

The Impact of Industry-Research Institute Collaboration Knowledge

Network on the Technology Transfer: A Case Study of Chinese

Academy of Sciences

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INTRODUCTION

Technology transfer from public-funded research organizations to industry is significant for the economic development of one country. Low technology transfer rate has become a serious problem for many countries especially for developing countries such as China, which is caused by lacking information communication channels and incentive motivation. The Chinese government has carried out some measures, such as legislation and subsidies, to promote the technology transfer from universities and research institutes to firms, but the results are not very satisfying.

Fortunately, the change of innovation paradigm gives a new way of technology transfer. With the development of opening innovation, enterprises also participate in the innovation activities and begin to collaborate with public-funded research organizations, which promote the information communication between academic circles and industry. Previous studies have detected whether there are some impacts of university-industry collaboration network on technology transfer and find the impact is positive (Lai, 2011). However, the knowledge network formed by this collaboration is always overlooked. Some technology fields are combined through this collaboration, which creates many technologies can be used to commercialize directly. Different technology fields in different knowledge network positions can reflect the commercialized potential of one technology field to some extent. So, detecting the impacts of technology field's position in knowledge network on their technology transfer can help firms or public-funded research organizations to make proper collaboration and technology transfer strategies.

In addition, innovation system in China is different from that in western countries. For example, in the United States, the main innovation actors are colleges and universities. A total of 80 % of basic research jobs and 28 % of applied research jobs across the United States have been taken by colleges and universities (Gao, Guo, & Guan, 2014). Therefore, the collaboration and technology transfer in western countries is mainly those between the universities or colleges and firms. But the case in China are different. Research institutes represented by Chinese Academy of Sciences (CAS) and universities are both the main public-funded research organizations. Research institutes play an equally important role to the universities in innovation. For example, in the Chinese biotechnology field, patent inventions have been primarily conducted by public research institutes (Z. Chen & Guan, 2011). However, studies of the collaboration and technology transfer between research institutes and firms are rare.

To fill gaps mentioned above, this study focuses on the industry-research institutes

collaboration knowledge networks, and detects the impact of different technology fields' network positions on technology transfer between research institutes and firms. We use CAS as a case study.

METHODOLOGY

We address this question by combining with analytical method of social networks and econometrics. Social network analysis (SNA) is always used to present and analyze the relationship of nodes representing authors, knowledge elements, organizations, etc (Wang, 2016). Different technology fields are combined in different technologies through industry-research institutes, which forms the knowledge network. By calculating the network indices, SAN can present the network position of different technologies fields. Therefore, SNA is suitable for our study. In addition, to analyze the impact of knowledge network on technology transfer quantitatively, we draw on the analytical model used by Guan (K. Chen, Zhang, Zhu, & Mu, 2017). He combined the SNA with econometrics and analyzing the impact of innovation collaboration network on innovation performance.

We use the patent data of CAS and design the research framework including three steps and show it in **Figure1**:

1) Step1: Patents are relatively mature technologies and the technology transfer always refer to the transfer of patent right. We download all CAS's patent data from website of Chinese Academy of Sciences Intellectual property as dataset1, including the information of patent assignee, IPCs, patent licensing, transfer of patent right, etc.

2) Step2: We extract patents of industry-research institutes collaboration from dataset1 as dataset2. Then, we extract the IPC which is always used to represent different technology fields from dataset2 and construct the industry-research institutes collaboration knowledge network. Degree centrality and structure hole are calculated as the main indices to describe the network position of different technology fields. Transfer of patent right is used to represent the technology transfer. We count the technology transfer number of different technology fields.

3) Step3: The degree centrality of one technology field represents its combinatorial potential, while the structure hole represents the combinatorial opportunities. To analyze the impact of the two characters on one technology field's technology transfer, we use degree centrality and structure hole as independent variables, and technology transfer number as dependent variable. Negative binomial regression is used to analyze the relationship between technology transfer number and degree centrality or structure hole.

RESULTS AND POLICY IMPACT/IMPLICATIONS

The analytical result show that: 1) technology field's degree centrality in knowledge network has inverted U effects on its technology transfer; 2) technology field's structure hole in knowledge network are positively related to its technology transfer.

This study uses CAS as a case and focuses on the impacts of technology field' s network position in industry-research institutes collaboration on its technology transfer. The results of this study can give a reference for CAS and firms to make proper

cooperative strategy aiming at transferring or getting technologies in specific areas.

Keywords: Technology Transfer; Industry-Research Institute Collaboration; Knowledge Network Position; Chinese Academy of Sciences (CAS)

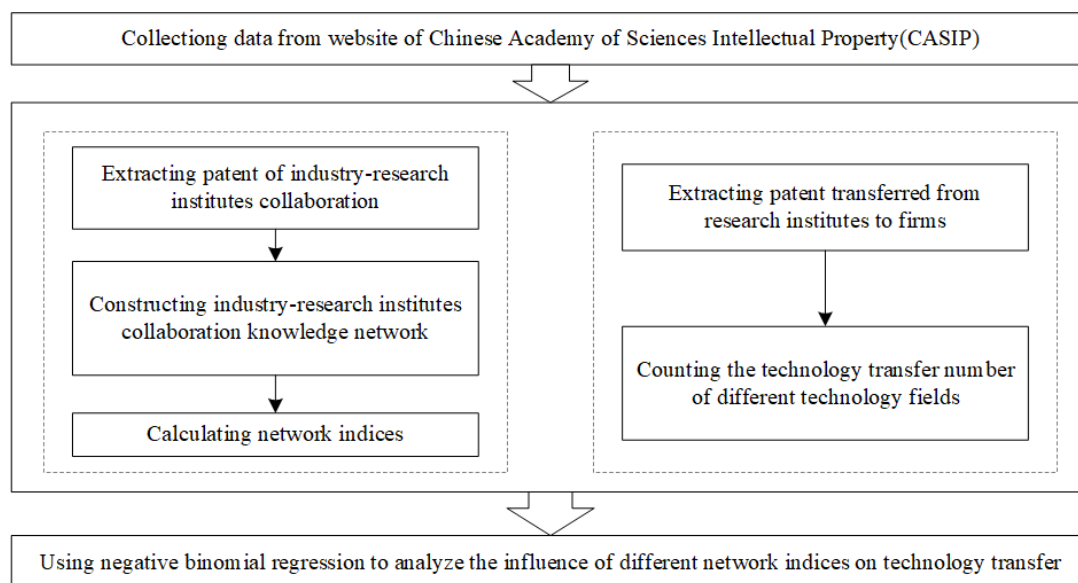


Fig.1 The research framework

REFERENCE

- Chen, K., Zhang, Y., Zhu, G., & Mu, R. (2017). Do research institutes benefit from their network positions in research collaboration networks with industries or/and universities? *Technovation*.
- Chen, Z., & Guan, J. (2011). Mapping of biotechnology patents of China from 1995–2008. *Scientometrics*, 88(1), 73-89.
- Gao, X., Guo, X., & Guan, J. (2014). An analysis of the patenting activities and collaboration among industry-university-research institutes in the Chinese ICT sector. *Scientometrics*, 98(1), 247-263.
- Lai, W. H. (2011). Willingness-to-engage in technology transfer in industry–university collaborations. *Journal of Business Research*, 64(11), 1218-1223.
- Wang, J. (2016). Knowledge creation in collaboration networks: Effects of tie configuration. *Research Policy*, 45(1), 68-80.