

The effects of technology information sharing on technology capabilities and performance of global manufacturing company: focus on Parent company and their foreign subsidiary companies

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Abstract. We empirically show that effects of technology information sharing on technology capabilities and performance with survey data of 195 foreign branch of Korean parent firms. This study provides evidences that technology information sharing enhances technology development capability and technology introduction capability but, technology introduction capability doesn't enhance technology innovation performance.

Keywords: Technology Information Sharing, Technology Development Capability, Technology Introduction Capability

1 Introduction

Enterprises today strive to remain competitive by effectively and flexibly responding to the rapidly changing environment and the needs of customers. In order to survive in the fierce competition, manufacturing companies continue Research and Development activities in diverse areas such as technologies for new product development, product improvement and efficiency of production processes, etc.. They strive to secure differentiated competition advantages through these means. Recently, Korean businesses are actively promoting overseas advancement in order to break into new market and to expand it. However, the manufacturing businesses launched overseas put in high uncertainty in terms of securing their competitiveness. Therefore, these businesses are experiencing much difficulty competing with preexisting businesses. Skill is a very important factor in business management that affects not only short-term achievements but also long-term survival of the business. In the case of businesses launched overseas, the supply of management sources is limited in improving their technological development capabilities because of the relatively low level of technical retention and the lack of professional human and financial resources. In this type of situation, technology transfer from the headquarters in Korea or technology information sharing can be a solution to strengthen their competitiveness.

In conclusion, we will observe the effect of active technology information sharing between the parent company and foreign subsidiary manufacturing company on the level of technology capability and technology innovation performance of the foreign subsidiary manufacturing company. Through the results, we plan to propose practical implications that will strengthen the competitiveness of the manufacturing company launched overseas.

2 Theoretical Background

2.1 Technology Information Sharing

Sharing of information indicates the official or unofficial sharing of meaningful and timely appropriate information between companies and can be defined as the parties involved favorably providing helpful information to their partner [13]. This expectation of collecting diverse information enables the partner to better respond to internal process and external market conditions [4]. Accordingly, sharing of accurate and timely appropriate information enables reasonable decisions making and improvement of the effectiveness of the process [11]. Therefore in this study, we identified that technology information sharing as a part of technical cooperation form that is a beneficial factor for the technological capability of the subsidiary company.

2.2 Technology Capability

In business management, technology innovation has been regarded as a very important key point that has a critical influence on not only the short-term performance but also the long-term survival of the business [1]. A business's technical capability can be defined as an activity that strategically manages the entire periodic innovation process including the creation of new technology and use of existing technology with the purpose of reinforcing competitiveness. Technical capability is a critical capability necessary to secure a business's competitiveness and such important technical capability can be shaped through the business's self-development or learned through external introduction [5, 7]. Technology innovation through its own development laboratory is a representative method through self-development, and alliance for R&D, Merger and Acquisitions, foreign direct investment, employment of technical professionals etc. are representative methods through which external technology is acquired [9]. Therefore in this study, we identified technical capability as technology development capability and technical capability introduced as these are assets that the business can have to strengthen its technical competence in view of resource-based theory.

2.3 Technology Capability and Technology Innovation Performance

The technical capability of a business is closely related to its technology innovation performance [3, 12]. Observing researches on the effect of a company's technical capability on its technology innovation performance, Qui et al. (2013) observed changes in a company's technology innovation performance depending on the different processes of acquiring technology from external sources in Chinese enterprises. Kocoglu et al. (2012) identified that a company's R & D capability affects its technical learning, and that it has a significant influence on the company's technology innovation performance.

3 Research Method

3.1 Research Model and Hypothesis

This study strives to examine the effect technology information sharing between Korean parent company and foreign subsidiary manufacturing company has on the foreign subsidiary manufacturing company's technology development capability, technical capability introduced, and on technology innovation performance in general, based on prior research. We constructed a conceptual framework <Figure 1> for that reason.

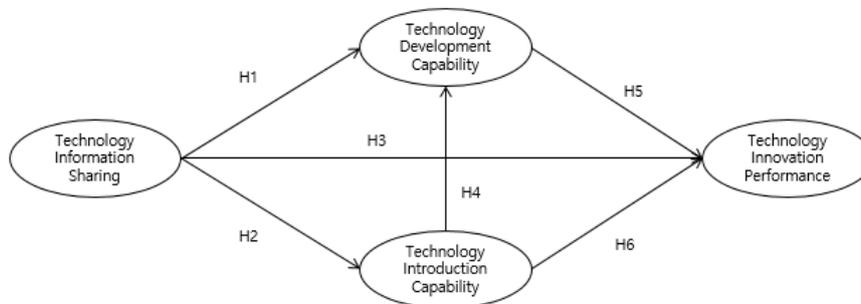


Fig. 1. Conceptual framework

Hypothesis 1. Technology information sharing between Korean parent company and foreign subsidiary manufacturing company will have a significant positive (+) effect on the foreign subsidiary manufacturing company's technology development capability.

Hypothesis 2. Technology information sharing between Korean parent company and foreign subsidiary manufacturing company will have a significant positive (+) effect on the foreign subsidiary manufacturing company's technical introduction capability.

Hypothesis 3. Technology information sharing between Korean parent company

and foreign subsidiary manufacturing company will have a significant positive (+) effect on the foreign subsidiary manufacturing company's technology innovation performance.

Hypothesis 4. Foreign subsidiary manufacturing company's technical introduction capability will have a significant positive (+) effect on technology development capability.

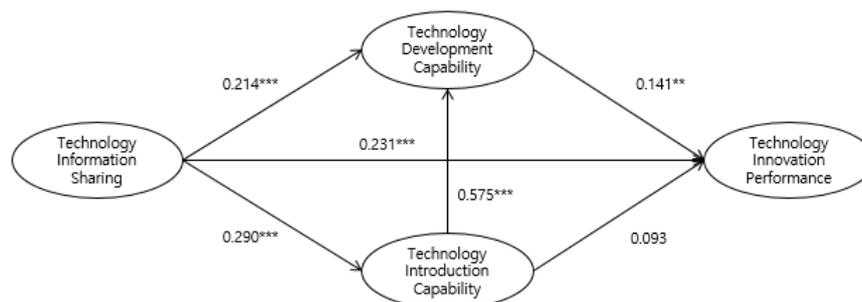
Hypothesis 5. Foreign subsidiary manufacturing company's technology development capability will have a significant positive (+) effect on technology innovation performance.

Hypothesis 6. Foreign subsidiary manufacturing company's technical introduction capability will have a significant positive (+) impact on technology innovation performance.

4 Analysis

4.1 Hypothesis testing: results

The hypothesized model was tested using the SEM(structural equation model). The final structural equation model with standardized regression weights, shown in Figure 2, had the following fit vales: CMIN/ DF = 1.661(≤ 2), $p = 0.001 (< 0.05)$, GFI = 0.933(≥ 0.9). AGFI = 0.893(≤ 0.9), NFI = 0.960(≥ 0.9), TLI = 0.977(≥ 0.9), CFI = 0.983(≥ 0.9), RMR=0.069(≤ 0.08), RMSEA = 0.05(≤ 0.05). We judged the figure's acceptability level as satisfactory as indices such as GFI, AGFI, NFI, TLI, and CFI met the standard recommended criteria of over 0.9, and RMR and RMSEA met the standard criteria as well. Some of the hypotheses were supported at the $p < .001$ level, and others were supported at the $p < .01$ level.



** $p < 0.01$, *** $p < 0.001$

Fig. 2. Structural Equation Modeling

As shown in <Figure 2>, Hypothesis 1 (whether technology information sharing

between Korean parent company and foreign subsidiary manufacturing company will have a significant positive (+) impact on the foreign subsidiary manufacturing company's technology development capability) is accepted and found to be significant as the related path coefficient is 0.214($p < .001$). Hypothesis 2 (whether technology information sharing between Korean parent company and foreign subsidiary manufacturing company will have a significant positive (+) effect on the foreign (subsidiary manufacturing) company's capability of technical introduction) is accepted and found to be significant as the related path coefficient is 0.290($p < .001$). Hypothesis 3 (whether technology information sharing between Korean parent company and foreign subsidiary manufacturing company will have a significant positive (+) effect on the foreign (subsidiary manufacturing) company's technology innovation performance) is accepted as the path coefficient is 0.230($p < .001$). Hypothesis 4 (whether the foreign subsidiary manufacturing company's capability of technical introduction will have a significant positive (+) effect on technology development capability) is accepted as the path coefficient is 0.575($p < .001$). Hypothesis 5 (whether the foreign subsidiary manufacturing company's technology development capability will have a significant positive (+) effect on technology innovation performance) is accepted as the path coefficient is 0.141($p < .01$). Hypothesis 6 (whether the foreign subsidiary manufacturing company's capability of technical introduction will have a significant positive (+) impact on technology innovation performance) cannot be accepted as the result was not statistically significant. In addition, we verified the mediating effect of technology development capability in terms of the relationship between technology information sharing and technology innovation performance and that in terms of the relationship between technology introduction capability and technology innovation performance. In response, we used the standard error formula to find the Z-value and performed the Sobel Test, which evaluates the significance in order to verify whether the mediating effect has a statistically significant impact [12]. Typically, if the Z-value found through the Sobel Test is greater than 1.96 or less than -1.96, the null hypothesis is rejected and the mediating effect is evaluated as statistically significant [4]. After the Sobel Test, we checked that the mediating effect exists as the Z-value found was greater than 1.96. The full results of the Sobel Test are show in <Table 1>.

Table 1. Sobel Test for Mediating Effect Analysis

Path	Standardized coefficient	S.E	Sobel-Z score	Result
TIS → TDC	.232	.059	2.605	Accepted
TDC → TIP	.185	.071		
TIC → TDC	.556	.07	2.475	Accepted
TDC → TIP	.185	.071		

5 Discussion and Conclusions

Domestic manufacturing companies launched overseas are exposed to various environmental uncertainties in increasingly more severe competitive global environment. They are especially struggling with strengthening their competitiveness through technology innovation. Accordingly, this study has the following theoretical significance and practical implications.

First, we sought a solution to improve the competitiveness by identifying the causal relationship between technology information, technology capability, as well as technology innovativeness.

Second, verifying of the mediating effect of technology development capability in terms of the relationship between technical introduction capability and technology innovation performance suggests the importance of the strengthening of technology development competency of foreign subsidiary manufacturing company. We can suggest that if technology information sharing and technical introduction capability building of the subsidiary manufacturing company is carried out, independent technology development capacity can be strengthened.

Third, the probability of generalization of this study can be increased as this study targeted and was conducted with manufacturing companies of various industries among manufacturing companies launched in various countries such as China, Vietnam, Indonesia, USA, Mexico, Slovakia, etc.

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