Institutional Support and Openness of Open Innovation Practices in SMEs in China and the United States

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Abstract

This purpose of this paper is to examine the openness of open innovation in SMEs in China and the United States and examine the effect institutional support plays on openness. This research was based on a quantitative survey of 88 small and medium-sized enterprises in the United States and China. Institutional support was found to play an important role on the openness of open innovation in both countries; the correlation was more significant in China and thus resulted in a higher openness in China. This study shows that governments can play a dynamic role in facilitating the adoption of open innovation practices and that favorable government policies and regulations encourage more open innovation or external collaboration, as seen in the higher openness of SMEs in China as compared to the United States.

1. Introduction

Due to the effects of globalization and the improvements worldwide to transportation and communication, the world has become more connected and businesses have adapted (Blanchard and Shen, 2015). Traditional research and development (R&D) was focused on internally developing new products or services and distributing it to the market using internal paths (Lichtenthaler, 2009). The changes in the world have caused this traditional closed paradigm of innovation to face challenges and a new innovation paradigm known as open innovation to emerge (Chesbrough, 2011). Open innovation is different from prior models of innovation as it relies on both internal and external knowledge and internal and external paths to the market. Open innovation is becoming increasingly adopted through a variety of countries and is becoming a tool for numerous companies to expand their research and development and reduce costs (Buganza and Verganti, 2009). This study seeks to examine the following research questions:

1) To what extent are open innovation practices adopted in SMEs in China and the United States?
2) Does institutional support play a significant role in the openness of firms?

1. Literature Review.

2a. Institutional Support and Openness.

The majority of that literature that examines the role of institutions or government and open innovation, is focused on the adoption of open innovation practices in the public sector and government institutions. Feller et al (2010) highlighted that open innovation practices highlighted a fundamental transformation not just in the value creation and service delivery of public administration but also in the nature of their organization. In addition, Lee et al (2012) researched open innovation in the public sector of leading countries, finding that countries such as USA, Singapore, and Australia have adopted open innovation policies at the national level, and facilitate a positive open innovation climate.

The theory on institutional support and innovation shows that the government can play three major roles in facilitating and stimulation innovations (Rothwell, 1986). The three main roles that
institutional support plays in stimulation innovations are the role of a broker, a role in demand articulation, and a role in stimulating innovations (Faber et al, 2008). The government role of a broker is the role where the government enables the coming together of various actors in the innovation system; national framework conditions and public research infrastructure play a critical role in this government role (Faber et al, 2008). The government can also play a role in demand articulation where the government plays a key role in setting standards (Faber et al, 2008). This role is important as countries can gain a competitive advantage in compared to other countries through setting strict entry or environment standards (Porter, 1990). Finally, the government can also play the role of stimulating innovation (Faber et al, 2008). The government can play this role through a plethora of different approaches; amongst others this includes tax reductions, tax subsidies, financial support, and financial incentives.

2b. Open Innovation and Openness

Firstly, the literature began with the founder of the notion of open innovation, Chesbrough (2003), who illustrated the paradigm shift from a closed to an open model that has been occurring in the business world. Historically, R&D expanded due to the need for industries to maintain and improve their production activities (Chandler, 1990). On one hand, companies exploited the knowledge accumulated by internal R&D to develop new products, increasing their economies of scope, while on the other hand, the emergence of large scale R&D functions, created a barrier to entry through economies of scale (Chandler, 1990). The economies of scope and scale for internal R&D lead to a vertically integrated innovation model, where companies internalized R&D activities to fit their specific needs and commercialized R&D through internal development, manufacturing, and distribution (Chesbrough, 2006, p.5). In contrast to the closed innovation paradigm, Chesbrough (2003,2006) describes that valuable ideas can come from inside or outside the company and that these valuable ideas can be taken to the market from inside or outside the company. The main differentiation for open innovation compared to prior theories of innovation, includes equal importance between internal and external knowledge, a central business model to convert R&D into commercial value, outbound flows of knowledge and technology, a proactive and nuanced role of IP management, innovation intermediaries, and new metrics for measuring innovation capability, performance, and evaluating R&D projects (Chesbrough, 2006).

The next important phase of open innovation research was the groundbreaking work conducted by Laursen and Salter (2006), who described the openness of open innovation, examining the breadth and depth of open innovation. Laursen and Salter (2006) examining small and medium enterprises in the U.K manufacturing sector were able to analyze quantitatively the open innovation level of the firms and their link to firm performance by providing a questionnaire survey on the basis of the Oslo Manual. Laursen and Salter (2006) opened a Pandora box for open innovation research through quantitatively analyzing the extent of open innovation and this has lead to the opening of numerous other strands of open innovation research. Laursen and Salter (2006) The openness of the open innovation process is best described by the intensity or frequency of collaboration with external partners and the number of different partners used in the collaboration process (Inauen and Schenker-Wicki, 2011). Miotti and Sachwald (2003) have described the numerous possible actors who could be involved in cooperative R&D activities and collaboration.

2. Methodology

In this study, a quantitative strategy method is used. This method allows for collecting a large amount of data, quantifying it and performing a statistical analysis (Sauder et al., 2003). The primary data used in this study was collected through an online survey questionnaire. The respondents were selected using convenience-sampling method. According to the survey for this study, the selected samples were asked about the importance of information for their firm’s open innovation practices. The questionnaire was designed using a Likert rating scale of 5 levels, ranging from 1 = “Never” to 5 = “Very High”. The respondents were asked to point out to according to their own opinion the
importance or significance of each factor. Since the Likert rating scale is an ordinal scale, Mann-Whitney U tests were used to determine the identification of statistically significant differences of each dimension of the open innovation practices between the comparison groups. Furthermore, in order to find the correlation between the variable of institutional support and openness of open innovation, the researcher conducted an ANOVA analysis. The alpha level was set at 0.05 for all statistical tests.

The samples consisted of small and medium-sized enterprises of different industries located in both China and United States. In addition, they are SMEs that already conduct open innovation. The number of potential respondents was 657 in China and 459 in the United States. The number of valid responses was 55 in China (12 % response rate) and 33 in the United States (14 % response rate).

3. Results

The cooperation intensity in R&D projects was measured via collaboration with different partners. The result in Table1 present that SMEs in China more actively involved in collaboration with different partners than SMEs in the United States. The exception is the collaboration with universities and research institutes, which SMEs in the Unites States are slightly higher but not significantly different. There are four statistically significant differences between the groups (Asymp. Sig. < 0.05). Such a difference related to collaboration with end-user and retailer supplier, consumers, competitors and government agencies are seen between the groups, whereas SMEs in China are more collaborates with these partners.

Table 1: Difference in cooperation intensity in R&D projects with the following partners
Statistically significant at P < 0.05.

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>United States</th>
<th>Mann-Whitney U</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universities and Research Institutes</td>
<td>3.1321</td>
<td>3</td>
<td>3.2571</td>
<td>898.000</td>
</tr>
<tr>
<td>End-user and retailer</td>
<td>3.7736</td>
<td>4</td>
<td>2.942</td>
<td>542.500</td>
</tr>
<tr>
<td>Supplier</td>
<td>3.9245</td>
<td>4</td>
<td>2.771</td>
<td>410.500</td>
</tr>
<tr>
<td>Consumer</td>
<td>3.7170</td>
<td>4</td>
<td>2.742</td>
<td>522.500</td>
</tr>
<tr>
<td>Competitors</td>
<td>3.1509</td>
<td>3</td>
<td>2.257</td>
<td>558.500</td>
</tr>
<tr>
<td>Government agencies</td>
<td>3.3962</td>
<td>3</td>
<td>2.485</td>
<td>524.000</td>
</tr>
<tr>
<td>Innovation Intermediaries</td>
<td>3.2075</td>
<td>3</td>
<td>3.114</td>
<td>887.000</td>
</tr>
<tr>
<td>Companies in other industries</td>
<td>3.3585</td>
<td>3</td>
<td>3.0286</td>
<td>737.000</td>
</tr>
</tbody>
</table>

Table 2 shows the result of the regression run between institutional support and openness of open innovation. The coefficient for institutional support was found to be statistically significant and positively correlated to openness of open innovation. Since Sig. values for both of the countries in the table show a significant level (p-value < 0.05), this demonstrates that institutional support significantly affects the openness of open innovation for SMEs in both countries. The result shows a positive relationship between the variables measured; Openness and Institution support. This implies that the greater institution support, the higher the probability that the firm will be more openness toward open innovation.
Table 2: The significant effect of institutional support on the openness of open innovation practices.

<table>
<thead>
<tr>
<th>Variables</th>
<th>China</th>
<th>The United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>S.E.</td>
</tr>
<tr>
<td>Constant</td>
<td>9.979</td>
<td>5.249</td>
</tr>
<tr>
<td>Institution Supports</td>
<td>1.124*</td>
<td>.330</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.185</td>
<td></td>
</tr>
<tr>
<td>ANOVA F ratio</td>
<td>11.563</td>
<td></td>
</tr>
</tbody>
</table>

Note: Institution Supports include government policies and programs that have been beneficial to your company’s operations, government provides technology information and technical support to your company, government provides financial support as well as government assists the obtaining of licenses for imports of technology, manufacturing and other equipment. The institution support variable is the sum value of those items.

5. Discussion.

One of the key factors in explaining the higher openness of Chinese SMEs as compared to those of the United States is that open innovation is merely a new concept in China not a new practice (Fu and Xiong, 2011). Traditionally, R&D activities lead to a vertically integrated innovation model, where companies would fit their specific needs into the R&D process and commercialize innovation through internal development, manufacturing, and distribution (Chesbrough, 2006). The change, where valuable ideas can come from both inside and outside of the company boundaries, occurred in the early 2000’s with the expansion of globalization (Chesbrough, 2003, 2006). The literature, which focused on the United States and other Western countries, highlighted a drastic change in R&D and showed an increase in adoption of open innovation practices throughout the years. In China, on the other hand, even though open innovation is a new concept it is not a new phenomenon (Fu and Xiong, 2011).

Although open innovation is a new term, intense collaboration and relative openness has been common practice for plenty Chinese firms since the opening up policy of 1978 (Fu and Xiong, 2011). In the past decades, Chinese Science and Technology policy has undergone several distinct phases or milestones (Liu, 2008). With the opening up policy of 1978, China had to change its economy and innovation from a closed innovation model in a planned economy to a significantly more collaborative innovation model and economy in terms of a ‘catch-up strategy (Fu and Xiong, 2011). The first open strategy involved importing technology and know-how and assimilating it into the local economy in order to improve quality and performance or management but also to reduce costs (Fu and Xiong, 2011). The external absorption of advanced technology from foreign firms enabled a rapid improvement in manufacturing and technology application capability, whilst also broadening the source of innovation knowledge (Fu and Xiong, 2011). Furthermore, joint ventures are a key foreign entry mode into China for numerous foreign companies and have a positive effect on the openness in China (Yan, 2000). Chinese openness has also traditionally benefited from an influx of foreign direct investment (FDI) into the country since the opening up policy (Yan, 2000). FDI has improved management, local production, and marketing system through the introduction of capital and technology, management, and marketing know-how (Yan, 2000). Since the turn of the millennium, Chinese firms have also increased openness with the ‘go global’ strategy where SMEs in China work heavily with foreign partners (Fu and Xiong, 2011). The key difference in the openness between China and the United States is the decades long tradition of collaborating and cooperating with various partners in China as compared to the relatively recent opening up of R&D and collaboration in the United States.
The results have shown a higher openness of Chinese SMEs as compared to the SMEs in the United States, and a much greater institutional support towards open innovation in China as compared to the USA as seen in Table 2. Furthermore, Table 2 shows a strong influence of institutional support on the openness of a country, clearly demonstrating that governmental policies can have a positive effect the openness. In the literature, a government can play three significant roles in framing and promoting an innovation policy, the role of a broker, a role in demand articulation, and a role in stimulating innovations (Fu and Xiong, 2011). The Chinese government has played all three roles and has helped facilitate a more open domestic market and institutional environment that is favorable to innovation flows and impacts the openness of Chinese firms and Chinese SMEs (Fu and Xiong, 2011).

The government role of a broker is when the government commits itself to bringing together various actors in the innovation system; in particular national framework conditions and public research infrastructure play a critical role (Fu and Xiong, 2011). The Chinese government invests heavily to diversify the economy and even though China has traditionally, and still, struggles with the protection of intellectual property the government has began tackling the issue more intensively (Fu and Xiong, 2011). The Chinese governments role as a broker is beset highlighted by the development of the technology transaction market; the rules and conditions the aide the creation of a technology transaction market help facilitate open innovation (OECD, 2008). Since the emergence of the first technology stock exchange market in Shanghai in 1999, the technology transaction markets have expanded rapidly, for example in Beijing in 2004 technology transaction amounts were around 10 billion RMB, in 2009 the total technology transaction amounts were 130 billion RMB.

In addition, the Chinese government plays a role in demand articulation; the government creates markets for open innovation through the setting of relevant standards (Fu and Xiong, 2011). According to Porter (1990) countries can gain a competitive advantage by setting strict entry or environment standards, which the Chinese government policies have aided in achieving more open modes of innovation. In the initial phases of the opening up policy, the Chinese government highly aided domestic firms in acquiring high-end technology and in cooperating with foreign firms through the creation of joint ventures and also creating an environment that encouraged FDI (Fu and Xiong, 2011). Domestic companies profited from the governments encouraging import policies, with foreign technology being heavily subsided and for tax subsidies. In the early 1980’s the State Council issued the “Provisions on the Encouragement of Foreign Investment” which facilitated the absorption of foreign investment and introduction of advanced technology through favorable financial measures (Fu and Xiong, 2011). Furthermore in 1999, the “Circular on Further Encouraging Foreign Investment” further incentives were provided for foreign companies, such as a full refund and income tax reductions on purchases of any Chinese-made equipment that fails (Fu and Xiong, 2011). Finally, the “Catalogue of Industries for Guiding Foreign Investment” sought to improve the administration and services to foreign-funded enterprises and even offered financial support (Fu and Xiong, 2011).

Finally the Chinese government also plays the role of stimulating innovation through national policies and incentives. The key role of the Chinese government was the offering of tax subsidies, financial incentives and even financial support either to digest and absorb technology or to license and sell technology in the latest phase of ‘going global’ (Fu and Xiong, 2011). An example of the ‘going global’ approach encouraged by the Chinese government is the availability of special funds to promote domestic firms participating in international R&D cooperation since 2000 (Fu and Xiong, 2011). The Chinese government has also heavily investment in innovation as a whole and has placed a great emphasis on innovation in its latest 5 year plan (Blancahrd and Shen, 2015).

On the other hand, SMEs in the United States do have institutional support but to a much lower extent than SMEs in China. One of the reasons to explain the difference in the openness between the two countries is the traditional laissez-faire economic approach in the United States, which is based on limited government intervention in the economy (Blancahrd and Shen, 2015). Open innovation in itself
and in the United States is in essence market-driven despite an increase in institutional support in recent years (Fu and Xiong, 2011). The key institutional support in the United States is the role of the broker, where the government plays an important role in creating and enforcing a regulatory system that is supportive of innovation (Oettinger and Henton, 2013). The American regulatory system is one of the most innovation-friendly in the world with strong laws protecting intellectual property and a regulatory process that allows inventors to buy, sell, license, and trade their technology (Oettinger and Henton, 2013). The United States government also does financially support collaborative innovation at both the State and Federal level, through grants and funding, such as the Oakridge National Laboratory for example (Oettinger and Henton, 2013). The government policies in the United States are not at widespread and collaborative or open in nature as those in China.

6. Conclusion

The study has shown a significant correlation between institutional support and the openness of open innovation in both countries. In addition, the country with stronger institutional support also showed a higher openness answering both of our research questions. The results showed a substantially higher openness in Chinese SMEs as compared to those of the United States, due to longer tradition of collaborative innovation in China (since 1978) as compared to the United States. Furthermore, the higher openness in China can be explained through the higher institutional support which offers numerous financial incentives, subsidies, tax benefits to companies both domestic and foreign that collaborate extensively. This study implies that governments worldwide can influence the adoption of open innovation practices in their country through their policies. Due to the overwhelming evidence in the literature of the positive effects of open innovation on performance governments should adopt policies that encourage the implementation of open innovation practices.

Bibliography:


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countries.” *Management Decision*, vol. 50, no. 1, pp. 147-162.


framework of analysis.*Research Policy* 32, no. 8: 1481-1499.


(18) Oettinger, J and Henton, D, 2013, The role of innovation brokers in a knowledge economy: The 
fourth strand to triple helix. Collaborative Economics, paper submitted to the Triple Helix XI 


(20) Rothwell, M, 1986, Public Innovation Policy: To have or to Have Not? R&D Management. Vol.16 
(2) pp. 25-36

Education

(22) Yan, Y, 2000, *International Joint Ventures in China: Ownership, Control and Performance*. 
Macmillan Press Ltd, New York