

The Structural Model Investigating the Causal Relationships Between Management Strategy and Innovation Activity and Performance in Manufacturing and Service Sectors

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Abstract: Today, innovation is as an essential factor for corporations for gaining competitive advantage and generating profits continuously in a rapidly changing environment. Within this environment, the managements of corporations have identified innovation as a core activity, they are implementing various innovation activities for their products, structure, processes and human resource management to differentiate themselves from other corporations. Therefore, by considering previous studies on innovation, we aim to use empirical analysis to observe how business strategies that have a large impact on innovation, such as product and market differentiation and cost-leadership strategies, affect the innovation activities of actual corporations. Based on empirical analysis of the survey of 176 corporations, we found that three elements of business strategy, product differentiation, market differentiation and cost leadership have a significant impact on corporate innovation activities. Moreover, corporate innovation activities are a significant factor in improving business performance. The results of this study show that differentiation strategies and cost leadership are important factors in achieving business performance goals through innovation activities. Additionally, the results provide theoretical implications for the relationship between business strategies, corporate innovation activities and business performance and other useful implications for corporate innovation activities.

Key words: Innovation activity, management strategy, firm performance, provide, leadership

INTRODUCTION

Innovation is a requisite for the corporations' momentum of growth and for gaining competitive advantage and generating profits continuously amid environmental changes such as acceleration of technological changes and shortened product life cycle (Tao *et al.*, 2010). Though innovation has a much higher probability of failing than succeeding, corporations that are unable to sustain innovation will eventually dissipate (Zahra and Covin, 1994; Bareghehet *et al.*, 2009). Therefore, it is essential for corporations to take interest in and practice innovation to survive and expand in today's competitive environment. To this end, managements of corporations are adopting innovation as a core business activity and implementing continuous innovation, because it is one of the most important means to differentiate themselves and survive the competition. With the increasing uncertainty in the environment, such

as caused by the recent international affairs, the importance of innovation is further emphasized not only for increasing the competitiveness of corporations but also as a growth engine for the national economy. Therefore, efforts are being made to define the concept of innovation from both a theoretical and an operational perspective and examine the correlation between various factors related to innovation activities and their level of influence (Dolfsma and Seo, 2013; Choi *et al.*, 2014).

By considering previous research on innovation and related factors, this study aims to identify the relationship between factors that have a major impact on innovation and determine whether innovation activities lead to improved business performance. Therefore, this study examines business strategies that are considered important in corporate innovation activities and proposes three elements of business strategies as variables, product differentiation, market differentiation and cost

leadership to verify their relationship with innovation activities using empirical analysis. Moreover, this study will empirically verify how corporate innovation activities influence business performance. This study aims to identify factors that must be considered for maximizing the effectiveness of business performance and innovation activities and provide useful implications for contributing to improved performance.

Literature review:

Innovation theory: The concept of innovation is related to not only technology but also products, processes and management. The purpose of innovation is to improve business performance and the efficiency of production and business by implementing several new changes within the corporation. Thus, the core of innovation is not only improving business performance but also strengthening competitiveness by reconstructing product or service quality, processes and the overall management of the organization. Corporations carry out various innovation activities at the individual or group levels to improve performance and competitiveness. These activities are determined by various factors related to the corporation. The considerable influence of innovation activities extends to not only the corporation but also the national economy. Schumpeter (1934) claimed that there could be no economic development without corporate innovation activities and that corporate innovation is the driving force for national economic development. In other words, the corporation is both the starting point and the principal agent of innovation. Nelson and Rosenberg (1993) referred to this as "Schumpeter Mark I." Since then, there have been continuous studies on corporate innovation, its success and determinants of innovation from the perspective of various researchers.

Utterback and Abernathy (1975) conducted the most widely applied pioneering research on technology innovation. They focused on the introduction and establishment of innovation in the industry and the ways in which technology innovation, its organization and industry structure are changing. Moreover, they attempted to classify corporate innovation into process innovation and product innovation by focusing on how innovation changes over time in three distinct phases: fluid, transitional and specific. Utterback and Abernathy (1975) claimed that the characteristics of the process and the attempts at innovation could be different for each corporation depending on its environment and strategy. They also claimed that innovation demonstrates systematic diversity in accordance with the developments in process technology.

During the emerging phase in which new, radical innovation emerges within the industry, numerous corporations begin to compete based on some form of the innovation. As the impetus to innovate is based on production rate and needs, product innovation surpasses process innovation. However, after a certain amount of time, the competition falls into the transitional phase, during which radical innovation dissipates and incremental innovation and process innovation aimed at cost reduction become prominent. Furthermore, during the final specific phase in which the market becomes stagnant and both product and process innovation decline, a new, radical innovation emerges and initiates a new cycle of innovation. Knight (1967) classifies innovation into four categories: product innovation, process innovation, structural innovation and people innovation. Draft (1978) largely distinguishes innovation into two types: technology innovation which is a combination of Knight's product and process innovation and administrative innovation which is a combination of Knight's structural and people innovation. Damanpour also distinguishes innovation as technology innovation and administrative innovation and explains how innovation appears from an organizational perspective.

Drucker (2007) is a leading scholar of innovation from a business innovation perspective. According to Drucker, technology comprises not only electricity, genetics, discovery of new material, etc. but also management based on corporate entrepreneurship. In other words, entrepreneurial management could also be considered new technology. Through his book *Innovation and Entrepreneurship: Practice and Principles*, Drucker (2014) further explains that in order to innovate, corporations must push forward with the objective of business innovation. Rogers (1995) explains the innovation diffusion theory from the perspective of a technology innovation supporter in his book *Diffusion of Innovations*. According to Rogers (1995), innovation diffusion is the process by which innovation is communicated through certain channels over time among the participants of a social system. Moreover, innovation is influenced by five attributes relative advantage, compatibility, complexity, trialability and observability; therefore, in order to claim innovation, these five criteria must be met.

Chesbrough (2013) claims that the concept of open innovation involves the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for the external use of innovation, respectively. He further claims that corporate innovation is determined by how well and appropriately the knowledge flow between the internal and external parties

Table 1: Perspectives, classification and categories of innovation

Researcher	Perspective of innovation	Classification and category of innovation
Schumpeter(1934)	Corporate innovation	New product launch, adoption of new production method, market emergence, supply of raw materials, group formation
Utterback and Abernathy (1975)	Technology innovation	Process innovation, product innovation
Daft (1978)	Organization innovation	Administrative innovation, technological innovation
Drucker and Noel(1986)	Management innovation	The act that endows resources with a new capacity to create wealth
Christensen (2013)	Technology innovation	Sustaining innovation, disruptive innovation
Chesbrough (2006, 2013)	Technology innovation	Open innovation, closed innovation
Dyer <i>et al.</i> (2011)		
Dyer <i>et al.</i> (2009)	Corporate innovation, organization innovation	Innovator's DNA (Discovery DNA, Execution DNA)
Communities	Corporate innovation	Technology innovation (product innovation, process innovation)
		Management innovation (marketing innovation, organization innovation)
Rogers (1995)	User innovation	Diffusion of innovations theory and five stages from the users' perspective

is utilized and that the flow of innovation is an inevitable trend. As described, earlier studies on innovation examine its definition from diverse perspectives, including technology, corporations, organizations and users. A summary of previous studies on innovation is presented in Table 1.

Business management and corporate innovation:

Earlier studies on corporate strategies emphasize that corporations must progress by properly understanding their environments in order to attain competitive advantage in the market and create profit; they also explain the required business strategies from various perspectives. Porter (1985) considers creating a differentiated competitive advantage as the core reason for business strategies. Porter (1985) proposes a cost-leadership strategy based on the product market, a differentiation strategy and a focus strategy as strategic factors that influence how a corporation pursues competitive advantage. Day and Wensley (1988) claim that product differentiation and positional advantage of product differentiation are the sources of advantage for corporations for gaining competitive advantage in the market; this strategic orientation has a positive effect on not only sales but also relative performance such as increase in profitability and market share. Mintzberg (1978) divides corporate business strategy into the planning stage and implementation stage. The strategy derived in the planning stage is the intended strategy which the organization hopes to execute. The strategy the organization actually follows is the realized strategy and it stems from the process of acquiring, reinforcing and distributing the required resources for securing competitive advantage and differentiation.

Chenhall and Langfield-Smith (1998) emphasize that the approach required may differ depending on the type of strategy the corporation pursues. They explain that business performance could be improved if the selected approach is suitable for each type of strategy. In other words, proper planning and execution of business strategies can positively influence corporate innovation and performance. Chandler (1990) views a business

strategy as a corporation's decision to fulfill its long-term objectives and innovation as a corporation's activity to fulfill those objectives by distributing the required resources and determining its direction.

The reasons corporations attempt innovation is to gain competitive advantage in the market. Furthermore, to gain this advantage, corporations seek innovation with regard to the invested resources, processes and abilities. Therefore, planning and pursuing a particular business strategy and adopting and utilizing various innovation techniques could influence the gaining of competitive advantage and business performance. Additionally, innovation activity could occur during the corporation's process of utilizing various internal systems and resources to respond to its external environment. Gupta and Govindarajan (1984) believe that different business strategies could yield different levels of competitive advantage and that product innovation should occur by using a differentiation strategy rather than a cost-leadership strategy. Manley *et al.* (2009) were able to determine the positive correlation between business strategy and innovation activities by examining the relationship between business strategies, corporate innovation activities and business performance.

Research model and hypotheses: Based on earlier discussions, this study develops a research model (Fig. 1) and conducts an empirical analysis to observe, the role of business strategies from various perspectives of technology innovation activities and the relationship between technology innovation activities and business performance. Corporate strategic orientation can have a positive influence on gaining competitive advantage or creating profit. Strategic orientation can be in the form of a differentiation strategy or a cost-leadership strategy. Gupta and Govindarajan (1984) believed innovation activities could occur by using a differentiation strategy and Manley *et al.* (2009) verified that a corporate strategy could induce innovation activities. Furthermore, when efficiently practiced, innovation activities could lead to cost reduction and positive performance such as securing reliability or gaining market share advantage.

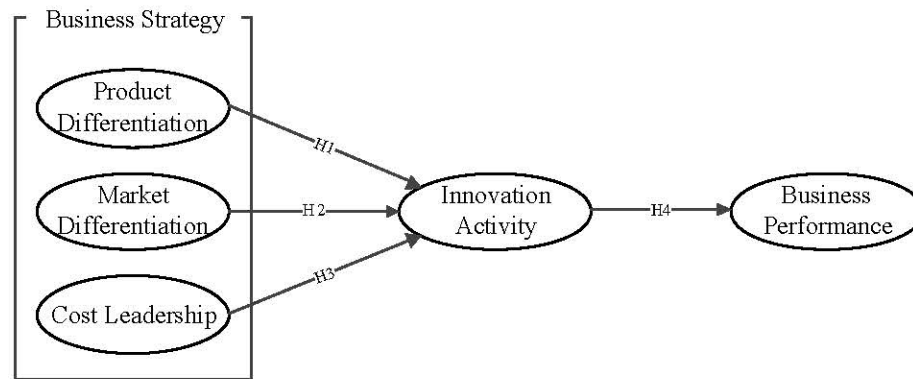


Fig. 1: Research model and hypotheses

Therefore, this study establishes the following research tasks through the proposed empirical research framework. First, this study will distinguish business strategy as product differentiation, market differentiation and cost advantage. Then, it will identify how these factors influence corporate innovation activities by using empirical analysis. Second, through empirical research, this study will investigate how corporate innovation activities influence business performance.

Hypotheses development: A business strategy is a management tool to plan and execute a corporation's overall activities in response to the changing environment. Generally, it refers to the strategy selected by a corporation in order to achieve a dominant position in the market. Corporations through efforts to gain advantage in terms of cost or product and service differentiation, aim to develop their unique competitiveness within the industry. Segev (1989) emphasized that since the main objective of business strategies is to achieve continuous competitive advantage, implementing a business strategy is one of the most important factors in improving corporate activity and business performance. Manley *et al.* (2009) examined the relationship between corporate strategy, innovation activities and business performance and verified that a relevant business strategy is a positive influence on innovation activity.

Moreover, Gupta and Govindarajan (1984) claimed that corporate innovation activities should occur while using a differentiation strategy, as competitive advantage or performance varies according to the business strategy. In addition, for corporations to successfully carry out technology innovation activities, it is crucial that they implement strategies and differentiation in terms of resources such as technology, products, workforce and market activities. In other words, corporations are able to maximize their corporate innovation activities by utilizing business strategies relevant to their conditions and environment. Therefore, this study presents the following hypotheses.

- H₁: Corporations' product differentiation strategies significantly influence their innovation activities
- H₂: Corporations' market differentiation strategies significantly influence their innovation activities.
- H₃: Corporations' cost-leadership strategies significantly influence their innovation activities

Most studies on corporate innovation activities propose innovation adoption or innovativeness as a dependent variable and try to identify its influencing factors. However, in this study, we aim to present business performance as the result index of innovation activities and identify their relationship through an empirical analysis. When executed successfully, innovation activities have positive outcomes such as enhanced quality and reliability through reduced costs and process issues. Koellinger (2008) claimed that corporate innovation activity for products and processes could influence business performance, for example, by generating profit, increasing sales and providing growth potential. Geroski and Toker (1996) also believed that innovation positively affects business performance, for example, by increasing sales. Geroski and Machin (1992) confirmed that a corporation with one or more innovation activities is more likely to enjoy positive effects such as increased sales, generation of profit and increased productivity of its members than a corporation without innovation activities. Therefore, this study proposes the following hypothesis to examine the relationship between corporate innovation activities and business performance:

- H₄: Corporations' innovation activities significantly influence their business performance

MATERIALS AND METHODS

Research specimen: This study used the survey method to collect data for the empirical analysis of the relationship between business strategy, corporate innovation activities and business performance. To develop the

Table 2: Breakdown of the study participants

Category	Frequency	Percentage
Manufacturing industry		
Electric/Electronic	60	34.1
Architecture	20	11.4
Metal/Machine	9	5.1
Automobile	8	4.5
Energy	8	4.5
Shipbuilding/Flight	5	2.8
Textile	5	2.8
Food	3	1.7
Other	30	17.0
Service industry	28	15.9
Capital region		
Seoul	129	73.3
Gyeonggi-do	16	9.1
Noncapital region		
Busan	2	1.1
Daegu	4	2.3
Incheon	3	1.7
Gwangju	3	1.7
Daejeon	4	2.3
Gangwon-do	2	1.1
Chungcheong-do	3	1.7
Jeolla-do	4	2.3
Gyeongsang-do	6	3.4
Total	176	100.0

survey tools and verify their validity, an in-depth interview with the employees and top management of corporations was conducted. The in-depth interviews were conducted between December, 2014 and January 2015 and the survey was finalized based on the interview results and consideration of earlier studies.

We collected data through the final survey between January-February 2015. The survey's participants included 300 corporations in the manufacturing and service industry from all over the country. Among the 300 corporations, completed surveys were collected from 181 corporations (response rate: 60.3%). After excluding 6 surveys due to quality issues, data from 176 corporations was used for the analysis. The statistical data regarding the survey answers for this study is presented in Table 2.

Measuring items: Observed variables for each component of the observation study model were developed in three steps. First, the metrics used in the existing literature were modified to fit through the object and the context of the present study. This developed item used the 5-point Likert scale with 1 being "strong negative" and 5 being "strong positive." Then, the accuracy verification of each item is increased by professors and graduate students who verify the accuracy and content validity. Finally, a feasibility study was conducted with businesses officer that middle size firm to validate the reliability and validity of the measurement model.

RESULTS AND DISCUSSION

Reliability and validity of the measurement model: Prior to conducting the structural model analysis, a Partial

Table 3: Result of convergent validity and reliability tests

Construct	Item	Factor loading	AVE	C.R	Cronbach's alpha
Product differentiation	Pro1	0.861	0.704	0.904	0.859
	Pro2	0.888			
	Pro3	0.740			
	Pro4	0.860			
Market differentiation	Mar1	0.900	0.767	0.908	0.848
	Mar2	0.868			
	Mar3	0.858			
Cost leadership	Cos1	0.916	0.790	0.937	0.911
	Cos2	0.859			
	Cos3	0.891			
	Cos4	0.888			
Innovation activity	Inn1	0.874	0.776	0.965	0.959
	Inn2	0.868			
	Inn3	0.867			
	Inn4	0.849			
	Inn5	0.883			
	Inn6	0.905			
	Inn7	0.908			
	Inn8	0.895			
Business performance	Per1	0.797	0.632	0.939	0.926
	Per2	0.853			
	Per3	0.707			
	Per4	0.674			
	Per5	0.828			
	Per6	0.819			
	Per7	0.841			
	Per8	0.836			
	Per9	0.782			

Least Square (PLS) analysis was conducted to verify the validity and reliability using SmartPLS3.0. The advantage of the PLS approach is the ability to verify the relationship between variables even with a small sample size and verify the model of latent variables even with non-normal distribution of samples. First, for verifying the reliability of the measurement model, the final collected data (n = 176) and the commonly used Cronbach's α value was applied; if Cronbach's α is >0.7 , then reliability is achieved. Next, to verify the discriminant validity, the method of analyzing the correlation between square root values and the constructs from Fornell and Larcker (1981)'s Average Variance Extracted (AVE) analysis was applied. Generally, a discriminant validity is established when the square root value of the AVE of each construct is much larger than the correlation of the specific construct with any of the other constructs.

Finally, the evaluation of convergent validity was completed using each factor's factor loading, composite reliability and AVE values. Convergent validity is established when each factor loading is >0.6 , the construct reliability is >0.7 and the AVE of each latent variable is >0.5 . Upon analysis, all thresholds were satisfied with the factor loading value of 0.674~0.916 for the 5 latent variables used in the study, AVE of 0.632~0.790, construct reliability of 0.904~0.965 and Cronbach's α of 0.848~0.959. These results show that the reliability and validity of the measurement model for verifying the hypotheses of the proposed structural model were secured. The results are presented in Table 3.

Table 4: Squared inter-correlation among the study constructs

Construct	1	2	3	4	5
Product differentiation	0.839*				
Market differentiation	0.747	0.876*			
Cost leadership	0.815	0.686	0.889*		
Innovation activity	0.755	0.659	0.697	0.881*	
Business performance	0.766	0.685	0.710	0.702	0.795*

*The diagonal are the square root of the AVE

Table 5: Summary of the results

Hypothesis	Path	Std. Coefficient	t-value	Result
H1	Product differentiation-Innovation Activity	0.457**	5.339	Accept
H2	Market differentiation-Innovation Activity	0.181*	1.903	Accept
H3	Cost leadership-Innovation activity	0.200*	1.858	Accept
H4	Innovation activity-Business performance	0.702**	14.424	Accept

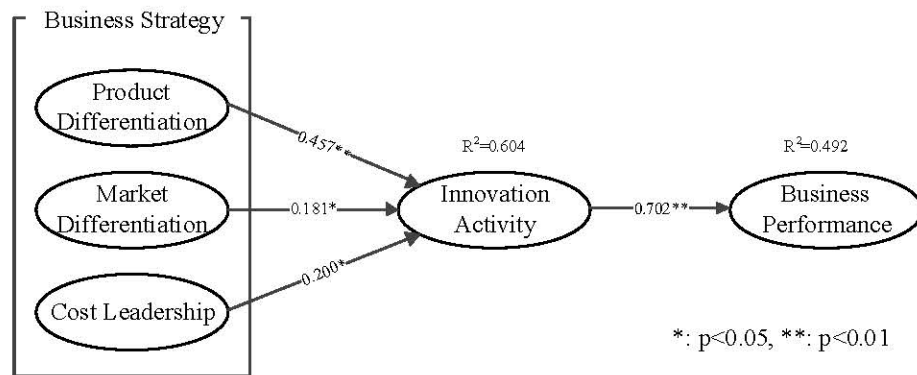


Fig. 2: The structural model

Next, based on the results regarding the discriminant validity, we established the discriminant validity of the measurement tools, with the square root value of the AVE of each construct in the research model being larger than the correlation of the adjacent constructs (Table 4).

Hypothesis test results of the structural model: After verifying the measurement model, the structural model was analyzed to verify the correlation between the variables of the research model proposed in this study. Smart PLS3.0 was also used for the structural model analysis and through the structural model analysis, the result values of the path coefficient α and the endogenous variables R^2 were found to identify the correlation between the research model's variables. Here, R^2 refers to the ratio explained by the exogenous variable in the total fluctuations of the endogenous variable. Each hypothesis of the research model was verified after completing 500 resampling processes through the bootstrap resampling method in SmartPLS3.0.

Based on the results of the analysis, product differentiation ($\alpha = 0.457$, $t = 5.223$) which is one of the three variables of business strategy, has a statistically significant impact on corporate innovation activity at the

0.01 level. Next, market differentiation ($\alpha = 0.181$, $t = 2.040$) and cost leadership ($\alpha = 0.200$, $t = 1.964$) have a statistically significant impact on corporate innovation at the 0.05 level. Therefore, hypotheses 1~3 are accepted. This suggests that the corporations' strategic efforts regarding innovation activities for differentiating markets and products and achieving cost leadership could lead to and strengthen corporate innovation activities.

Next, corporate innovation activities ($\alpha = 0.702$, $t = 14.870$) have a statistically significant impact on business performance at the 0.01 level. This result indicates that corporate innovation activity regarding products and processes is an important factor in business performance. In the analysis of the structural model using PLS, the value of R^2 should generally be >0.10 ; R^2 is the coefficient of determination of the endogenous variable it predicts. Upon analysis, the R^2 of corporate innovation activities (the endogenous variable) is 0.604; this indicates that the exogenous variable is 60.4% which is the explanatory power of the innovation activities (the endogenous variable). Furthermore, the R^2 of business performance is 0.492, indicating dispersion or the explanatory power of 49.2%. The results of the structural model analysis and the test results of the hypotheses are summarized in Table 5 and Fig. 2.

CONCLUSION

Discussion and implications: A corporation's business administration suggests the pursuit of innovation and assuming that it is a going concern, this means that a corporation must constantly innovate in order to survive. A corporation's efforts toward innovation involve various activities. Among these activities, developing a business strategy can serve as an important factor and growth driver in terms of corporate innovation. Amid increasing instability of international markets and uncertainty of the financial environment, a pertinent business strategy and corporate innovation activities are becoming more important than ever as driving forces for gaining competitiveness (Hitt *et al.* 1998; Deeds and Decarolis, 1999). Furthermore, a strategic orientation is proposed as an important factor that strengthens corporate innovation activity and facilitates competitive advantage.

Therefore, we aimed to present meaningful implications by considering innovation, presenting requisites for effective corporate innovation activities and examining how innovation leads to improved business performance. Furthermore, we used empirical analysis to explore and verify the relationship between innovation activities and business strategy factors such as product differentiation, market differentiation and cost leadership. Lastly, we examined the relationship between innovation activities and business performance in order to verify the important role of innovation activities within a corporation. The summary of this study's results is as follows.

First, corporations' product and market differentiation strategies and efforts and activities toward cost leadership have positive effects on corporate innovation activities. These results are in accordance with the results of earlier studies that highlight business strategies as one of the important preceding factors of innovation activities (Manley *et al.*, 2009; Segev, 1989). Thus, we were able to verify that innovation activities for attaining competitive advantage and success in the market arise from the product and market differentiation and the cost leadership of the corporations. We anticipate that the results of this study will provide theoretical implications for future studies aiming to explain the relationship between corporations' strategic orientation and innovation activities theoretically. Additionally, we propose that corporations in the manufacturing and service industries will be able to pursue product or process innovation through differentiation strategies and efforts regarding cost leadership.

Second, corporate innovation activities positively affect overall business performance such as attaining an

advantageous position in the market and improving manufacturing performance and profitability. These results are in accordance with the results of studies conducted by Koellinger (2008) and Geroski and Toker (1996), Choi *et al.* (2014). In other words, we were able to verify that corporate innovation activities such as product innovation or process innovation have a positive influence on not only the quantitative aspects of business like increased profit and sales but also on qualitative aspects like growth potential. Furthermore, efficient practice of innovation activities could reduce the issues and costs related to products and processes and provide positive results such as enhanced quality and reliability.

To summarize, strategic orientation from various perspectives of the corporation is a factor that boosts a corporation's ability to implement relevant innovation activities for products and processes; these activities, in turn, enhance the corporation's business performance or competitive advantage in the market. Therefore, corporations must practice relevant product and process innovations in order to attain success and positive results. The entire management must make active efforts to implement various differentiation and cost-leadership strategies.

LIMITATIONS

This study identified the key factors that influence corporate innovation and examined the effects of innovation activities on performance but with a few limitations. First, although we derived variables related to business strategy as preceding factors of corporate innovation activities, there could also be other factors that influence innovation activities. Thus, future studies must reexamine and reevaluate this fact and develop variables and measurement tools that are more theoretically and empirically relevant. Second, though the analysis targets of this study were corporations in the manufacturing and service industries, the concept of innovation activities, their importance and their impact on business performance could vary depending on the specific type and characteristics of the corporations.

RECOMMENDATIONS

Thus, we recommend that future studies should utilize diverse samples for continuous data collection and analysis, such as samples from large corporations and small and medium-sized corporations from the manufacturing, service and other industries. Additionally, there is a need to examine the difference in

the relationship between business strategies, innovation activities and performance, depending on the difference in the types and characteristics of corporations.

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