are important to the leadership perspective ambidextrous organization. Heterogeneous team members, the consensus of exploration and development, smooth information exchange and joint decision-making behavior can promote integration and improve Ambidexterity of the organization (Lubatkin, 2006, pp.646-672; Simsek, 2005, pp. 69-84).

These three types are the most frequently mentioned in ambidextrous organization, and they are all achieving ambidexterity through the different business units or organization level in the same organization, what's more they stressed the importance of all the executive teams. So some scholars claimed that the three kinds of ambidextrous organization models are not exclusive but complement (Gibson, 2004, pp.209-226; Birkinshaw, 2004, pp.47-55). The ambidextrous models that an organization used could be adjusted over time (Raiseh, 2009, pp.685-695).With future research, some scholars believe that the exploration and the development can be achieved through the network relationship or different alliances (Lavie, 2006, pp.797-818; Michel Ferrary, pp. 181-192).Some scholars begun to empirical analysis of ambidexterity in strategic alliances and inter-company network. (Tiwana, 2008, pp.251-72; Im, 2008, pp:1281-1296)

### 3. Ambidextrous characteristics of industry-university-institute cooperation

The knowledge, ability and the distribution of resources do not match but separated, so not all the organizations have the conditions to constructed ambidexterity by themselves. But through the cross-boundary combination of exploration and development activities, the organizations can not only obtain complementary elements and abilities but also achieve the ambidexterity (Filiou,2008, pp: 1-6).The model of obtain ambidexterity by exploration and development activities in different organizations and balancing the relationship of the organizations is similar to the structure-based ambidexterity (OP Kauppila, 2010, pp.283-312). A large number of literature shows that cooperation are the most important way that organizations obtain the knowledge, skills and resources from each other, and the unions or the alliances can reduce the resource consumption on single organization. It will reduce the economic risks especially in the instability environment. Accordingly, the complementary is the basis for the organizations focusing on the exploration and development activities themselves and with their partners. Obtaining the exploration and development abilities is also the key purpose of establishing the alliances or partnerships relationship (Russo, 2010, pp.30-45).

#### 3.1 Ambidextrous basis for industry-university-institute cooperation

Universities or the institutions have high complementary with industries on the resources and capabilities, and they all need the relationship of symbiotic (Si Shangqi, 2009, 15-19). The organization could be an university, a research institution or an enterprise, will establish a relatively strong competitive advantage in some particular areas but it may not do so well in other areas. The universities and the institutions are good at research activities based on their existing knowledge but they are weak on the commercialization of their research achievement (Tina, 2008, 1424-1447). As knowledge creators, disseminators and users, universities and research institutions have advanced research equipment, a large number of outstanding researchers and best technological knowledge accumulation. They have insight and research capabilities of new technology developing and breakthrough innovation. However, universities and research institutions often do focus on the production of new knowledge but do ignore the potential needs of the market and the customers, and their ambition and capacity for their achievements to be industrial are insufficient. So many excellent achievements can not be translated into practical productive forces. The enterprises are emphasis on the application of existing knowledge and commercialization of existing products, but their importance on exploration of emerging technologies are not sufficient. As the main market-oriented economy subject, enterprises do focus on the real economic interests. They are interesting in development activities which are short-term, quick profitable .They stressed on the research of application technology, and they do more continuous, progressive technology research or development based on existing knowledge or products. They put little into the uncertain profitable or long-term exploration of technical or knowledge. However, enterprises can understand deep and sense rapidly in the demand and changes of markets. The enterprises have the basis of resource, knowledge and ability in the industrialization of research findings.

The complementary of enterprises, universities and research institutions provides a reasonable basis for the ambidextrous cooperation. Industry-University-Institute Cooperation Innovation will help all subjects build their ambidextrous abilities. What's more it can help them across the "Death Valley" of the technology innovation chain and promote the development of new industrial technology.

#### 3.2 Achievement of ambidextrous abilities in industry-university-institute cooperation innovation

From the perspective of trading governance, the main mode of industry-university-institute cooperation can be divided into market-based cooperation mode, pre-market cooperation mode and integration cooperation mode. Market-based cooperation mode includes research achievements transferring, consulting services, technology licensing, commissioned development and other forms. The pre-market-based mode includes forms of cooperating development, building institutions together, setting up enterprises and so on. The industry-university-institute cooperation innovation process is not only the process that both subjects obtain abilities to explore and develop, but also the process that fund, information, and talent flow. In the market-based cooperation mode, the enterprises introduced technological achievements from universities and research institutions to achieve the development or exploration of new products and new technology. The universities and research institutions can obtain the funds from the enterprises to begin their further research. In the mode of pre-market-based, the cooperation of the two subjects show closer with more frequent communication, and both can achieve strong ambidextrous abilities. The both sides will take part in the exploration activities of existing knowledge and new knowledge. It can be described in Fig.1.

<Insert Figure 1 Here>

#### **4. The causes and obstacles of ambidexterity ability construction in Industry-University-Institute Cooperation innovation Entities**

##### *4.1 The causes of ambidextrous ability construction in Industry-University-Institute Cooperation innovation Entities*

Universities and research institutions play important roles in national innovation system, and they should take the responsibility of the accumulation, creation and dissemination of new knowledge and they are very important to one national innovation and competitiveness. As the constraints of the resources, the environment, the talent, and economy can not achieve sustained economic growth through high capital accumulation. It must rely on the creative and competitive use of knowledge (O'Shea, 2004, pp.1081-1104). With the rise and development of the knowledge economy, life cycles of product and technology are getting shorter. The economic activity demand of new knowledge and new technologies increases. Both the policy maker and the industry are increasingly aware of the importance of the new knowledge and the new technology. To promote the new technology-based economic development and the formation of the competitive advantage, universities and institutions are required to do more in the transferring of knowledge and commercialization of S.&T. achievements. But the funds from the governments are limited, universities and institutions are difficult to attract more outstanding researchers and buy more advanced equipments. So they have the needs and the motives of transferring and commercializing their research results to obtain more research funds. By providing S. &T. Knowledge, research achievements, abilities and research resources and the products development with the enterprises, universities and institutions can transform the skills and knowledge into economic productivity better.

To the enterprises, the technology as a source of competitive advantage and an important strategic asset has become a key factor in the competition. In reality, however, companies usually put too much economic resources, research resources and management resources on the existing technical path but few on new technology and new knowledge. The Corporate culture also tends to do the development activities rather than the uncertain exploration activities. The limitations of the resources and knowledge greatly restricted the exploration activities of the enterprises. However, the enterprises need to explore new technology and new knowledge constantly to seize opportunities and gain competitive advantage in an uncertain future. Through exploration and research activities, enterprises can determine the technology needs for future and make right technology strategy for the commercialization. However, the enterprises always focus on development activities, and they always put much exploration activities into external subjects such as universities, research institutes.

##### *4.2 The obstacles of ambidextrous ability construction in industry-university-institute cooperation innovation entities*

Although through the Industry-University-Institute cooperation which is a kind of cross-boundary way to construct ambidextrous can make full use of the advantage complementary participation, and realize the balance of the development and exploration. But the development and exploration activities are quite different in organizational structure, mode of thinking and cultural atmosphere, and in addition that universities and research institutions have diverse value orientation and capability basic, so the construction of the ambidexterity can not be realized without conflicts.

Although enterprises really need new technology and new knowledge, the focus they pay attention is mainly about the current market competition and profit purchase, and most of the resources and labor are invested in such areas, which caused the lack of the investment in new technology and new knowledge. The scientific and technological resources in enterprises are mainly used to application and development, so the scientific researchers are mainly practical workers who are lack of new theory, new knowledge and know little about the frontier technology, which lead the lack of the innovation. What's more, scientific research and development activities of some enterprises are totally gain from market, the technician in such kind of enterprises only to engage in maintaining the daily production operation activities, or just communicate with the research institutions. In China this situation is more popular, except some large and medium-sized enterprises, many manufacturing factories mainly not to do research and development, and they just do the low level processing activities, when encounter technical problems they mainly need the help out of their factories. Such differentiation in resources and capabilities between the research institutions and enterprise for one hand create the base of the ambidextrous construction, and meanwhile also create barricade. The duty to innovate let research institutions have the enthusiasm to broadcast their new achievement, but the enterprises need to create and retain the competitive advantage, so usually they have the enthusiasm to keep secret and control the intellectual property. Inevitable misunderstanding and conflict will happen because of the differences in the inspiration and knowledge.

## 5. The knowledge process and ambidextrous model in Industry-University-Researcher cooperation innovation

In the Industry-University-Researcher cooperation, enterprises and research institutions focus their own comparative advantage, and through relation and interaction to develop their own capability which can be used to construct the ambidextrous ability, but there are obviously different in the cooperation process.

In the market model innovation process, the enterprises gain exploration capability through achievements transfer, technology licensing and commission development, and use its own commercial advantages and technology development ability to implement the development activities. While the research institutions get the fund from enterprise to realize the transfer of the knowledge and research achievements. In such kind of market model, the exploration and develop activities have been done separately in research institutions and enterprises, technology and knowledge flow into the enterprises in one-way, and the enterprise use explicit demand and intended use to control the research achievement. While in the pre-market cooperation mode like cooperation develop, joint establish entities, and cooperation technology venture, the research institutions and enterprise have a frequent and close relationship, and communication of information interaction, through which the knowledge can be created and communicated by the endeavor of both sides. The quasi-market cooperation innovation mode not only forms ambidexterity by join the research institutions and the enterprise, but also show ambidextrous by itself.

In cooperation development model, each side is in the equal status, usually the enterprise afford the fund and both sides invest some researchers to achieve the research aim together through the scientific advantages and resources universities and research institutions. In such process, the researchers in both sides through interaction and wearing in to decide the research and development technology route, and achieve the balance of development activities and exploration activities, which is like context ambidextrous. Co-constructed research and development entities included co-constructed key laboratory, co-constructed engineering technology research center and co-constructed technology development center, so co-construction research and development entities is a kind of long-term, common and interactive technology explore development cooperation way. In such form, both sides should to invest more researchers and scientific and technological resources and spent costly energy to establish management structure and operating system. The main entity plays a leading role is different in different cooperation form. In co-constructed key laboratory, the universities and research institutions usually plays the leading role but in the co-constructed technology development center usually the enterprises. In co-constructed research and development entities, the researchers learn knowledge from each other and create more, and during these courses the human resources training can be done. For this reason, such kind of organizational context not only needs support, trust, discipline and development, but also need brilliant organization leaders who have exploring and developmental consciousness and ability.

When the universities and research institutions do the technology venture through the co-constructed research and development entities, the universities and research institutions afford the research achievements and technical supports, mean while the enterprises afford the ability to complete the new achievements, industrialize an develop activities for the commercialization. In the whole process of the co-constructed research and development entities, there are frequent and continuous exchange of the employees and knowledge, and by learning each other on technical superiority and ability they create new knowledge. Because the cooperation technology venture involves two kinds of different activities which are technology research and commercialization, the employee in both sides should have conflict during the cooperation, and such condition needs a good ambidextrous scenario to promote the learning initiative, creativity and tolerance.

## 6. Conclusion

Facing the dynamic changeable environment, the ambidextrous organization not only can develop and utilize the current knowledge to deal with the current competition pressure, but also can deal with the development and change of the future, and can enhance competitiveness. Ambidexterity can be realized through the organizing the organization structure and arranging the situation inner the organization, and ambidexterity can also realized between the organizations through using complementary advantages. The universities and research institutions and enterprise have lots of complementary and comparative advantage, so there are broad cooperation basis and potential. Industry-university-institute cooperation entities can achieve the ambidextrous ability across the organization boundaries to explore and develop at the same time. However, in different cooperation innovation ways the have different knowledge processes. In the market model innovation process, the knowledge creation process is independent, while in the cooperation development model, the knowledge creation process comes from both sides, so the cooperation development model is more like the ambidexterity.

Because the exploration and develop activities need different procedures, skills and traditions, while the value-based, target and personnel specialty are quite different in universities and research institutions, the cooperation process will certainly have the inevitable conflict and excursion. Therefore in order to achieve the aim of the Industry-University-Institute cooperation, the universities, research institutions, and enterprises should follow these principles: Firstly, treat the innovation cooperation in an opening mind, have a good understanding of the importance of the exploration and development activities in the organization development during the dynamic changeable knowledge economy. Have the mind of establishing the organization ambidexterity, and reach an agreement of building an ambidexterity during the top of the organization. Enough and suitable recourse employees and sustaining system should be given to the exploration and development activities; Secondly, when establish the ambidexterity through the organization relationships across the organization boundaries, the differences of the marketing mode and pre-marketing model should be distinguished. Although the marketing mode is a kind short-term and project type cooperative relationship, the long-term framework cooperation agreement is also needed for the sake of promoting the knowledge formation and circulating in order to upgrade and transform of the knowledge achievement; Thirdly, according to the ambidextrous mode of the different marketing cooperation, launches the resources, system, process, culture, incentive and restraint system to arouse the enthusiasm of the cooperative innovation and initiative coordination, and maintains the consistency of the target. The leaders in different groups who charge the cooperation should have or studying the ambidextrous ability, make an agreement on ambidexterity, use diversity and heterogeneity human resources to form the top management team who are in charge of specific operation.

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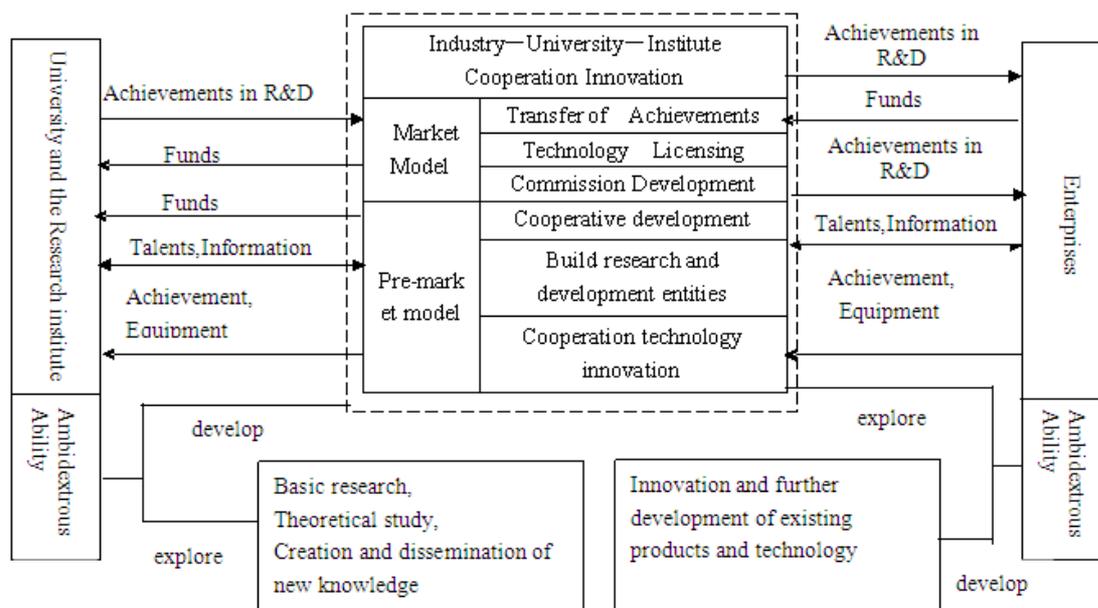


Figure 1. Achievement of Ambidextrous Abilities in Industry-University-Institute Cooperation Innovation