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Wei-xing Xu
School of Business Administration, Zhejiang Gongshang University, Hangzhou, 310018,China, xingyuhe@163.com

Ting-ting Li
School of Business, Ningbo University, Ningbo,315211,China

Litao Shu
School of Business, Ningbo University, Ningbo,315211,China

External Corporate Social Capital and Technology Innovation Performance: Conceptual Model and Empirical Analysis

Wei-xing Xu [1,2*], *Ting-ting Li* [2], *Litao Shu*[2]
[1] School of Business Administration, Zhejiang Gongshang University, Hangzhou, 310018,China
[2] School of Business, Ningbo University, Ningbo,315211,China

Abstract: Based on the research of relationship between corporate social capital and technology innovation, this paper raised conceptual models and theoretical assumptions of corporate social capital influencing technological innovation performance, and analyzed in depth how the corporate social capital affected corporate technology innovation performance by using resource acquisition, according to questionnaire survey and multiple regression analysis from 210 Chinese companies in Zhejiang Province.

Keywords: corporate social capital, technological innovation performance, multiple regression analysis

1. THESES ISSUES RAISED

Social capital is the forth capital of influencing the corporate competition and economic development[1]-[2]. As an important relational capital, the accumulative quantity and quality of social capital is good for the increase of the core competence and acquisition of competitive advantage[3]. Good corporate social capital could improve corporate technology innovation, and then boost Enterprise competitiveness.

Facing the increasing speed of current technology innovation, the increasing difficulty of technology innovation and the competition among corporations, more and more corporate began to explore the influence of internal and external social network on technology innovation, so as to improve their innovation ability and keep their competitive advantage. So, it has certain theoretical significance and practical significance for corporate to study the effect of the external social capital on technology innovation performance in depth.

On the basis of constructing conceptual model and theoretical assumptions of how external social capital influences technological innovation performance, this article made a questionnaire survey and empirical analysis on 210 Chinese companies in Zhejiang Province to test the rationality of conceptual models and theoretical hypothesis.

2. CONCEPTUAL MODELS AND THEORETICAL HYPOTHESIS OF CORPORATE SOCIAL CAPITAL INFLUENCING TECHNOLOGY INNOVATION

2.1 Conceptual models

Based on the summary of previous research about how corporate social capital affects technology innovation performance from home and abroad, this article asserts that the improvement of technology innovation ability resulted from the combination of the internal and external corporate social capital, in which external corporate social capital played a more important part . Corporate external corporate social network makes contribution to achieve innovation information, knowledge and fund, while related factor of resource

* Corresponding author. Email: xingyuhe@163.com (Wei-xing XU)
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acquisition may play an intermediary role in the influence of external corporate social capital on technology innovation performance. The conceptual models of external corporate social capital influencing technology innovation are as follows:

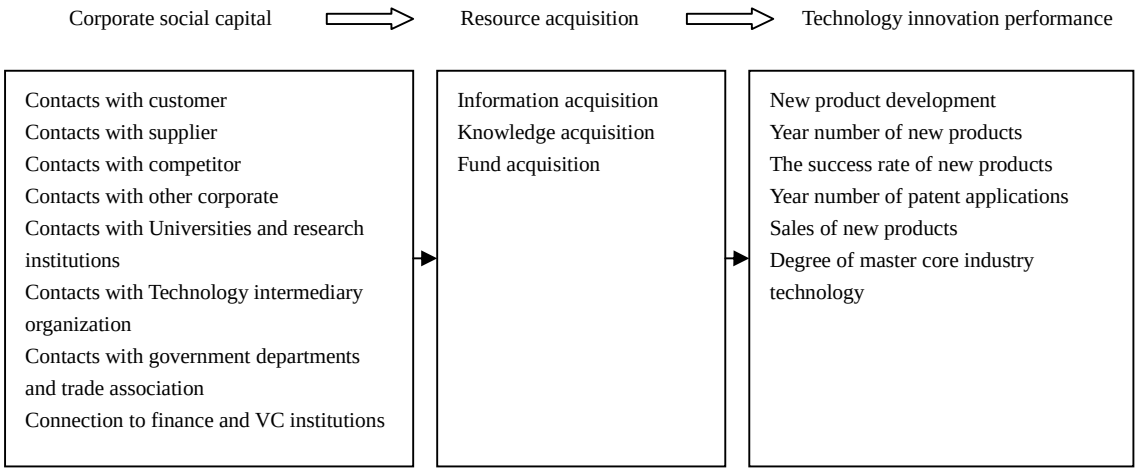

Fig1. The conceptual models of external corporate social capital influencing technology innovation

2.2 Theoretical hypothesis

Corporate technology innovation is not only a process to create new knowledge within the corporation, but also a process to absorb information and knowledge from outside[4]-[5]. Corporate external links are also important factors for success in technology innovation. Therefore, to strengthen exchanges and cooperation with external principals is a critical way for corporate to obtain external resources and enhance technological innovation ability and also a specific manifestation of pluralistic subjects of technological innovation.

2.2.1 External corporate social capital and Resource acquisition

All kinds of information, knowledge and resources for corporate innovation can be required by social capital. When come to the effects of external corporate social capital on technological innovation, the acquisition of information, knowledge and fund resources may play as middle agent to a large extent. At the same time, the intensity of external contacts, frequency of external links and the number of external links had an impact on the value of the resource.

Hypothesis 1: external social capital and information acquisition has positive relationship while keeping other variables constant; that is to say, the intensity of external contacts, frequency of external links, the number of external links and information acquisition are positive related.

Hypothesis 2: external social capital and knowledge acquisition has positive relationship while keeping other variables constant; that is to say, the intensity of external contacts, frequency of external links, the number of external links and knowledge acquisition are positive related.

Hypothesis 3 : external social capital and fund acquisition is positive related while keeping other variables constant; that is to say, the intensity of external contacts, frequency of external links , the number of external links and fund acquisition are positive related.

2.2.2 Resource acquisition and technological innovation performance

Under the dynamic and complex market circumstance, high performance corporate could be more active to take part in absorbing information, meanwhile, it could promote the information to be communicated more timely and effectively within the corporation, so as to achieve new improvement in corporate performance by

knowledge and its acquisition which can promote R&D and production. Corporate technological innovation activities also depend on the input of funds, in addition to the necessary information and knowledge support.

Hypothesis 4: resource and technology innovation performance are positive related while keeping other variables constant, that is to say, information acquisition, knowledge acquisition, fund acquisition and technological innovation performance are positive related.

3. EMPIRICAL ANALYSES

3.1 The distribution and recovery of questionnaire

This article's data is collected by the combination of questionnaire survey and investigation of the typical cases. 210 questionnaires were distributed in total and 162 questionnaires are responded, among which 115 are effective making the effective recovery rate reached 54.76%. The investigated corporations are mainly distributed in Hangzhou, Ningbo, Wenzhou and etc, and related industries covers electronics, information, integration of machinery and electronics, biomedical industry and materials industry.

3.2 Reliability, validity testing and Correlation analysis

The study used the Crobach's Alpha coefficient to analyze reliability, only when the results have the higher consistency values can the variable's measurement accord with the required reliability. The study validity testing is through content validity testing, which is to test if the selected items could represent the content or theme which would be measured. Table 1 test reliability and validity of explained variables, mediating variables and explanatory variables, as is shown in the table, this study has higher reliability and validity.

Table 1 . Reliability testing results of variables

Main factor	Variable	Alpha value	Factor loading coefficient	
			Min	Max
External social capital	Intensity of external contacts	0.897	0.702	0.885
	Frequency of external contacts	0.947	0.823	0.913
	Number of external contacts	0.915	0.747	0.862
Resource acquisition	Information acquisition	0.838	0.86	0.879
	Knowledge acquisition	0.874	0.865	0.915
	Fund acquisition	0.838	0.776	0.86
Technological innovation performance	Innovation performance	0.890	0.735	0.867

It has positive effects for intensity of external contacts, frequency of external contacts, and number of external contacts on information acquisition, knowledge acquisition and fund acquisition. That is to say, the accumulation of external corporate social capital helps the corporate to achieve information, knowledge and fund. The correlation is shown as below:

Table 2 . Correlation coefficient of external capital on resource acquisition's each indicator

	Intensity of external contacts	Frequency of external contacts	Number of external contacts	External corporate social capital
Information acquisition	.625(**)	.604(**)	.669(**)	.789(**)
Knowledge acquisition	.608(**)	.599(**)	.712(**)	.813(**)
Fund acquisition	.597(**)	.687(**)	.695(**)	.793(**)

** Indicates that the two variables are significant on the level of 0.01 two - tailed test

As is shown in table 3: the correlation coefficient between information acquisition and technology innovation performance is 0.689**, information acquisition may have an active impact to innovation performance. The correlation coefficient between knowledge acquisition and technology innovation performance is 0.812**, which indicating knowledge acquisition may have a positive impact to innovation performance. The correlation coefficient between fund acquisition and technology innovation performance is 0.743**, which indicating that fund acquisition may have some impacts to innovation performance.

Table 3 . The correlation coefficient between resource acquisition and technology innovation performance

	information acquisition	knowledge acquisition	fund acquisition
Technology innovation performance	.689(**)	.812(**)	.743(**)

** Indicates that the two variables are significant on the level of 0.01 two - tailed test

At the same time, the correlation coefficient between technology innovation performance and external corporate capital is 0.737**, showing that corporate social capital has positive effects on technology innovation performance, but effects are very obvious.

3.3 Regression analysis

In order to research the statistical relationship between external corporate social capital and information, knowledge and fund acquisition, and the statistical relationship between information, knowledge, fund acquisition and technology innovation performance, this article may use information acquisition, knowledge acquisition, fund acquisition and technology innovation performance as dependent variable to make regression analysis.

3.3.1 Regression analysis of each factor in the external corporate social capital to resource acquisition

Resource acquisition includes information acquisition, knowledge acquisition and fund acquisition. We treat resource as dependent variable, while treat intensity of external contacts, frequency of external contacts and number of external contacts as independent variable, and do variance analysis for different relationship capital to resource acquisition.

We got sig=0.000 from the variance analysis to each factor of external capital. Because of the value is very small, it can be regarded as the multiple regression effects are significant at the level of 1%, the theoretical hypothesis 1 get empirical support. That is to say, there are significant effects for intensity, frequency, and number of external contacts on information acquisition in enterprises, by multiple regression analysis.

We can get the regression coefficient between them (as in table4)

Table4. Regression analysis between external corporate social capital and information acquisition

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1.79E-17	.056		.000	1.000		
	Intensity of External contacts	.364	.089	.364	4.110	.000	.404	2.474
	Frequency of External contacts	.305	.077	.305	3.957	.000	.533	1.874
	Number of External contacts	.239	.094	.239	2.546	.012	.361	2.769

a Dependent Variable: information acquisition

The multiple regression equation between these variable and information acquisition can be expressed as: Information acquisition= $1.79*10^{-17}$ + 0.364*intensity of external contacts + 0.305*frequency of external contacts + 0.239*number of external contacts.

We get sig=0.000 from the variance analysis to each factor of external capital, the multiple regression effects are significant, theoretical hypothesis 2 get empirical support. That is to say, there are significant effects for intensity of external contacts, frequency of external contacts and number of external contacts on knowledge acquisition. We can get the regression coefficient by multiple regression analysis (Table 5).

Table 5. Regression analysis between external corporate social capital and knowledge acquisition

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	**(Constant)**	1.27E-16	.054		.000	1.000		
	Intensity of External contacts	.263	.086	.263	3.077	.003	.404	2.474
	Frequency of External contacts	.282	.074	.282	3.788	.000	.533	1.874
	Number of External contacts	.376	.090	.376	4.159	.000	.361	2.769

a Dependent Variable: knowledge acquisition

Regression equation: knowledge acquisition = $1.27*10^{-16}$ + 0.263*intensity of external contacts + 0.282* frequency of external contacts + 0.376*number of external contacts.

That is to say, there are significant effects for intensity of external contacts, frequency of external contacts, number of external contacts on fund acquisition, the multiple regression effects are significant, theoretical hypothesis 3 get empirical support (as is shown in Table.6)

Table6. Regression analysis between external corporate social capital an fund acquisition

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.84E-16	.055		.000	1.000		
	Intensity of External contacts	.167	.087	.167	1.920	.047	.404	2.474
	Frequency of External contacts	.388	.076	.388	5.127	.000	.533	1.874
	Number of External contacts	.359	.092	.359	3.901	.000	.361	2.769

a Dependent Variable: Fund acquisition

Regression equation: fund acquisition= $1.84*10^{-16}$ + 0.167*intensity of external contacts + 0.388* frequency of external contacts + 0.359* number of external contacts

3.3.2 Regression analysis of each factor in resource acquisition to technology innovation performance

As the same, we regard the resources acquisition's each factor as the variable, variance analysis showed Sig = 0.000, which means that at the level of 1%, it can be considered as the regressive effect is significant, that is to say, information acquisition, knowledge acquisition, Fund acquisition have an significant effect on technology innovation performance. Hypothesis 4 got the empirical support. The regression analysis is shown in table 7.

Table 7. Regression analysis between external corporate social capital and technology innovation performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1.39E-016	.047		.000	1.000		
	Information acquisition	.237	.074	.237	3.224	0.002	.407	2.454
	Knowledge acquisition	.478	.095	.478	5.018	.000	.243	4.108
	Fund acquisition	.219	.089	.219	2.465	0.015	.280	3.572

a Dependent Variable: technology innovation performance

Regression equation：technology innovation performance $=1.39*10^{-16}$+0.237*information acquisition +0.478* knowledge acquisition + 0.219* fund acquisition.

Regression results show that, information acquisition, knowledge acquisition, fund acquisition will have an certain impact to technology innovation performance. In which, information and fund acquisition has a considerable impact on technology innovation performance. Knowledge acquisition has the most effects on the technology innovation performance, so when enterprises acquire resources, they should pay special attention to the accumulation of intangible resources such as knowledge.

4. CONCLUSION AND ENLIGHTENMENT

The results of conceptual models and empirical analyses showed that there are positive effects for external corporate social capital on technological innovation performance. This required us to educate and develop the external corporate social capital. Firstly, the corporate should strengthen the contacts with the outside constantly, especially, we should contact with other shareholders closely to acquire all kinds of resources actively. At the same time, the corporate should search for the cooperation with universities, technology mediating department and R&D institutions to obtain the new knowledge, technology from corporate products R&D. The enterprises also develop good relationship with government department and financial institutions and strengthen the contacts between each other, so as to supply sufficient funding source for the development of technology innovation activities smoothly.

Corporate social capital has become a very important key factor for the corporate increasing technology innovation performance, for the economic behavior has social embeddedness.

Its innovation activities are also a dynamic process. With the evolution of the innovation actor from one to multiply actors, the corporate can obtain the required information for technology innovation by developing variables of relationship nets, such as the knowledge and fund resources and etc, in order to boost the corporate technology innovation ability and international competition.

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