

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(12), 2014 [6077-6082]

Industrial alliance's innovation mechanism analyses : base on the network structure theory

Zhang Jian¹, Duan Shan², Huang Chun^{3*}

^{1,2} School of Public Affairs, Zhejiang University, Hangzhou310058, Zhejiang, (CHINA)

^{3*} College of Management, Zhejiang University of Finance and Economics, Hangzhou310018, Zhejiang, (CHINA)

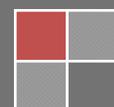
710466884@qq.com, 10705808 @qq.com, jasonhuang603@163.com

ABSTRACT

The paper took the number of technical agencies as a representation of the heterogeneity of overall network with various strategic alliances. Combined with the systematic arguments of existing researches, it summarized the function mechanism of information transfer, cost reduction and resource integration by the technical agencies within the alliance, and in the background of strategic alliance, it discussed the influence of special network characteristics within the alliance (technical agency) on the overall innovation performance of the alliance, and put forward the corresponding research hypothesis.

KEYWORDS

Alliance Mechanism; Alliance Innovation; Network Structure.



INTRODUCTION

In recent years, technical agency and alliance creation has aroused the attentions of researchers on management and industrial economics. The network structure of traditional alliance organization with industry-university-research cooperation always tends to be single, with enterprises, alliance of institutions of higher learning and relevant scientific research institutions either at upstream or downstream of industrial chains lacking of in-depth integration. The cooperation network of the industry-university-research cooperation alliance linked by large projects is restricted. Due to the differences of interests and values, the subjects within the alliance show a weak trend in expanding the network capacity and capability of drawing external resources, thus hindering the effective delivery of the network node energy. The roles of technical agency in the alliance are prominent, attaching sufficient attention to the delivery of innovation development between industrial chain and service chain, establishing the grid route with industrial chain as horizontal axis and service chain as vertical axis, and realizing a complete coverage of knowledge innovation and technological achievement transfer of institutions of higher learning in the network nodes. Yet, what are the roles of technical agency to the alliance? Whether technical agency can effectively promote the innovation of the alliance and promote the alliance performance, remains to be a problem to be solved.

THEORETICAL EVIDENCE OF THE RELATIONSHIP BETWEEN TECHNICAL AGENCY AND ALLIANCE

The researches on innovation network and regional innovation system provide a relatively complete analytical framework for us to analyze the roles of technical agency in alliance. We are convinced that the influences of technical agency on alliance enterprises mainly cover three mechanisms, i.e. information, cost and integration.

Information mechanism based on relations: Technical agency acts as a contributor of knowledge “spillover effects” in innovation network. The technological innovation can be considered as the process of new knowledge production and creation^[1], and upheld the characteristics of business cooperator in studying innovation^[2].

Cost mechanism based on trade: Technical agency performs the role of cultivating trust within the alliance. This is because that depending on the roles of technical agency as “channel of communication”, enterprises can communicate and promote the understanding and trust among each other^[3]. What's more important, depending on the corresponding “filtering” roles of the technical agency, the cooperating enterprises can gain certain reliability and reputation, making it possible to establish more extensive enterprise alliance and innovation network. Lee et al. indicated in their researches that the technical agency has the functions of promoting knowledge equity transaction among the enterprises, reducing technological transaction cost, promoting the establishment of innovation network and assisting the network members to establish trust mechanism^[4].

Integration mechanism based on resources: Technical agency acts as an “interaction platform” to assist the integration of the heterogeneity of different enterprises and the mutual complementary recourses. This is mainly reflected in the following two aspects: on one hand, technical agency can help the enterprises within alliance (especially small and medium sized enterprises) to gain such important resources as necessary fund^[5, 6]. On the other hand, as a critical communication channel, technical

agency makes possible the complementarities of technological demand and technological supply within the enterprises, and further expands the integration of the resources inside and outside the alliance^[7]. Although pointed out that scientific research institutions mainly affect the performance of enterprises in exploratory innovation, nowadays it undeniable that enterprises are unable to solely rely on their own to independently complete a series of complicated innovative behavior, and the network relationship has a critical bearing on whether they can gain certain knowledge, fund and personnel support^[8].

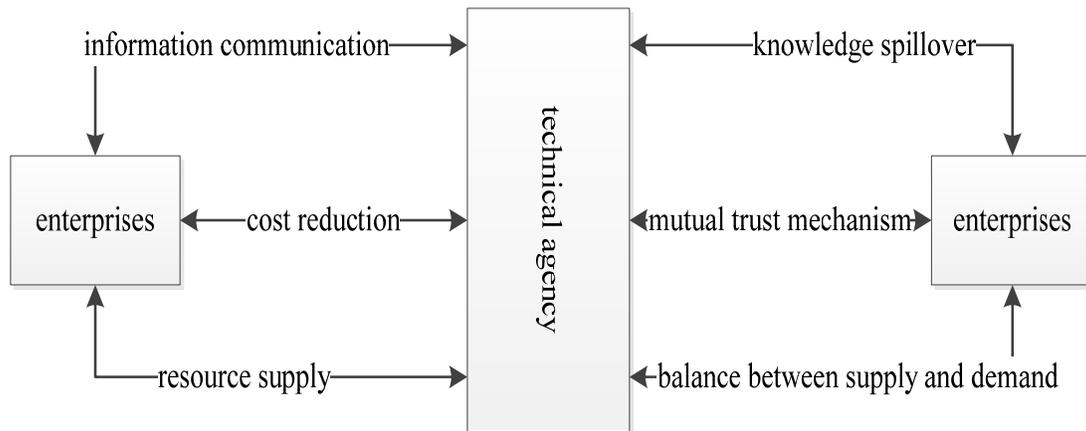


Figure 1 : Mode of action of technical agency

EMPIRICAL RESEARCH ON THE RELATIONSHIP BETWEEN TECHNICAL AGENCY AND ALLIANCE INNOVATION

Illustrations on data source

With the help from the personnel of relevant bureaus of statistics and economic and information commissions, we have collected 17 industrial cluster demonstration zones of Hangzhou City of Zhejiang Province. The 2012 cross-section data has verified the relevant hypothesis. In 2012, the 17 industrial cluster demonstration zones have realized a total industrial output value of 774.327 billion RMB, registering a year-on-year increase of 8.36%. Their total output takes 60.1% of the industrial output of above-size industrial enterprises in the city, with 0.61 percentage point increase compared with that of last year (TABLE 1).

Measurement of Variable

Independent variable. Technical agency The paper combining with the material gained, the paper incorporated the innovation platform, technology platform, industrial association (with technical service), institutions of higher learning/regional lab, center on industry-university-research cooperation/platform within specific cluster, into the statistics on the number of technical agencies.

Dependent Variable. Innovation performance Most of the traditional innovation researches apply number of patents to measure innovation performance and the paper followed this practice by taking number of newly added patents of the year as the measurement indicator of innovation performance.

Control Variable. The paper adopted corresponding replacement, by applying the weight coefficient of the enterprises within each industrial park to measure the degree of industrial clustering,

applied intensity of scale to distinguish the differences in type among the industries, applied science and technology input coefficient to describe this variable.

TABLE 1 : Part of the important strategic alliances in zhejiang Province

Name of the alliance	Industrial cluster	Core enterprise	Number	Other important enterprise members	Other types of members
Electric enterprises in Zhejiang Province	Hangzhou energy conservation and new energy industry	Wangxiang Automobile Co. Ltd.	25(above 90% alliance-industry overlapping rate)	Zhejiang Power-driven Automobile Operation Co. Ltd, Hangzhou Dayou Science and Technology Co. Ltd, etc.	Zhejiang University, Zhejiang Provincial Chemical Engineering College, Geely Automobile Research Institute etc.
low voltage appliance industry in Zhejiang Province	Wenzhou low voltage electrical appliance industry	Zhejiang Zhengtai Electrical Appliance Co. Ltd.	16/(above 95% alliance-industry overlapping rate)	Zhejiang Tianzheng Electrical Appliance Co. Ltd, Sentai Electric Co. Ltd, Zhejiang Delixi Co. Ltd, etc.	Wenzhou University, Hebei University of Technology
printing and dyeing industry with energy conservation and emission reduction in Zhejiang Province	Shaoxing textile industry	China Textile Research Institute	12/85%(above 85% alliance-industry overlapping rate)	Zhejiang Yataite Wide Painting and Dyring Co. Ltd, Xinchang Yufeng Printing and Dyeing Machinery Co. Ltd, etc.	Zhejiang Sci-Tech University, Shaoxing College of Arts and Sciences, China Textile Science Research Institute
macromolecule industry in Zhejiang Province	Wenzhou Ruian Macromolecule Industry	Huafeng Group Co. Ltd.	22/(above 100% alliance-industry overlapping rate)	Huatai Group Co. Ltd, Ruian Dongwei Plastic Co. Ltd, Ruian Aohua Plastic Co. Ltd, Ruian Weitai Plastic Co. Ltd, etc.	Ruian Macromolecule Research Institute
leathering cleaning and production industry in Zhejiang Province	Jiaxing Haining leather industry	Haining Mengnu Group Co. Ltd.	16/(above 90% alliance-industry overlapping rate)	Zhifu Group Co. Ltd, Brother Science and Technology Co. Ltd, Zhejiang Shengxiong Leather Co. Ltd, etc.	Wenzhou University, Haining Leather Research Institute, etc.
motive power generation for ship in Zhejiang Province	Ningbo ship building industry	Ningbo Zhongce motive power engine Group Co. Ltd.	10/(above 80% alliance-industry overlapping rate)	Ningbo Riyue Group Co. Ltd., Ningbo Huatong Electric Appliance Co. Ltd, etc.	Zhejiang University, Ningbo University

Data source: interior reference material from Zhejiang Provincial Economic and Information Commission.

CONCLUSION AND DISCUSSIONS

To test the hypothesis, the paper set two groups of model to do the test, of which dependent variable is the number of newly added patents, and independent variable and control variable remain unchanged. The paper applied SPSS 18.0 to conduct regression analysis. In order to prevent the occurrence of multi-collinearity, the paper calculated the VIF of the variable, and results show that the VIF of all variables are less than 3, so the multi-collinearity among the variables are unobvious. Finally, The model shows the general explanatory power is relatively sound.① when the significance level is below 0.1%, the regression coefficient between number of newly added patents and technical agency is 8.363, which indicates that **technical agency has positive promotion to technological innovation, and the hypothesis has been verified.** ② in terms of the variable, when the significance level is below 10%, the regression coefficient between degree of industrial clustering and the number of newly added patents is -4.607, which indicates that the degree of industrial clustering has negative effects on technological innovation, and within China's typical clusters the encapsulated mechanism plays a big role; the regression coefficient corresponding to intensity of scale and to time effect of technology is -2.484 and 3.525 respectively. Although the significance level hasn't been met, this is consistent with the expectation of previous economic studies, i.e. emphasizing that the big enterprises have weak performance in innovation and the chronicity of technological innovation. Of course, intensity of scale also indicates in another aspect that the enterprises in some industries don't purely rely on the advanced nature of technologies to gain their own competitive edge. When the significance level is below 0.1%, the correlation coefficient between science and technology input and the number of newly added patents is -251.651, which indicates that there is negative relationship between science and technology input and technological innovation in the year. It seems to be against the basic theoretical common sense, yet the paper upholds that this cannot deny the positive influence of science and technology input on technological innovation; rather it simply indicates that there is obvious time lag between the innovation input and output.

The paper took the number of technical agencies as a representation of the heterogeneity of overall network with various strategic alliances. Combined with the systematic arguments of existing researches, it summarized the function mechanism of information transfer, cost reduction and resource integration by the technical agencies within the alliance, and in the background of strategic alliance, it discussed the influence of special network characteristics within the alliance (technical agency) on the overall innovation performance of the alliance, and put forward the corresponding research hypothesis. By regression analysis of cross-section data of the 17 industrial clusters in Hangzhou City of Zhejiang Province in 2012, the paper verified the hypothesis and finds that there is a positive correlation between the number of technical agencies and technological innovation performance of the alliance. Therefore, technical agency plays very positive role in alliance as innovation "driver": technical agency can not only reduce the transaction fees of enterprises in the process of acquiring certain technologies, but also raise the possibility of the enterprises in obtaining mutual complementary resources. In the era emphasizing rapidly and dynamically meeting emergency, the above functions can reduce various operational cost, and raise the efficiency of enterprises in applying resources. At the same time, technical agency performs the function of "knowledge spillover" and "information channel", which indicates that the enterprises can take advantage of technical agency to obtain various technological information favorable to them, and expand the source of technological innovation resources, to assist

themselves to break the original technological path and realize true innovation featured by openness. Enterprises shall take advantage of their market forces, and actively and gradually integrate the alliance or platform with industry-university-research cooperation of technological innovation of various resources.

ACKNOWLEDGEMENTS

This work was financially supported by the National Natural Science Foundation of China (71303209), the Zhejiang Science Foundation of China (LQ13G030003).

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