Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 3, July 2021:3274- 3283

Research Article

The analysis of the correlation between non-technical innovation and appropriation and management performance of small company

Jin Choi

Professor, Department of Industrial Engineering and Management, Namseoul University, 91 Daehak-ro, Seonghwan-eup, Seobuk-gu, Cheonan-si, Chungnam, Republic of Korea 31020

Peter3375@hanmail.net

Abstract

Background/Objectives: This study attempted to conduct an empirical analysis on how appropriation other than non-technical innovation affects the business performance of a company.

Methods/Statistical analysis: Regression using the data of '2018 Korean Business Innovation Survey: Manufacturing Sector' of the Institute for Science and Technology Policy as analysis data. As a result of hypothesis verification through analysis.

Findings: It was verified through empirical analysis that non-technical innovation affects management performance, appropriation is affected by non-technical innovation, and mediating factors act between the business performance of a company. It was judged that it could be a meaningful study to study non-technical innovation and appropriation for non-technical innovation, which has been discussed recently, and as a practical implication, it is important to determine the improvement of corporate management by securing appropriation. Companies need to establish strategies to secure appropriation.

Improvements/Applications: The limitations of this study were limited to non-technical innovation and research on appropriation, and it was concluded that it is possible to develop a research that affects the business performance of a company through various variables for future research.

Keywords: Innovation, Organizational innovation, Marketing innovation, Appropriation, Business performance

1. Introduction

Companies have been researching the main concerns of innovation and management performance from the perspective of technological innovation. Researches focused on product innovation and process innovation, which are traditional technological innovations, and various kinds of studies were conducted to find out the effect of technological innovation on the improvement of corporate financial performance [1,2]. Research related to recent innovation is developing into research that reflects non-technical innovations such as organizational innovation and marketing innovation together with traditional technological innovation centered on product innovation and process innovation [3]. In such innovation research, technological innovation and non-technical innovation are classified, and the definition of corporate innovation activities is indicated, and the expansion of innovation and the type of innovation are defined and classified, but each innovation is studied in the study of technological innovation and non-technical innovation. We

are heading towards an atmosphere of developmental research on the interaction between the two [4]. In recent research, it is expanding in the direction of analyzing the impact on companies through comparative analysis of technological innovation and non-technical innovation, and researching the impact of non-technical innovation on business performance [5]. These recent research flows have evolved from product innovation and process innovation, leading to research related to organizational innovation and marketing innovation. In addition to innovation to improve management performance, among other success factors, appropriation is possible because, as the appropriation improves over other companies, management performance can secure profits from innovation. In order to develop a company and carry out continuous innovation activities, it is necessary to invest intensively in R&D and expect sufficient appropriation of corporate sales [6]. This importance of appropriation is deeply treated by product innovation, so process innovation requires less-level cooperation among collaborations with external environments and companies than product innovation, but from the moment a product in the market is accessible to customers. It is highly likely to become reverse engineering [7]. This study investigates the effect of appropriation as well as non-technical innovation on small company's sales improvement targeting small companies in the manufacturing sector, and conducts a regression analysis using small company data from '2018 Korea Enterprise Innovation Survey: Manufacturing' of the Institute of Science and Technology Policy. I want to test the hypothesis. In addition, the hypothesis is drawn through prior research on what kind of business performance and how appropriation along with non-technical innovation activities affects the business performance of the company through non-technical innovation, and appropriation has a positive effect on non-technical innovation. It is determined through research that it is influenced and acts as a mediating factor between management performance, and aims to reach implications and conclusions.

2. Research

Innovation is an important factor that enables companies to survive in competition with other companies and to carry out more consistent and developmental business activities. In a global economic environment, research that emphasizes the importance of consumers' diverse demands, day-to-day technological development, and infinite competition. Is steadily progressing [8]. The business performance of a company must create a competitive advantage through innovation and lead to sustainable and steady corporate growth. Resource elements through corporate innovation include organizational efficiency, information, and knowledge. In this way, innovation can only develop when the company's resources are used to gain competitiveness. Recently, companies are engaged in activities through new technology, knowledge, and ideas, and are paying attention to product innovation and process innovation to secure corporate competitiveness. Product innovation refers to the ability to sell new products in the market and to add and expand new functions to existing products to improve, and refers to new technologies to survive in the market. In addition, process innovation is defined as technological innovation that mediates the process of producing innovation by improving productivity and reducing cost through the development of new products [9]. As standardization progresses through product innovation and process innovation, it is said that process innovation is attracted, and companies can adapt to the market environment by repeating this cycle [3]. In addition, it is expressed as corporate activities such as technology, products, processes and management systems to implement technological innovations developed through the creation of ideas [10].

The definition of innovation is evolving as marketing innovation through a new marketing system and organizational innovation by systematizing the organization system [4]. Organizational innovation is represented by the research and development and execution of new ideas through communication and interaction with others within the system [10]. Organizational innovation within a company is expressed as the act of making new items or making new ideas available to customers by making new items or making new ideas available to customers. In order to

implement organizational innovation, it was possible to create a more advanced organizational system by improving existing processes and methods that have been routinely established [11]. Recently, there are many companies that accept innovation by incorporating a new system related to marketing innovation into marketing, and examples of the company's growth are being expressed [13]. Marketing to improve corporate sales is showing a deep interest in communication and exchange between customers and companies. In other words, it is said that marketing innovation is an activity to express a new idea of a company as a way to develop sales of products that are expected to grow in sales. Marketing innovation played an important part in such innovations closely related to management performance, and in order to occupy a competitive advantage in the market, it is appearing in a consumer-oriented and market-oriented direction [14]. Marketing innovation is defined as a change in a company to bring out market-oriented innovation to create new customers [15,16]. Excluding the technological innovation shown above, research on non-technical innovation is increasing recently. Therefore, in addition to empirical studies dealing with the relationship between traditional technological innovation and management performance, research is being conducted to reveal the impact on management performance by dealing with various types of innovation handled by companies as categories and definitions of innovation [17]. In addition to product innovation and process innovation, which were traditional technological innovations previously dealt with, the marketing innovation and organizational innovation that have been recently concentrated in the same category can have a positive effect on the improvement of management performance. It can be seen that the research of open innovation develops from technological innovation to non-technical innovation and develops into innovation in a broad sense. For example, the Oslo Manual [16] included organizational innovation and marketing innovation as new forms of innovation in addition to traditional product innovation and process innovation. Based on this Oslo manual, research on the effects of technological innovation and non-technical innovation is being conducted through German CIS 4 data [18]. In addition, it is time to understand corporate innovation in a broad sense that expresses not only technological innovation but also non-technical innovation, such as innovation for business performance.

In order to improve appropriation, it is necessary to focus on securing appropriation so that companies can lead to improvement of management performance through R&D and business performance through investment in R&D [19]. The concept of appropriation is expressed as a possibility to obtain legal protection from imitation of existing technological innovations held by a company in an informal way through a formal method using intellectual property rights and a company's strategy, and to derive management performance through innovation. [20]. In order for a company to bring product success to the market and customers through research and development, it is necessary not only to supplement the company's assets, but also to appropriate technology. Firms can protect intellectual property rights from competitors and drive higher corporate profits through legal protection [21].

As such, companies need to make efforts to secure appropriation, which is technical or management information that is advantageous for their sales activities through various methods. Patents are a means of appropriation of companies we are familiar with. In particular, the number of large corporations focusing on patents to secure appropriation has been steadily increasing since the 1980s. Research to retain this appropriation is ongoing, and through more improved research than previous studies, the appropriation effect reveals various differences depending on not only the characteristics of the industry but also the type of innovation, corporate strategy, personnel management, and organizational management It was confirmed that there was [22]. Research on other aspects of appropriation that affects management performance is underway.It is a positive factor that has the effect of enhancing the increase in investment in R&D by securing a high appropriation property. This led to a decline in profits through technological improvement, leading to a recession in technological progress occurring in related industries [23]. In summary, it is time to make

efforts to improve management performance through non-technical innovation as well as technological innovation. Management performance can be maximized when utilizing these innovations and implementing the appropriation to lead to legal protection of corporate interests as in non-technical innovation.

3. Materials and Methods

The data for the study was '2018 Science and Technology Policy Research Institute Korea Enterprise Innovation Survey (Manufacturing Industry)'. The Korea Enterprise Innovation Survey is data collected and promulgated by the Institute for Science and Technology Policy based on the OECD Oslo Manual. The corporate innovation survey is data measuring the innovation activity of companies through a questionnaire survey, and has been conducted and surveyed every two to three years since it was designated as a nationally approved statistics by the National Statistical Office in 2003.

3.1. Research hypothesis and model

This study presented a research hypothesis and a research model as follows to verify the correlation analysis between non-technical innovation of small companies and business performance of companies.

3.1.1. Hypothesis

Companies that have not properly reflected the market environment and customer requirements in their products are likely to have limitations only with technological innovation. Based on these contents, recent research shows a trend that develops into a broad sense of innovation including technological innovation and non-technical innovation, assuming that there is a correlation between technological innovation and non-technical innovation, and cases dealing with non-technical innovation Among the studies, there is a research result that the business performance of companies that are introducing a new marketing system is increasing [24,25]. Research results show that such technological innovation has a relationship that leads to marketing innovation and organizational innovation, and that organizational innovation, which is a non-technical innovation, has a partial effect on product innovation and process innovation, which are technological innovations [18]. Technological innovation and non-technical innovation are one of the important factors to improve business performance, and high business performance can be derived through mutual combination. In the process of product innovation and process innovation to support these studies, the activity cycle of product innovation and process innovation appears differently, and it is said that companies should implement innovation that fits the innovation type [3]. In addition, innovation that pursues market competitiveness based on marketing innovation by reflecting the market environment and customer needs along with the change of organizational structure can contribute to the improvement of corporate management performance. In other words, in order to improve management performance, a company can improve performance by combining product innovation that releases products according to customer demand and non-technical innovation to take advantage of the product over competitors in the market environment. Accordingly, it can be assumed that the factors that positively influence corporate management performance are organizational innovation and marketing innovation, which are non-technical innovations.
Hypothesis 1: Enterprise's non-technical innovation (organizational innovation and marketing innovation) will improve corporate management performance.

In order for a company to actively conduct R&D and lead it to management performance, it must be able to generate profits from R&D and willingness to invest in R&D by guaranteeing appropriation [26]. The reasons why companies want to protect intellectual property rights are when it is not easy to legally protect their technology from competitors, or it is not easy to keep internal trade secrets, it is not easy to independently hold the creations of R&D, or the crystal of innovation is easily imitated If this leads to, companies will shorten the period of generating revenue for their research results. For this reason, companies need to make efforts to derive management performance through securing

appropriation [27]. In addition, among domestic studies, we measured the impact of technological innovation on the business performance of companies and analyzed the effects of technological innovation and non-technical innovation [28]. According to the research results, it may be different depending on the purpose of the study, but it can be seen that non-technical innovation has a correlation with technological innovation or has an effect on management performance. Therefore, in order to maximize management performance, companies implementing innovation must expand not only technological innovation activities but also non-technical innovation activities to bring out higher management performance, and strive to secure appropriation that can guarantee high returns on such management performance. . As such, in this study, it is assumed that non-technical innovation further promotes the securing of corporate appropriation, and as a result, has a positive effect on management performance.

Hypothesis 2: Appropriateness will be improved through non-technical innovation in companies

Hypothesis 3: Appropriateness will appear as a mediating effect between non-technical innovation and business performance.

3.2. Model

In this study, it is assumed that appropriation is linked to the company's non-technical innovation activities, directly leads to the business performance of the company, and that appropriation indirectly affects the business performance of the company. For the hypothetical novel, we find out by comparing and analyzing the basic relationship that non-technical innovation presented above directly leads to management performance, and the unique relationship that has appropriation in the relationship between non-technical innovation and management (Figure 1).

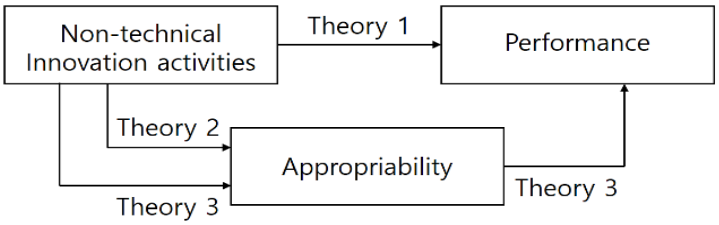

Figure 1. Research model

3.3. Data

Table 1: Definition & Measurement

	Variable	Definition	Measure
DV	Per	Performance	LN_Per
IV	N1	Non-Tech	Yes: 1 No: 0
	N2		
	N3		
	N4		
	N5		
MV	App	Appropriation	

Table 1 shows the operational definition and measurement method of the variables used in this study. Per represents the company's management performance, sales, and the value excluding missing values is converted to a natural log and used as an indicator of the company's management performance. Non-Tech refers to non-technical

innovation, N1 refers to changes in the introduction of work performance systems in performing organizational innovation, N2 refers to flexibility of work and integration between departments, N3 refers to changes in relationships with external organizations, and N4 refers to The changes in the aesthetic design and packaging of products, the N5 expresses the use of new pricing methods such as product price discounts and price differentiation. App represents the exclusiveness of a company and represents the application of patent rights, application of utility model rights, registration of design rights, registration of trademark rights, and protection with trade secrets as an official method to utilize intellectual property rights. Table 2 shows the descriptive statistics of variables and the value of VIF. As for the sample of the study object, companies are conducting non-technical innovation activities and appropriation, and non-technical innovation and appropriation are in the range of values 1 to 5.

Table 2: Statistics and VIF

Table 2. Statistics and VIF

Variable	N	Avr	SD	Min	Max	VIF
Per	1335	9.37	1.50	3.40	13.73	1.044
App	1335	0.86	1.24	0	5	1.034
N1	1335	0.33	0.47	0	1	1.054
N2	1335	0.69	0.46	0	1	1.060
N3	1335	0.44	0.50	0	1	1.053
N4	1335	0.36	0.48	0	1	1.058
N5	1335	0.40	0.49	0	1	1.061

Corporate management performance averaged 9.37, appropriation was 0.86, and non-technical innovation activities averaged 2.22. The results of the study analysis of VIF (Variance Inflation Factor) showed that the VIF of all variables did not exceed 2 and the average was 1.052, indicating that there is no multicollinearity between the variables.

4. Results and Discussion

Table 3: Results of Mediation effect verification

DV	IV	B	S.E	β	t	p	F	R^2 ($_{adj}R^2$)
App	(CON)	0.685	0.074		9.226^{***}	<.001	28.642^{***}	.278 (.269)
	N1	0.144	0.073	0.054	1.976^{*}	.048		
	N2	0.156	0.074	0.058	2.122^{*}	.034		
	N3	-0.084	0.069	-0.033	-1.211	.226		
	N4	0.371	0.072	0.144	5.185^{***}	<.001		
	N5	-0.208	0.071	-0.082	-2.954^{**}	.003		
Per	(CON)	8.974	0.089		100.326^{***}	<.001	46.943^{***}	.283 (.274)
	N1	0.322	0.087	0.101	3.682^{***}	<.001		

	N2	0.475	0.089	0.147	5.364***	<.001		
	N3	-0.255	0.083	-0.084	-3.061**	0.002		
	N4	0.054	0.086	0.017	0.628	0.530		
	N5	0.136	0.085	0.044	1.601	0.110		
Per	(CON)	8.896	0.092		96.811***	<.001	54.871***	.295 (.286)
	N1	0.306	0.087	0.096	3.505***	<.001		
	N2	0.458	0.088	0.141	5.176***	<.001		
	N3	-0.245	0.083	-0.081	-2.957**	0.003		
	N4	0.012	0.087	0.004	0.139	0.890		
	N5	0.160	0.085	0.052	1.881	0.060		
	App	0.113	0.033	0.094	3.448***	<.001		

*p<.05, **p<.01, ***p<.001

Changes in the introduction of non-technical innovation in the way of performing work, business flexibility and integration between departments, introduction of changes in relationships with external organizations, changes in product design and packaging, and use of product discounts and pricing methods affect the business performance of the company. In terms of impact, Baron and Kenny's hierarchical regression analysis proposed by Baron and Kenny was conducted to verify the mediating effect of appropriation. As a result of this, the regression model has statistical significance in step 1 (F=28.642, p<.001), step 2 (F=46.943, p<.001), and step 3 (F=54.871, p<.001). The explanatory power of the regression model was 27.8% in step 1 (corrected R squared 26.9%), 28.3% in step 2 (corrected R squared 27.4%), and 29.5% in step 3 (corrected R squared 28.6). %). Also, the Durbin-Watson statistic is 1.718, which is close to 2, indicating that there is no problem with the assumption of independence of the residuals, indicating that there is no multicollinearity problem. As a result of verifying the significance of the regression coefficient, the change in the introduction of the work performance method in step 1 (β=.054, p<.05), work flexibility and integration between departments (β=.058, p<.05), and products Of aesthetic design and packaging (β=.144, p<.001) is positively significant, and product price discount and price discrimination (β=-.082, p<.01)) was negatively significant. These results show that the greater the change in the introduction of the work performance method, the flexibility of work and the integration between departments, and the change in product design and packaging, the higher the appropriability. I can. In the second stage, changes in the introduction of work performance methods (β=.101, p<.001), flexibility of work, and integration between departments (β=.147, p<.001) were positively significant (+). The introduction of changes in external tissue relations (β=-.084, p<.01) was negatively significant. In the 3rd stage, changes in the way of performing work (β=.096, p<.001), flexibility of work and integration between departments (β=.141, p<.001), product price discount and price discrimination (β=) .052, p<.05) and proprioception (β=.094, p<.001) showed positive (+) significance, and the introduction of changes in relationship with external tissues (β=-.081, p<. 01) was negatively significant. The effect of the change in the introduction of the work performance method (β=.101→.096) and the work flexibility and inter-departmental integration (β=.147→.141) on corporate management performance was lower than in the second stage, and the way the work was performed Appropriateness was found to play an intermediary role in the changes in introduction and influencing business flexibility and inter-departmental integration on corporate management performance. On the other hand, in the third stage, changes in the introduction of work performance methods (β=.096, p<.001), work flexibility and inter-departmental integration (β=.141, p<.001) have a significant effect on corporate management performance. It was found that appropriability was judged to play a role as a partial mediator

in the changes in the introduction of work execution methods and the flexibility of work and integration between departments affecting corporate management performance (Table 3). Through this analysis result, N1 and N2 showed positive (+) effect on management performance, N3 was negative (-) effect, and appropriation was N1, N2, It was found that N4 had a positive (+) effect and N5 had a negative (-) effect. In the path that non-technical innovation is linked to management performance, it can be seen that appropriation has a mediating effect. Therefore, it was confirmed that non-technical innovation has a direct effect on management performance, but indirectly when appropriation is involved in the process leading to management performance.

5. Conclusion

This study verified the research hypothesis that non-technical innovation leads to management performance through the mediating effect of appropriation, unlike the existing research model that leads directly to business performance. To support this, non-technical innovations such as organizational innovation, marketing innovation, and formal methods using intellectual property rights were defined as proprietary and empirical analysis was conducted based on the manufacturing industry data of the Korea Corporate Innovation Survey in 2018. First, it was possible to verify the existing research that non-technical innovation has an effect on management performance, and it can be seen that the influence on management performance is revealed through appropriation. In addition, it was empirically analyzed that non-technical innovation leads to appropriation and ultimately affects management performance, and the mediating effect of appropriation shows an effect. Through the results of this study, the following implications can be suggested. First, the results of this study reconfirmed the results of a recent study that analyzed that non-technical innovation affects management performance [27]. In the existing research focused on technological innovation, recent innovation research has been conducted in earnest to analyze the direct and indirect effects of non-technical innovation, which can contribute to more diverse innovation research. Second, through this study, we drew significant results that non-technical innovation can affect management performance, and that non-technical innovation can affect management performance even in the process of linking appropriation. These results confirmed through empirical analysis that non-technical innovation has an effect on management performance, and appropriability is influenced by non-technical innovation, and appears as a mediating factor between management performance. Third, the relationship between the existing research mainly focused on research on technology innovation such as product innovation and process innovation as a factor affecting management performance and management performance, which analyzed only part of non-technical innovation such as organizational innovation and marketing innovation, was examined. In the previous studies that have not been attempted to study technological innovation and some non-technical innovations on these management performances, and have not attempted parallel research on appropriation performances, this research has led to non-technical innovation and research on non-technical innovations such as organizational innovation and marketing innovation. In parallel study of appropriation, it can provide theoretical implications that it has more influence on the management performance of the company and this can lead to the competitive advantage of the company. Fourth, as practical implications, companies have recently been making efforts to improve management performance through non-technical innovation as well as technological innovation, but it is also important to invest in appropriation. Appropriateness is a factor that affects business performance, and if appropriation is high, profits that can be generated from innovation can be guaranteed. As such, it is time for companies to make efforts to secure appropriation by determining management performance through securing appropriation, and future-oriented insight to secure appropriation.

This study shows the following two limitations and directions for future research. First, to use the data of this study, the data of STEPI's 2018 Korean Business Innovation Survey were analyzed. In the process of restricting the two innovation

activities of the corporate innovation survey to non-technical innovation, constraints were encountered in expanding the scope of the research along with the related questionnaire. Therefore, future research will be able to suggest a better research direction by analyzing detailed questionnaires reflecting the management performance improvement activities of various companies in the corporate innovation survey. Second, in using the manufacturing industry data, I felt the need to do a comparative analysis with the service industry, which is a non-manufacturing field. The relationship between the non-technical innovation and appropriation of the manufacturing and service industries and the direction connected to management performance may differ. This study was limited to studies that empirically verify the mediating effect of non-technical innovation and appropriation, and it was judged that it would be possible to develop research that leads to management performance through various verification methods for future studies.

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