The Influence of Equity International Strategic Alliance on Innovation Performance

Guzi Yang[1]

[1]*College of Professional Studies, Northeastern University, Boston*
yang.guz@northeastern.edu

ABSTRACT
Under the macro background of national innovation-driven development, increasing enterprises seek strategic partners in the international arena and occupy the market by establishing strategic alliances to learn technology. In the process of building alliances, companies will face numerous choices. On the one hand, the strong alliances will make it easy for enterprises to acquire technology, resulting in the generation of dependence, which is not conducive to enterprises' continuous innovation and development. On the other hand, the enterprise would not benefit from an alliance if they choose a weak partner, leading to the loss of core technology. Therefore, it becomes a vital issue for enterprises to handle well with their position in the international strategic alliance. Based on previous studies and the international strategic alliance established in China since the 21st century, this paper focuses on the two hot issues of shareholding ratio and innovation performance from the perspective of co-opetition and conducts a quantitative analysis on the impact of strategic alliances on innovation performance.

Keywords: *Equity strategic alliance; Innovation performance; Co-opetition relationship*

1. INTRODUCTION

With the development of economic globalization, increasing enterprises are going abroad to win the global market by finding overseas partners, and such cooperation is called an international strategic alliance. Faced with the unpredictable business environment, establishing strategic alliances has become an indispensable way in the internationalization of enterprises and an essential part of winning the market competition. International strategic alliances can be divided into equity-based and contractual international strategic alliances. An equity alliance is similar to a joint venture, which can share capital, technology, market, and talent resources, and it is a long-term and in-depth alliance partnership that benefits innovation research. Meanwhile, the Chinese government has made it clear that innovation is the top priority of national industrial development. Thus, in the context of national innovation-driven development, more domestic companies are willing to use multinational strategic technology alliances to acquire technology based on this kind of national innovation-driven development environment. Therefore, studying the impact of international strategic alliances on innovation performance is of great significance for establishing strategic alliances.

The purpose of establishing equity-based strategic alliances is to acquire advanced knowledge and technology from partners. For this reason, it is crucial to study what equity-based strategic alliances can have the most significant benefits for innovation performance. Li Xiaodan (2018) [7] pointed out that lagging firms in the alliance often have an asymmetric relationship with firms that have leading technology. The resources contributed to the alliance determine its importance, while the firm's self-learning ability affects its dependence on the alliance. These two different influences on the alliance lead to the magnitude of innovation performance, based on her study of the relationship between technology acquisition and dependence in international strategic alliances. The study of inter-firm competition by Zhou (2017) [14] pointed out that companies could cooperate while also generating competitive relationships, and this fair competition will strengthen the research results and positively influence the alliance. Based on the analysis of previous studies, the author argues that the impact of equity-based strategic alliances on innovation performance should not be purely positive or negative. However, a critical factor might exist to maximize the benefits for both parties.

S. A. R. Khan et al. (Eds.): ICMSSE 2022, AHCS 12, pp. 636–645, 2023.
https://doi.org/10.2991/978-94-6463-056-5_93

There have been considerable studies on competing relationships in strategic alliances. For example, Meng Weidong (2018) [8] studied the effect of resource integration in alliances, and he proposed that only the integration of otherwise static resources into a dynamic environment can help firms build competitive advantage and boost innovation performance. Wang Jianping (2019) [10] researched the relationship between the strength of network relationships and firm performance from a competitive perspective and suggested that weak relationships could provide diversity and unique information, leading to innovation and performance. Also, intense relationships can strengthen the combination of information and knowledge, promoting firm cooperation and performance.

Compared with the previous research results, it can be found that most of the previous research is aimed at the influence of "strategic alliance" on "innovation" or "international strategic alliance in science and technology" on "alliance stability." However, few scholars have put forward the concept of "equity international strategic alliance" separately.

This paper replaces the vague inter-firm strength and partnership concepts with a specific concept: the shareholding ratio in a strategic equity alliance. A higher shareholding ratio indicates a higher commitment to the alliance. Taking Sino-foreign joint ventures as research subjects, this research will investigate the impact of the shareholding ratio on the innovation performance of alliances in strategic equity alliances from the perspective of the competitive relationship and try to find a reasonable shareholding ratio to maximize the benefits of Chinese enterprises and provide constructive suggestions for the establishment of international strategic alliances.

2. LITERATURE REVIEW

2.1 Concepts about Strategic Alliances

The strategic alliance is a new concept in management science that was first introduced in the 1970s. However, there is still no united definition of strategic alliances until now. Experts have made various explanations from different perspectives regarding the interpretation of strategic alliances. On the one hand, Wang (2002) [11] believed that a strategic alliance is a partnership based on the contractual spirit of competition and cooperation between two or more companies with the same goal while ensuring relative independence to achieve specific strategic goals. Qin thought an alliance is a loose network of two or more firms or specialized divisions with equivalent business strengths formed to win markets together. On the other hand, Porter explained in terms of competitive cooperation that a strategic alliance is a way to expand a company's market without expanding the company while overcoming the communication difficulties between each company. Based on those research, Li (2002) [5] classified alliances into five types from the perspective of the purpose of alliances which are strategic alliances to spread risk, strategic alliances for sharing distribution systems, strategic alliances for providing joint services, strategic alliances with production and distribution as a connecting chain, and strategic alliances for joint use of market channels.

2.2 The Impact of Strategic Alliances on Innovation

There have been many studies on the impact of strategic alliances on innovation, and scholars analyzed how alliances promote innovation performance from different perspectives. Meng Weidong (2017) proposed the perspective of resource integration and dual cooperation, which implies that companies in one alliance could share resources such as production lines and markets in addition to sharing technology when they cooperate. This kind of deep resource integration represents the creation of dual cooperation, including developmental cooperation with downstream partners in the value chain and exploratory cooperation with upstream partners in the value chain. The impact on innovation performance can be reflected by the contribution of alliances to the complete industry chain. Despite technology and resources, Yang (2015) [12] also studied the impact of alliance stability on technology alliances, which companies of similar size and strength generally form to increase market competitiveness. The factors such as trust and stability among alliances will significantly impact the effectiveness of technology alliances.

Kumar Pankaj Akbar (2018) [4] put forward a relationship between the stability of alliance networks and innovation in strategic alliances. He argued that a stable network harms innovation because the diversity facilitates knowledge integration, so the more stable the egocentric network, the worse the innovation performance of the significant firm. Ram Ranganathan (2018) [9] studied the role of competition during multiple technology coordination in alliances, which is the relationship between the pros and cons of heterogeneity of cooperating firms for the alliance. The article mentioned that higher heterogeneity could positively contribute to innovation performance when competing firms cooperate. Hannah (2018) [3] also researched competing relationships in alliances and examined the change in output of five US firms over seven years under a new ecosystem context by dividing the competing relationships into three stages.

In comparison, Amol took a different perspective on the impact of patents on the performance of innovative firms. He found the opposite result that the formation of patent pools significantly reduced the number and quality of patents subsequently generated by licensors and licensees. It turned out that the empirical findings suggest

that patent pools have a dampening effect on systemic innovation in firms.

2.3 Co-opetition

The term co-opetition relationship was first coined by Nalebuff and Brandenburger, which refers to the fact that firms are competitors and partners in the operation process. In order to maximize the interests, the competing relationship uses the idea of the prisoner's dilemma from Nash's theory. Li (2008) [6] established a dual-dimensional model of the strength of strategic alliance competition, which can measure the strength of competition and explains the inverted U-shaped effect of the strength of competition on the alliance. Cozzolino (2018) [1] talked about the strength of partners in protecting intellectual property rights in his study of the dynamics of synergy under a competitive relationship. Besides, he believed that it is essential to take protective measures and not blindly join partners in the downstream value chain when the intellectual property rights are weak.

It is not hard to find that Chinese scholars prefer to study the strength comparison of companies between alliances and the technology orientation in alliances. In contrast, foreign scholars favour the competing relationship between companies in alliances and how to maintain dynamic stability. Based on the above research results, this paper will select the shareholding ratio of Chinese companies in the alliance as the independent variable to measure the strength of companies in the alliance, then replace technology with patent comparison, together with internationalization experience as the moderating variable, attempting to explore the impact of equity-based international strategic alliances on innovation performance from the perspective of competing

3. RESEARCH DESIGN

3.1 Research Hypothesis

3.1.1 The Effect of Shareholding Ratio on Innovation Performance

The amount of value invested in the alliance can directly impact their firms' revenue when Chinese firms establish alliances with foreign firms. With Chinese firms' inputs gradually increasing, the overall scale and resources of the alliance will also increase, and it is a positive relationship between the firm's inputs and the value created. Also, the data on private companies studied by Zhang shows that companies' input increases can bring revenue growth. Therefore, companies' investment in alliances can positively contribute to the effectiveness of their innovation.

The partner firms in the alliance would become weaker when the input continues to increase, and thus, fewer resources could be obtained. Cui (2018) [2] analyzed the competitive relationship among alliance partners and concluded that maximizing the interests of both parties is beneficial when the competitive relationship between two firms decreases from high intensity. However, it has a negative impact on the market and is detrimental to the firm's innovation performance when the competitive relationship decreases to the point where both have the same alliance firm. Therefore, it can be concluded that the establishment of an alliance is less beneficial for the more substantial firm when there is a large gap between the strengths of the two alliance parties, and it could be argued that the firm's input has a negative relationship with the value obtained.

Companies in an alliance can have both cooperative and competitive relationships when they work together from the perspective of competition. This is a strategic bilateral relationship in which both companies cooperate and compete for profits from the alliance. Based on the Nash equilibrium, the alliance would not maximize its benefits when one of the two partners wants to maximize the benefits. Only when both partners are in a state of equal strength can the firm's innovation performance be maximized. In studying how to measure the input of enterprises to the alliance, it could be believed that compared with contractual strategic alliances, the cooperation within equity-based international strategic alliances is deeper and more durable, so the shareholding ratio in equity-based alliances is an ideal object of study. Based on this, this paper proposes the following hypotheses.

H_1: The effect of the shareholding ratio in equity-based strategic alliances on innovation performance is an inverted U-shape.

3.1.2 Boundary Conditions on Enterprise Innovation

There are many reasons for establishing strategic alliances between firms. Most domestic experts studied strategic alliances established for technology acquisition, as mentioned in the previous literature review of this paper. For example, Zhang (2018) [13] elaborated on the benefits of private enterprises from alliances from the perspective of technological complementarity by analyzing a large number of cases of private enterprises in the southeast coastal region of China, and he also found that private enterprises can legitimately supplement their inadequate technologies by cooperating with foreign enterprises, thus helping their enterprises to innovate. In addition to technological complementarity, some enterprises have made direct technology acquisitions through alliances. Li Xiaodan (2018) [7] mentions that several large domestic firms such as Huawei, Lenovo, and Haier have formed research and development alliances with foreign technology companies to improve their technological innovation capabilities and gain a

leading technological seat to gain access to the domestic market.

Based on the above findings, we should analyze whether there are firms with poor intellectual property rights that establish strategic alliances to acquire patented technologies, which may contribute little to innovation performance. Therefore, it is a crucial measurement indicator to compare patents owned by firms on both sides of the alliance establishment. We found that most of those who need technology acquisition are small coastal companies aimed to gain access to technology by sharing the market with the alliance firms. Is this also the case for large firms with international experience? Based on the above questions, this paper proposes the following hypothesis.

H_2: Internationalization experience has a moderating effect on innovation performance.

H_3: The ratio of the number of firms' patents between alliances has a moderating effect on innovation performance.

3.2 Research Design

The innovation performance of an alliance is influenced by the input of the companies in the alliance to the alliance, as well as by the degree of internationalization of the companies and the patent comparison between the companies. Based on this, the following model is derived from this study.

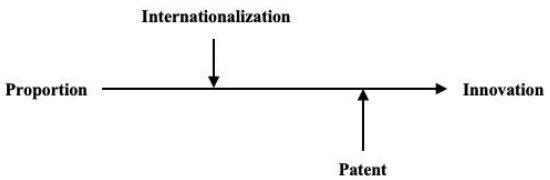

Figure 1: The Research Model

According to the previous hypotheses, we believe that the shareholding ratio will have an inverted U-shaped effect on innovation performance from the perspective of competitive relationships. At the same time, considering that the dependent variable (number of corporate patents) is non-continuous, a negative binomial regression is selected. Based on the H_1 hypothesis, this paper adopts a quadratic term hypothesis (β_1, β_2) for the proportion, selects the number of established contractual alliances (β_3) and firm age (β_4) as control variables, choose β_0 as constant term to fit the regression curve. Model (1) is obtained (P for Proportion):

$$\text{Lag Innovation}=\beta_0+\beta_1 P^2+\beta_2 P+\beta_3 \text{Alliance}+\beta_4 \text{Age} \quad (1)$$

Based on the theoretical analysis, this paper tests the boundary conditions of the effect of equity alliances on innovation. The independent variable is the proportion of equity alliance (the share of the major firm in an equity-based international strategic alliance), the dependent variable is innovation performance (with a one-period lag), the control variables are firm age and the number of established contractual alliances, and the moderating variables are the number of patents (β_5) and internationalization experience (β_6) of the alliance parties. Considering that the dependent variable (number of patents) is non-continuous, this paper chooses negative binomial regression, uses group regression to test the moderating effect and obtains the following model.

Comparison of the patents of the two sides of the alliance:

$$\text{Lag Innovation}=\beta_0+\beta_1 P^2+\beta_2 P+\beta_3 \text{Alliance}+\beta_4 \text{Age (if Patent Comparison}>=1) \quad (2)$$

$$\text{Lag Innovation}=\beta_0+\beta_1 P^2+\beta_2 P+\beta_3 \text{Alliance}+\beta_4 \text{Age (if Patent Comparison}<1) \quad (3)$$

Moderating role of international experience:

$$\text{Lag Innovation}=\beta_0+\beta_1 P^2+\beta_2 P+\beta_3 \text{Alliance}+\beta_4 \text{Age (if Internationalization}=1) \quad (4)$$

$$\text{Lag Innovation}=\beta_0+\beta_1 P^2+\beta_2 P+\beta_3 \text{Alliance}+\beta_4 \text{Age (if Internationalization}=0) \quad (5)$$

$$\text{Lag Innovation}=\beta_0+\beta_1 P^2+\beta_2 P+\beta_3 \text{Alliance}+\beta_4 \text{Age}+\beta_5 \text{Patent}+\beta_6 \text{Internationalization} \quad (6)$$

3.3 Measure of Variable

In order to verify the relationship between shareholding and innovation performance, this paper selects panel data of nearly 100 companies over three years and conducts regression analysis on innovation performance, patent comparison, internationalization experience, and shareholding to draw more objective conclusions. For the above-involved data, the following treatments are conducted in this paper.

Shareholding ratio: The shareholding ratio of Chinese enterprises in the alliance of the specific study is chosen as the independent variable, and only the shareholding ratio of the study enterprises is considered, not the shareholding ratio of other Chinese enterprises.

Innovation performance: Because the innovation performance, the dependent variable in this paper's study, is the variable that cannot be measured directly, it was decided to use the number of patents of the alliance companies as a proxy after referring to the relevant study by Romijn. The number of patents added by the alliance is observed to respond to the changes in innovation performance side-by-side.

Internationalization experience: In the study of the moderating variable internationalization experience, the concept of dummy variables was adopted because it is not easy to measure the degree of internationalization experience visually, 1 for firms with internationalization

experience and 0 for firms without internationalization experience.

4. RESEARCH RESULTS

4.1 Descriptive Results

Table 1 Descriptive Results

	N	Mean	SD	Maximum	Minimum
Age	450	15.607	20.616	99	0
Alliance	438	2.486	0.902	7	2
Proportion	438	0.484	0.149	0.9	0.12
Patent	450	150.344	292.267	1178	0
Internationalization	450	0.687	0.464	1	0
Comparison	41	11.627	36.827	201	0

4.2 Correlation Matrix

Table 2 Correlation Matrix Results

	1	2	3	4	5	6
Age	1.000					
Alliance	-0.017	1.000				
Proportion	0.195***	-0.402***	1.000			
Patent	0.030	-0.014	-0.015	1.000		
Internationalization	0.250***	-0.192***	0.029	0.255***	1.000	
Comparison	0.057	0.122	-0.075	0.306*	0.206	1.000

4.3 Regression Results

4.3.1 Model Check

In this paper, negative binomial regression is used to test the relevant hypotheses.

First, the Hausman test. The results of the Hausman test are used to determine whether the regression of panel variables accepts the "random-effects model" or the "fixed-effects model."

Second, the regression analysis of the panel data is conducted to determine the significance of each variable, the goodness of fit of the whole model, and the reasonableness of the test so that the impact of equity alliance on corporate innovation can be concluded. Since the number of patents is chosen to measure firms' innovation performance, considering that the dependent variable is discontinuous, the regression coefficients are calculated using the excellent likelihood estimation method in this paper. Considering the strict assumption of Poisson regression, this paper uses negative binomial regression.

4.3.2 Estimated Results and Analysis

In order to determine a more reasonable regression method for the effects model, the Hausman test was conducted. From the regression results, the original hypothesis of "random effects model is valid" is rejected at a 1% significance level, and "fixed effects model is valid" is accepted.

Table 3 Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	41.47	4	0.0000

4.3.3 Main Effect

Table 4 Main Effect Results

Lag Innovation	Coef.	Std.Err.	z	P>|z|	[95% Conf. Interval]	
Age	.1334666	.0166879	8.00	0.000	.1007588	.1661744
Alliance	-.1514704	.1848898	-0.82	0.413	-.5138477	.210907
Proportion	5.793888	4.891275	1.18	0.236	-3.792834	15.38061
Proportion2	-8.325583	4.681857	-1.78	0.075	-17.50186	.8506889
_cons	.4050483	1.522609	0.27	0.790	-2.579211	3.389308
Log likelihood=-1050.1337			Wald chi2(4) = 64.59			

Considering the transformation process of innovation results and the possible reverse causality, this paper lags the innovation performance, the number of patents obtained by the firm in that year (Innovation), by one year (Lag Innovation). This paper chooses a fixed-effects model with a negative binomial regression to obtain the results as shown above. This paper constructs a quadratic term for the shareholding ratio of equity alliance firms to test the nonlinear effect of equity alliance on firm innovation performance. The regression results show that the regression coefficient of the quadratic term of firm shareholding is significantly negative (b=-8.33, p<0.1), and the regression coefficient of the primary term of shareholding are positive but not significant (b=5.794, p>0.1), so hypothesis one is partially supported.

At the same time, this paper considers the boundary effect of international experience, and performs group regression. The results are as follows:

When the company has internationalization experience (Internationalization=1), the regression results are as follows:

Table 5 Internationalization regression results

Lag Innovation	Coef.	Std.Err.	z	P>|z|	[95% Conf. Interval]	
Age	.0377596	.0104673	3.61	0.000	.017244	.0582751
Alliance	.0429032	.1892306	0.23	0.821	-.3279819	.4137882
Proportion	7.352377	4.639662	1.58	0.113	-1.741193	16.44595
Proportion2	-7.857828	4.597332	-1.71	0.087	-16.86843	1.152776
_cons	-.2004891	1.448981	-0.14	0.890	-3.040439	2.639461
/ln_r	-.7149955	.12948			-.9687717	-.4612194
/ln_s	.1744334	.2492931			-.3141722	.6630389
r	.4891943	.0633409			.379549	.6305144
s	1.190571	.2968013			.7303933	1.940681
Log likelihood=-1584.4662			Wald chi2(4)=16.49			

As shown above, when firms have internationalization experience before the alliance, the coefficient of the quadratic term of equity alliance firms' shareholding ratio is significantly negative (b=-7.856, p<0.1), and the coefficient of the primary term of firms' shareholding ratio are positive (b=7.352, p>0.1), which increases the significance of the primary term of shareholding ratio compared to the main effect.

When firms do not have internationalization experience (Internationalization=0), the regression results are as follows.

Table 6 Regression results without internationalization

Lag Innovation	Coef.	Std.Err.	z	P>|z|	[95% Conf. Interval]	
Age	.0463531	.0333389	1.39	0.164	-.0189898	.1116961
Alliance	.1747891	.1399812	1.25	0.212	-.099569	.4491471
Proportion	5.711487	4.282377	1.33	0.182	-2.681818	14.10479
Proportion2	-5.30084	3.873114	-1.37	0.171	-12.892	2.290323
_cons	-1.95879	1.390442	-1.41	0.159	-4.684007	.7664267
/ln_r	.0112093	.2309242			-.4413938	.4638124
/ln_s	1.043025	.3821173			.2940886	1.791961
r	1.011272	.2335272			.6431394	1.590125
s	2.837788	1.084368			1.341903	6.001209
Log likelihood=-413.71079			Wald chi2(4)=3.88			

As shown above, when firms have internationalization experience before the alliance, the quadratic coefficient of the shareholding ratio of equity alliance firms is negative but not significant (b=-5.301, p>0.1), and the primary coefficient of the shareholding ratio of firms is positive (b=5.711, p>0.1), compared with the firms which have internationalization experience, the absolute values of the primary and quadratic coefficients of the shareholding ratio decrease significantly. Therefore, we suggest that internationalization experience can enhance the impact of equity-aligned firms on firms' innovation performance.

On this basis, this paper also explores the boundary effect of the comparison of the innovation capabilities of the firms in the alliance, the effect of the patent gap between the alliance firms on the main effect.

When the firms' innovation capabilities are in a dominant position (patent comparison>=1), as shown in the following figure.

Table 7 Regression results when dominant

Lag Innovation	Coef.	Std.Err.	z	P>|z|	[95% Conf. Interval]	
Age	.0404822	.007955	5.09	0.000	.0248908	.0560737
Alliance	-.1111521	.144583	-0.77	0.442	-.3945295	.1722253
Proportion	7.901428	3.579301	2.21	0.027	.8861261	14.91673
Proportion2	-8.800109	3.3706	-2.61	0.009	-15.40636	-2.193855
_cons	-.2175682	1.134174	-0.19	0.848	-2.440509	2.005372
/ln_r	-.6573862	.1068773			-.8668618	-.4479105
/ln_s	.1360151	.1721649			-.201422	.4734522
r	.5182041	.0553842			.4202683	.6389618
s	1.145699	.1972492			.8175674	1.605527
Log likelihood=-1970.9529			Wald chi2(4)=32.72			

The regression coefficient of the primary term of the equity share of the firm is significantly positive (b=7.901, p<0.05) and the regression coefficient of the quadratic term of the equity share are significantly negative (b=-8.800, p<0.01) when the firm is in an advantageous position in terms of innovation capability in the equity alliance. Thus, we believe that the equity alliance has an inverted U-shaped effect on the firm's innovation performance if the firm has an innovation advantage, and the relationship has a more substantial impact.

When the firm's innovation capability is in a dominant position (patent comparison<1), as shown in the following figure.

Table 8 Regression results when disadvantaged

Lag Innovation	Coef.	Std.Err.	z	P>|z|	[95% Conf. Interval]	
Age	.3257638	.0968817	3.36	0.001	.1358791	.5156484
Alliance	.5995796	.521732	1.15	0.250	-.4229964	1.622156
Proportion	94.92365	60.73515	1.56	0.118	-24.11506	213.9624
Proportion2	-94.73565	56.42844	-1.68	0.093	-205.3334	15.86206
_cons	-19.79094	14.30999	-1.38	0.167	-47.83801	8.256125
/ln_r	.9577786	1.304876			-1.599731	3.515288
/ln_s	-.8537977	.5156919			-1.864535	.1569399
r	2.605901	3.400378			.2019509	33.62562
s	.4257948	.2195789			.1549682	1.169925
Log likelihood=-50.471592			Wald chi2(4)=12.10			

The regression coefficient of the primary term of the firm's equity share is positive but not significant (b=94.924, p>0.1), and the regression coefficient of the quadratic term of the equity share is significantly negative (b=-94.734, p>0.1) when the firm is at an innovation disadvantage in the equity alliance. Thus, we argue that if the firm is at an innovation disadvantage in the alliance, then the equity alliance with an inverted U-shaped relationship is weaker.

In summary, we believe that hypothesis two, the enhanced effect of internationalization experience on the inverted U-shaped relationship of equity alliance on innovation performance, is partially supported. In contrast, hypothesis three, the enhanced effect of firm innovation capability comparison on the inverted U-shaped relationship of equity alliance on firm innovation performance, is supported. By comparing the significance of the regression coefficients, this paper concludes that the borderline effect of firm innovation capability contrast in alliances is stronger than the internationalization experience of firms.

5. CONCLUSION AND RESEARCH SIGNIFICANCE

5.1 Conclusion

5.1.1 The effect of shareholding ratio on innovation performance

From the analysis of the above study, it can be seen that when the shareholding ratio is tiny, after controlling the age size of the alliance companies and the number of alliances, the increase in the shareholding ratio leads to a significant increase in the effectiveness of innovation and has a positive driving effect on innovation. The increase in shareholding leads to a balance of shares of companies in the alliance, which promotes competition and innovation among them. At the same time, when the shareholding increases, the market capacity expands, the pressure on resources increases, and various innovative activities and further exploitation of natural resources become necessary.

5.1.2 The effect of internationalization on innovation performance

The higher degree of internationalization of a company could prove that the company has a better innovation system and that less culture shock is generated when cooperating with foreign firms similarly. The results of the study show that the degree of internationalization of a company has a positive impact on innovation performance. A higher degree of internationalization helps to reduce the difference in civilization with alliance firms during cooperation, and the difference in civilization determines the alliance stability, so the degree of nationalization helps improve the alliance stability and thus the innovation performance.

5.1.3 The impact of the number of patents of a company on innovation performance

The results show that when the number of patents is relatively tiny compared, it helps the company innovate. When the number of patents of Chinese companies is smaller than that of the cooperating alliance companies, Chinese companies are good at taking advantage of the technology complementarity and technology acquisition effects in strategic alliances to obtain advanced technologies and resources from the alliance companies. This is followed by R&D that incorporates the characteristics of the markets in which they operate to achieve growth in innovation performance. At the same time, when the company's patent property rights are weaker, the company has more vital learning ability and can make timely adjustments in various aspects according to the alliance partners and the market. This more vital learning ability is the embodiment of innovation ability.

5.2 Significance

5.2.1 Theoretical Significance

Theoretically, although many domestic and foreign scholars have made significant research results on the relationship between international strategic alliances and innovation performance, the following problems were found during the review and aggregation of the preliminary literature: In the domestic literature, a large number of scholars' research objects are mainly technology-oriented strategic alliances. For example, Zhang studied strategic alliances established by coastal enterprises for technology acquisition, while Li studied the demand for technology complementation by high-tech companies such as Huawei by acquiring overseas technology divisions. While previous studies have mainly examined the causes and outcomes that contribute to forming alliances, this paper investigates the impact of post-alliance intrinsic shareholding factors on innovation performance, making up for the lack of research on the alliance process. At the same time, this paper draws on the experience of foreign scholars' research on alliances to study the intrinsic association of alliances from the perspective of competing relationships. On this basis, it also introduces the number of patents, a convenient dependent variable for measuring innovation performance, for regression, which can more directly respond to the impact of the intrinsic game on the outside world from the data. Overall, this study focuses on the models formed by these two and explores the influence paths of these two through specific quantitative empirical studies, completing the relevant research framework.

5.2.2 Practical Significance

From a practical point of view, the relatively new concept of "international strategic alliance" was introduced in the 1980s, with the word "international" added compared to the earlier "strategic alliance." In the modern society of rapid development of economic globalization, increasing companies are going out of the country to connect with the international community, so studying international strategic alliance theory gives multinational companies a better choice. At the same time, since the 12th Five-Year Plan entered its fourth year of implementation, the country has clearly emphasized the policy orientation of three aspects of national industrial development: scientific development concept, transformation, and upgrading to enhance industrial competitiveness, and building an innovation-driven country. After experiencing the demographic dividend, Chinese companies have started to pay more attention to technology development, and "innovation performance" has become an issue that companies must consider. Similarly, the "innovation index" has also become an important indicator to measure the development prospect of companies. Therefore, studying the relationship between "international strategic alliance" and "innovation performance" can give more reference value to these multinational companies and improve the international competitiveness of Chinese companies.

6. LIMITATIONS AND PROSPECTS

Finally, although this study has achieved several meaningful results, there are still the following shortcomings due to several non-negligible restrictive factors: 1. The number of patents of some domestic companies is not given by the year due to the influence of the database, the number of patents is shown as constant in the regression, which to some extent weakens the significance of the regression. 2. The control variable is taken in this paper, the age size of enterprises may vary significantly between different enterprises, making this variable less significant. 3. Due to the limitation of the author's expertise, two other moderating variables were not regressed together in this paper, making the model slightly more straightforward.

Based on this, this paper has the following prospects for future research: Improve the database and select the panel data of alliances established since the 21st century for regression to make the data more realistic; Add local protection and cultural differences of alliance firms as moderating variables to explain the model better; Besides the competition relationship, it can also be explained from the perspective of alliance networks to make the theory more complete.

REFERENCES

[1] Cozzolino (2018) Strategic Management Journal, Vol.39(12), pp.3053-3085

[2] Cui (2018) Victor Strategic Management Journal, December 2018, Vol.39(12), pp.3116-313

[3] Hannah, D. P. (2018). Strategic Management Journal, December 2018, Vol.39(12), pp.3163-3192

[4] Kumar, P. A. (2018). Academy of Management Journal, 08/27/2018

[5] Li, S. H. (2002). Design and management of international strategic alliances [J]. Journal of Zhongnan University of Economics and Law, 2002(05):61-66.

[6] Li, J. & Jin, Z. (2008). Research on the competition and cooperation relationship between enterprises in strategic alliances [J]. Science and Science and Technology Management, 2008(06):129-134.

[7] Li, X. D. & Liu, X. (2018). Dependency, Technical Knowledge Acquisition and Product Innovation in International R&D Alliances [J]. Science Research, 2018, 36(09): 1632-1641

[8] Meng, W. D & Yang, W. (2018). Research on the relationship between resource integration, dual cooperation and focus enterprise performance on alliance portfolio [J]. Science and Science and Technology Management, 2018, 39(02): 85-94.

[9] Ram, R (2018). Strategic Management Journal, December 2018, Vol.39(12), pp.3193-3221.

[10] Wang, J. P & Wu, X. Y (2019). Network relationship strength, co-opetition strategy and corporate performance from the perspective of co-opetition [J]. Scientific Research Management, 2019, 40(01): 121-130.

[11] Wang, L. & Lou, M. (2002). Research on international strategic alliances and related theories [J]. Journal of China Institute of Coal Economics, 2002(03):246-249+263.

[12] Yang, Z. & Fan, L. (2015). Cooperation, Strategic Motivation and Alliance Stability in Transnational Technology Strategic Alliance [J]. Science Research, 2015, 33(08): 1161-1173.

[13] Zhang, H. & Xue, K. (2018). Technology complementarity and legitimacy effect in international strategic alliances [J]. Science Research, 2018, 36(11): 1975-1985.

[14] Zhou, J. & Zhang, W. (2017). Review and prospect of foreign research on competition and cooperation between enterprises [J]. Research and Development Management, 2017, 29(06): 144-158.