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Effect of Component Factors of Innovation Clusters on the Corporate Business Activity: The Moderating Effect of Financial Support

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Abstract

Globalization and knowledge-based economy have increased the importance of local areas as the units of global competition. Therefore, the meaning of localities has been emphasized as the core value of economic activities. In this context, innovation cluster has been recognised and emphasized as effective policy measure for innovation. Therefore, most countries have been trying to develop innovation clusters with their expectation for a rapid growth of economy. Nevertheless, there have been minimal empirical researches on innovation cluster. Therefore, for suggesting implications that activation factors of innovation cluster are to have an effect on tenant's business activities, this study conducted a literature review for the theories of regional innovation system(RIS) and innovation cluster. As a result, the activation factors of innovation cluster were classified into institutional, physicals, and social factor. The case of Gyeonggi province's innovation cluster policy was examined for an empirical analysis. Data were analyzed using ordered logistic regression. The results were as follows:First, Institutional and Infra factors had a positive influence on firms' business activities in every empirical test, so they were the most important activation factors of innovation cluster. Second, regarding the interactive effects of financial support, the interactive effects between financial support and Infra factor had a positive influence on the firms' business activities, according to the result of the empirical test.

1. INTRODUCTION

The expansion of globalization and knowledge-based economy, which are being progressed after late 1990s, became the chance for regions to become the more important factor in national competitiveness.

ICT innovation triggered globalization, which then triggered simultaneous competitions between corporations, regions, and countries. Furthermore, preoccupying comparative advantages through technological innovation with expansion of knowledge-based economy became another important factor of national competitiveness. In this context, all countries around the world are promoting various policies in order to preoccupy comparative competitiveness through 'region' and 'technological innovations'.

Many of preceding studies showed that regional innovation system promotes technological innovations in the region to lead growth. Therefore, all countries in the world are struggling for the formation of regional innovation system to secure global competitiveness (Cooke 2003). In this dimension, the concept of innovation cluster is in the limelight as effective means of policy in formation and utilization of the regional innovation system (Cooke 2008). Innovation has characteristics similar to organisms in that it gets promoted through very dynamic process. In that sense, the effectiveness of innovation cluster in the perspective of innovation promotion is emphasized as various main agents of innovation that are accumulated to interact organically in the innovation cluster.

So this study focused on the questions: 'Does innovation cluster give positive influence to the corporate business activity?", and "If so, what factors give most important influences?". Then, the study drew implications through consideration of preceding studies and empirical analysis.

This study selected Gwanggyo Techno Valley and Pangyo Techno Valley, which were created by the second largest local government Gyeonggi-do, as subjects of empirical analysis. These clusters are receiving interests from central government, other local governments, and Northeast Asia Countries.

The study is composed of 5 chapters. Chapter 1 is a discussion about the background, purpose, scope, and method of the study. Chapter 2 investigates the theoretical background and preceding studies. Chapter 3 sets up the study model and hypothesis, and suggests the relevant research methods. Chapter 4 performs analysis of empirical through factorial analysis and regression analysis on the result of surveys conducted on the corporations in the 'Gwanggyo Techno Valley' and 'Pangyo Techno Valley', which are the subjects of the study. Lastly, Chapter 5 summarizes the results of the study and explains about major implications, limitations of the study, and future research directions.

2. LITERATURE REVIEW

2. 1 Regional Innovation System

The concept of technological innovation was first used by Schumpeter. It is a dynamic concept where the development and utilization of technologies performed by major economic agents are emphasized. In his early studies (Schumpeter I), he defined technological innovation as 'introducing freshness into goods, production process, market, inputs, and organization based on the entrepreneurial spirit pursuing corporate earning'. As time passed by, in his late studies (Schumpeter II), he focused on the point that 'technological innovation can be continued in the shape of the corporation' and emphasized 'institutional framework' for constant creation of technological innovation.

These understandings were materialized through innovation system. Innovation system refers to the system consisted of mutual relationships of organizations influencing the creation, expansion, and utilization of economically beneficial knowledge and information while national innovation system is the innovation system in national level.

Freeman (1987) defined the national innovation system as 'the network between public and private organizations performing activities and interactions related with technological development in order to acquire new technologies and expand them'. Lundvall (1992) defined it as 'the system consisting of all components and relationships which interact during the production, expansion, and usage of new and economically beneficial knowledge'. Nelson and Rosenberg (1993), in the notion of negotiation, defined national innovation system as 'set of organizations which play major roles in influencing the results of technological innovation', while Chung (2002) described it as 'interactions between major agents of innovation existing in a country'.

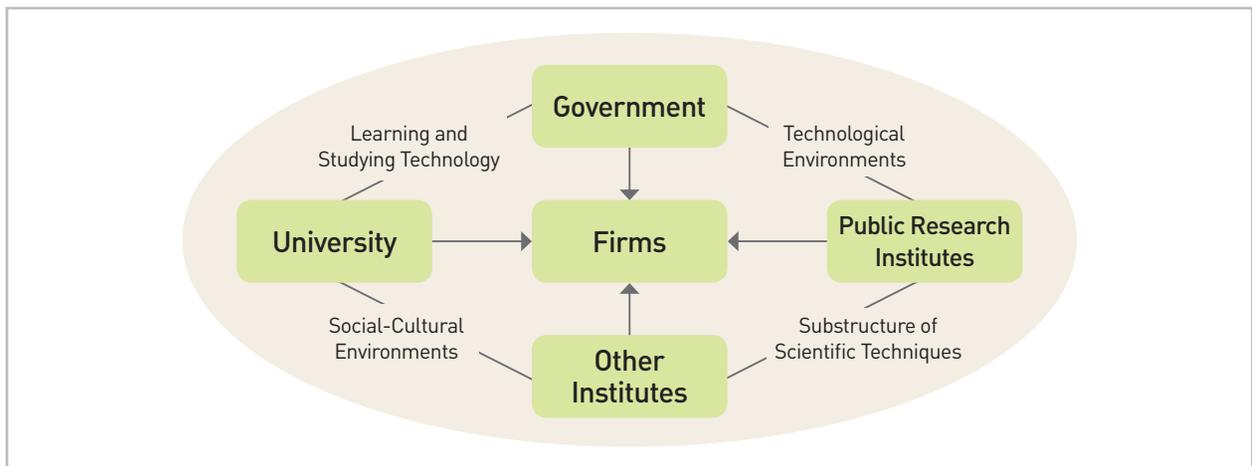The concept of regional innovation system is a regional ap-

Fig. 1. General model of National Innovation System
Source: Chung (2012); Lee (2008)

plication of national innovation system, which could be considered as complementary concept of innovation system (Cooke 1998). The regional innovation system was first introduced by Cooke (1992). It was late 1990s when more relevant studies started to be conducted (Brackzyk et al. 1998; Cooke 2008). These regional innovation systems are utilized in different countries and regions as political means (Cooke 2008) because of the broadened understandings about the characteristics and process of technological innovation in the changes and development of regions (Markusen 2003).

Regional innovation system means a system where 'major agents of innovation in the region and their complex' (Chung 2002; 2003) or 'major agents of innovation' in other words, research institutes, university, government, public institutes are interacting and learning through institutional environment of the embedded region (Cooke et al. 1997). Laranja et al. (2008) defined the regional innovation system as 'combination of innovation network and system in regional dimension supported by administrations in which they interact with each other strongly and regularly to increase the innovation results within the corporations in the region.' Therefore, geographical proximity has influence on the interaction and functional relationship between corporation and relevant organization in the region (Doloreux 2004a, b).

Gertler et al. (2000) emphasized the geographical proximity, sharing of regional culture, and creation of new regional system in the importance of region to the innovation. Krugman (1997) pointed out the indifference about spatial issues shown in mainstream of economics to suggest critical thinking about space and economy. The studies about regions, which

are geographically intermediate range in the innovation system theory, enriched the studies relevant to innovations (Mothe and Paquet 1998).

2. 2 Concept of innovation cluster

The concept of cluster was introduced by Porter in his 'The Competitive Advantage of Nations' in 1990, and it was used widely after that. Various studies have found in Silicon Valley in US, Cambridge Technopole in UK, Sophia-Antipolis in France, Kista in Sweden, and various other clusters that the foster of innovation clusters contributes to economic feasibility and creation of economic performance. The innovation clusters are becoming effective means of policy to materialize the regional innovation system (Cooke 2008). OECD(1999) defined components of cluster as 'very independent corporations linked with production chain of added value, knowledge creating institutes such as universities, research institutes, knowledge creating companies, related organization such as broke consultant, and network of customers', and led the discussion about promotion of cluster, which can be applied to member countries jointly.

Innovation cluster has difference from other clusters in that 'innovation' is its core function and, at the same time, its goal. Innovation cluster means a 'place with higher added value creation from comparative advantage over other regions in the innovation competitive level' (Lim 2002).

Putting together all things discussed above, it is advisable that regional innovation system is understood as a concept broader than clusters (Tödtling and Trippl 2005) because generally many clusters and industries may exist in a regional innovation system.
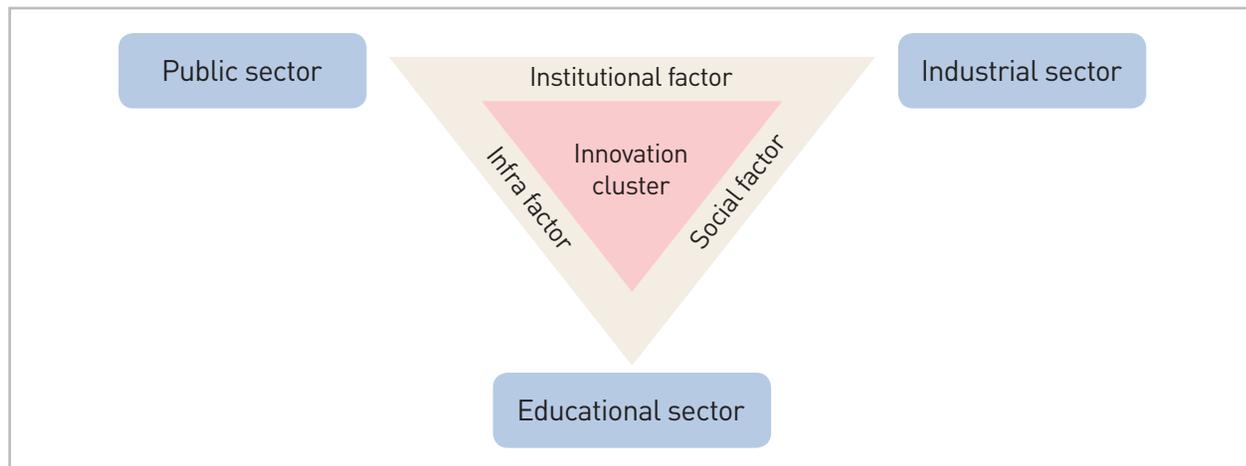

Fig. 2. Composition of innovation cluster
Source: Cooke (1997); Chung (1999, 2012)

2. 3 Component Factors of innovation cluster and Corporate Business Activity

The component factors of innovation clusters may be classified into institutional, infra, and social factors in the perspectives of innovation system theories (Kenworthy 1995; Cooke et al. 1997; Chung 1999a,b; Chung 2012).

Institutional factors possess very important meaning in the theory of national innovation system, which is the theoretical foundation of innovation cluster, because the institutional characteristics of each country is the biggest factor determining the innovation system, which is the core of national innovation capabilities (Kaufmann and Tödtling 2001; Filippetti and Archilbugi 2011). Infra factors are important because it consists of various infrastructures for innovation. If infra factors, such as settlement conditions, amenities, and joint equipment, are well prepared, the quality talents will be induced and the possibility of creating economic performance is greater. Good examples are attraction of outstanding foreign companies through organization of infrastructure in Wales, located in the southwestern part of UK, and attraction of manpower from Silicon Valley to Hsichu Science and Industrial Complex through organizing residential area. Lastly, social factors are important as it is cooperative network. These cooperative networks become the foundation of development of nation and region (Putnam 1993). Through analysis of empirical in his study about result of innovation cluster and openness of network, Eisingerich et al. (2010) proved that interaction between geographically closely located main agents of innovation give motivation in forming new connections or reinforcing the existing relationships. The result of research conducted by OECD (2001) showed that social factors had influence on the expansion of innovation and knowledge.

The overall effects of these three factors on the business activity within the cluster from preceding studies were put together in <Table 1>.

Table 1. Result of Preceding Study about Composition of each Type of Factors

	Institutional Factor	Infra Factor	Social Factor
Brown (2000)	Business support service, efficient networking, policy environment	Financing, increase in number of companies, existence of large company, equipment of infrastructure	Entrepreneurial spirit, capability to attract talents, science basis
Kaufmamn and Tödtling (2002)	Infrastructure utilizing system, direct financial support	Establishment of management organization, technological center, and business incubator	Proximity of outstanding university, capability enforcement program
Wolfgang (2004)	Expansion of regionally specialized innovation system and innovation network	Quality housing, transportation, and energy infrastructure (Infrastructure)	Experienced engineer, individual's innovation promotion capability (incentive)
Cooke, P. (2008)	Support for attracted industry promotion, Support policy for regional development platform focusing on cluster	Proximity to innovative governance, establishment of regional research institute and technology institute	Promotion of entrepreneurial spirit, training talents with knowledge expansion and absorption capability
Eisingerich et al. (2010)	Program for formation and activation of connected cooperation with management organization and public institutes	Establishment of trust relationship with innovation partner through geographical accumulation	Talents with flexibility to prevent the group from falling into inertia
Gagner et al. (2010)	Government support, networking	Exclusive management of venture capital and cluster	Experienced labor force, innovation technology transfer system, educational infrastructure

3. HYPOTHESIS AND MODEL

3. 1 Hypothesis

Through analysis on theories and preceding researches, it was found that innovation clusters consist of institutional, infra, and social factors and these factors have positive influence in the business activities.

This study set up 3 hypotheses in order to conduct analysis of empirical on the companies located in to the innovation clusters which represent Korea, Gwanggyo Techno Valley and Pangyo Techno Valley.

- H 1. Institutional factors of innovation cluster have positive influence on business activity.
- H 2. infra factors of innovation cluster have positive influence on business activity
- H 3. Social factors of innovation cluster have positive influence on business activity

Financing of companies is a part to be looked closely in re-lation to activation of innovation cluster. In their case study on 6 clusters in Upper Austria, Kaufmamn and Tödtling (2002) asserted that direct financial aid is an effective solution to financial bottleneck phenomenon of the corporation, and it needs to be properly connected with indirect supports to take note that it could act as factor promoting the performance. The following 3 hypotheses were set up based on the judgment from results of preceding studies that financial aid will take a role of moderating variable through interaction with independent variables.

- H 4. As the satisfaction on financial aid gets higher, institutional factor has more positive influence on business activities.
- H 5. As the satisfaction on financial aid gets higher, infra factor has more positive influence on business activities.
- H 6. As the satisfaction on financial aid gets higher, social factor has more positive influence on business activities.

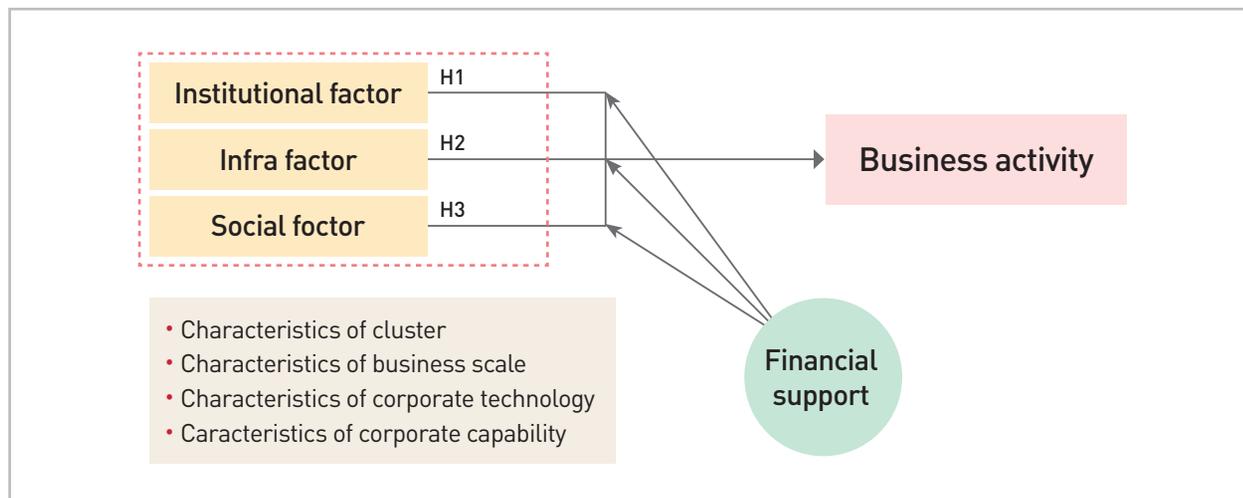The following research model in <Fig. 3> was schematized based on the hypotheses set above.

Fig. 3. Research Model

3. 2 Measurement of variables

Return on investment, operating profit, sales, share, and numbers of patents are used to measure the level of influence on corporate business activities in relation to dependent variables. However, subjective measurement methods are widely utilized because the accurate standard of judgment is hardly secured when the relevant data are difficult to be acquired, or the type of industry and scale of the business are similar.

The subjects of the study, Gwangyo Techno Valley and Pangyo Techno Valley, which are recently established, do not have many positive preceding researches; the data and information about companies located in these clusters are not gathered and managed systematically. Therefore, this study considered the limitation in data gathering of Gwangyo Techno Valley and Pangyo Techno Valley, and used 'level of support to corporate business activity' as dependent variable and subjective measurement variable as surrogate variable to measure using 5 point Likert scale.

Table 2. Composition and Measurement of Variables

Factor	Variable	Measurement Item	No. of Questions	References
Independent Variable	Institutional Factor	Level of satisfaction on management consulting and solution support for bottleneck technology	8	Putnam (1993) Kenworthy (1995) Brown (2000) Kaufmamn and Tödtling (2002) Wolfgang (2004) Cooke, P. (2008) Eisingerich et al. (2010) Gagner et al. (2010)
		Level of satisfaction on support for development of technology and acquisition of newest technology		
		Level of satisfaction on support for national and regional(Gyeonggi-do) task		
		Level of satisfaction on support for public facilities and management of complex infrastructure		
		Level of satisfaction on support for joint research equipment and facility infrastructure		
		Level of satisfaction on support for corporate marketing and public relations		
		Level of satisfaction on support for acquisition of data for newest management and technology		
		Level of satisfaction on exclusive management organization		
	Infra Factor	Level of satisfaction on support for legal and administrative matters	5	
		Level of satisfaction on amenities such as conference room and conventions		
		Level of satisfaction on nursery facility		
		Level of satisfaction on housings including partment		
		Level of satisfaction on neighborhood facility		
	Social Factor	Level of satisfaction on support for technology management and educational training	4	
		Level of satisfaction on support for joint research and technical cooperation		
		Level of satisfaction on support for activation of network such as forum		
		Level of satisfaction on support for outstanding ooperation institute matching		
Moderating Variable	Financial Support	Level of satisfaction on support for tax support such as tax cut	2	Kaufmamn and Tödtling (2002), Gagner et al. (2010)
		Level of satisfaction on support for finance such as financing		
Dependent Variable	Business Activity	Does moving in to cluster give positive influence to corporate business activity?	1	
Control Variable	Maturity	0 for Gwanggyo Techno Valley 1 for Pangyo Techno Valley	4	Yim et al. (2010)
	Scale of Business	0 for large company 1 for small company		Spencer et al. (2010)
	Policy Support	0 for IT and BT area 1 for other areas		Control of policy support factors
	Corporate Capability	0 for INNO-BIZ certificate 1 for non INNO-BIZ certificate		Yannis et al. (2004), Cooke (2008)

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Component factors of innovation clusters were set as independent variables in order to analyze the effect of innovation clusters on the corporate business activity. Through analysis on <Fig. 1>, the component factors were composed of 19 sub sections shown in <Table 2>.

Meanwhile, what needs to be pointed out in the process, where innovation clusters promote the corporate business activities of the tenants, is not how much component factors are equipped, rather it is how each component factor is organically interacting with main agents of innovation (Cooke et al. 1997). Based on these observations, the company's level of satisfaction on 19 component factors were used as surrogate variable to measure through 5 point Likert scales, and these 19 factors were classified into institutional, infra, social, and financial aid factors. As it was shown in the result of research done by Kaufmamn and Tödtling (2002), financial aid factors were set as moderating variable with assumption that it will have influence on dependent variables through interactions with independent variables.

For regression analysis, the variable, which can have influence on the relationship between independent variables and dependent variables, was set as control variable. Yim et al. (2010), Menzel and Fornahl (2007) asserted that maturity of innovation cluster changes the performance of companies. The maturity of innovation cluster was set as control variable based on these results. Spencer et al. (2010) asserted that existence of company with certain scale promotes comparatively higher growth than

other regions. Therefore, the scale of business was set as control variable. Also, as a reflection to the assertion of Yannis et al. (2004) and Cooke (2008), technological innovation capability and knowledge absorption capability have influence on innovativeness of company, and creation of economic performance, technological capability was selected as control variable. Lastly, the support direction of regional policy (Gyeonggi-do) was considered to have influence on dependent variables, therefore it was selected as a control variable.

3. 3 Collection of Data and Research Methodology

Survey was conducted on the tenants in Gwanggyo Techno Valley and Pangyo Techno Valley for empirical analysis.

One survey was given to one CEO or executive with good understanding of overall present conditions of the company per company. The method of analysis was self-administered questionnaire through email and fax.

Used as a method in this study, ordered logistic regression was utilized as very useful analysis tool in studying social sciences, which have to deal with complex and various responses. Ordered logistic regression is in an advanced form compared to traditional regression model, which cannot deal with discrete responses in regard that it can deal with responses from Likert scale with regression equation.

Table 3. Technovalley Overview (2012)

	Period	Object	Tenants	Employees	Component
Gwanggyo Techno Valley	2004 - 2008	Global convergence technology complex	198	About 3,700	BT 27%, IT 23% NT 15%, ETC 36%
Pangyo Techno Valley	2005 - 2015	Global ICT hub	121	About 10,000	IT 70%, CT 10% BT 10%, ETC 10%

Table 4. Present Conditions of Response to the Survey

	Period of Survey	Number of tenants	Number of Responded Company	Response Rate
Gwanggyo Techno Valley	2012. 9. 10 ~ 19	198	73	36.8%
Pangyo Techno Valley	2012. 3. 5 ~ 9	121	83	66.9%
Total	-	319	156	48.9%

4. EMPIRICAL ANALYSIS

4. 1 Verification of Reliability and Validity

For empirical analysis, the value of Chronbach's α was used to verify the reliability of survey items used in the questionnaire. Reliability is related to accuracy, consistency, possibility to depend, stability, and predictability of the measurement results, and it refers to the possibility of receiving consistent value when repeating measurement for same concept (Kerlinger 1964).

The final coefficient of reliability measured were shown in <Table 5> as 0.927 for institutional factor, 0.905 for social factors, 0.851 for infra factor, and 0.764 for financial aid factors. Generally, it is considered to have comparatively high reliabil-

ity when the value of Chronbach's α is higher than 0.6.

Validity is to check whether the concept or characteristics of measurement tool was accurately measured even if the measured data has reliability. It is important to verify the validity of measurement tool because the tool cannot accurately reflect the characteristics of the concept if the measurement tool has no validity.

This study conducted factorial analysis in order to verify the validity of measurement tool. Factorial analysis is one of the multivariate statistical analyses, which finds its basis in the correlations of various variables and finds systematic structure of immanent characteristics of variables. Gatherings of huge amount of information can systematically be bind, and it can check whether the characteristics and patterns of data are well

Table 5. Verification of Reliability for Measurement Items

Variable		Chronbach's α
Institutional Factors(8)	Bottleneck Technology	0.927
	Acquisition of Technology	
	Government Task	
	Acquisition of Data	
	Management of Facilities	
	Joint Equipment	
	Public Relations	
	Exclusive Institute	
Social Factors(4)	Technological Cooperation	0.905
	Cooperative Institute	
	Educational Training	
	Network	
Infra Factors(5)	Supporting Facility	0.851
	Housing Conditions	
	Neighborhood Facility	
	Convenience Facility	
	Nursery Facility	
Financial Support	Tax Cut	0.764
	Financial Support	

reflected and understood.

As shown in <Table 6>, the result of factorial analysis was classified into 4 factors. Principal component analysis was performed to extract factors with eigenvalue higher than 1 based on the factor extraction, and the results were rotated using varimax orthogonal rotation method. Factor loading value greater than 0.4 was considered as useful variable, and value greater than 0.5 was considered very important variable. The

classified characteristics were divided into institutional, infra, social, and financial aid factors. These four factors were shown to explain 72.552% of total variance.

4. 2 Verification of Hypotheses

Ordered logistic regression model was conducted to analyze the empirical Regression analysis, which was conducted on the result of survey to tenants in Gwanggyo Techno Valley and Pangyo

Table 6. Verification of Validity Measurement Items

Variable		Component			
		1	2	3	4
Institutional Factor	Bottleneck Technology	0.80432	0.212658	0.291464	0.074755
	Acquisition of Technology	0.800978	0.08019	0.240296	0.11005
	Government Task	0.794243	0.31177	0.232473	-0.13039
	Acquisition of Information	0.786855	0.333586	-0.12241	0.028887
	Facility Management	0.777828	0.188619	0.264428	0.172534
	Joint Equipment	0.769858	0.203951	0.163914	0.171333
	Public Relations	0.693093	0.080766	0.155059	0.421407
	Exclusive Institute	0.631202	0.243667	0.115951	0.405211
Social Factor	Technological Cooperation	0.293557	0.83806	0.247916	-0.05544
	Cooperative Institute	0.162633	0.837628	0.305113	0.099265
	Educational Training	0.346396	0.831783	0.118901	-0.01354
	Network	0.142718	0.799178	0.081241	-0.09386
Infra Factor	Supporting Facility	-0.04727	0.054655	0.838148	0.100256
	Housing Condition	0.280099	0.122986	0.806026	-0.00381
	Neighborhood Facility	0.242341	0.22127	0.685452	0.177035
	Convenience Facility	0.364604	0.382015	0.576821	-0.06952
	Nursery Facility	0.294337	0.313195	0.54153	0.215818
Financial support	Tax Cut	0.065426	-0.07599	0.067503	0.884538
	Financial Support	0.273053	-0.05572	0.144481	0.832556
Eigen Value		5.306	3.458	2.995	2.027
Variance		27.925	46.123	61.885	72.552

Techno Valley. The result of analysis is shown in <Table 7>.

Four control variables chosen are as follows: 'Maturity of cluster', 'direction of policy support', 'business scale', and 'technological capability'. 'Maturity of cluster' and 'regional direction of policy support' (Gyeonggi-do) had significant effect on 'corporate business activity', while they did not have significant effects on 'scale of business' and 'technological capability'. In other words, the fact that 'maturity of cluster (B=-1.323, P<0.05), which is control variable for differentiation of location whether in Gwanggyo or Pangyo Techno Valley, has significance implies that the component factors of companies located in Gwanggyo Techno Valley have higher positive effect in the corporate business activity compared to component factors of companies located in Pangyo Techno Valley.

In addition, the 'characteristics of technology field' of the tenants in the cluster showed results (B=-0.797, P<0.05), which may have similar interpretation; in other words, the component factors of companies in IT and BT field, which received regional policy support from Gyeonggi-do, were shown to have bigger positive effect on the corporate business activity compared to component factors of companies not in IT and BT field.

Institutional and infra factors among the independent variables had significant effect on corporate business activity, while social factors had insignificant effect. As a result of regression analysis, the obtained B was 0.515(P<0.05) implying that institutional factors have positive effect on corporate business activity, and hypothesis 1 was adopted. Hypothesis 2 was adopted as well because the infra factors showed B value of 0.990(P<0.051) implying positive effect on corporate business activity. Social factors showed B value of 0.2214, which means positive effect on the corporate business activity, but the result was statistically insignificant, thus hypothesis 3 was rejected.

H 1. Institutional factors of innovation cluster have positive influence on business activity. (Adopt)

H 2. infra factors of innovation cluster have positive influence on business activity (Adopt)

Table 7. Result of Regression Analysis

Variable		Dependent Variable: Level of support to corporate business activity			
		Model 1		Model 2	
		coefficient	z	coefficient	z
Control Variable	Maturity of Cluster (0 for Gwanggyo, 1 for Pangyo)	-1.323**	-2.33	-0.869	-1.33
	Scale of Business (0 for large and medium, 1 for small)	-0.114	-0.33	-0.137	-0.39
	Technological Capability (0 for INNO-BIZ, 1 for non-INNO-BIZ)	0.657	1.67	0.334	0.80
	Policy Support (0 for IT-BT, 1 for others)	-0.797**	-2.03	-0.5782	-1.43
Independent Variable	Institutional Factor	0.515**	2.24	0.6821***	2.65
	Social Factor	0.214	0.88	0.437	1.56
	Infra Factor	0.990***	4.52	1.007***	4.32
Moderating Variable	Financial support	-	-	0.417*	1.87
Interaction	Financial * Institutional	-	-	-0.005	-0.02
	Financial * Social	-	-	-0.022	0.11
	Financial * Infra	-	-	0.571***	2.91
Log likelihood		-106.527		-100.382	

H 3. Social factors of innovation cluster have positive influence on business activity (Reject)

Next, the regression analysis result of model 2, which includes moderating variable of financial aid, showed the effect of institutional and social factors on the corporate business activity depending on the financial aid was -0.005 and -0.022, respectively, which are statistically insignificant (P>0.1), therefore, hypothesis 4 and 6 were rejected. Hypothesis 5 was adopted because the effect of infra factors on the corporate business activity depending on the financial aid was 0.571, which is significant positive effect (P<0.01).

   H 4. As the satisfaction on financial aid gets higher, institutional factor has positive influence on business activities. (Reject)
   H 5. As the satisfaction on financial aid gets higher, infra factor has positive influence on business activities. (Adopt)
   H 6. As the satisfaction on financial aid gets higher, social factor has positive influence on business activities. (Reject)

These results support assertion of Kaufmamn and Tödtling (2002) in that direct financial aid will be effective solution to the bottleneck phenomenon of innovative company with empirical analysis.
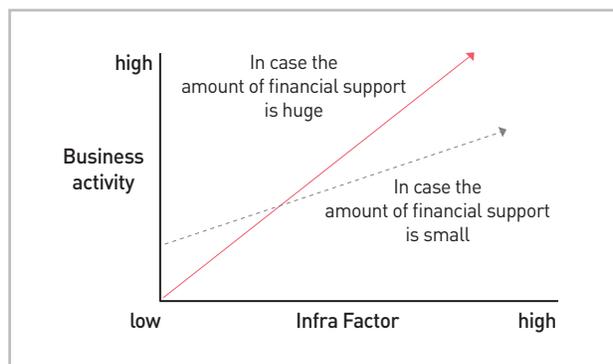

Fig. 4. Effect of Moderating Variable (Financial Aid)

Summarizing the result of regression analysis, the effect of independent variables on corporate business activity is different depending on 'maturity of innovation cluster' and 'regional (Gyeonggi-do) support policy direction' in the research subject area. Also, infra factors and institutional factors showed positive effect on the corporate business activity as an innovation cluster activating factor. Social factors were found to not have significant effect. Lastly, the analysis on the interaction between moderating variable, which is financial aid, and other independent variables showed that only infra factors are effective.

5. CONCLUSION

This study has performed empirical analysis on effects of component factors of innovation clusters on the corporate business activities. The subjects of the study are the companies located in two innovation clusters representing Korea, Gwanggyo Techno Valley and Pangyo Techno Valley. The interaction effect of moderating variable, financial aid, was also analyzed in the process.

First, the result of hypothesis verification on the effect of component factors of innovation clusters on the corporate business activity is shown in <Table 8>. Infra and Institutional factors had positive effect on the corporate business activity, but social factors did not have significant effect. This result implies that the cooperative network inside of innovation cluster is not activated yet. Therefore, political complements must be made for this result of hypothesis verification.

Table 8. Effect of Component Factors of innovation clusters on the Corporate Business Activity

	Results
Infra Factors	Adopt (have positive effect)
Institutional Factors	Adopt (have positive effect)
Social Factors	Reject (do not have positive effect)

Second, the result of hypothesis verification related to moderating effect of financial aid is shown in <Table 9>. The effect of financial aid was that infra factors had positive effect on corporate business activity, while institutional and social factors did not have significant effect.

Table 9. Effect of Financial Aid

	Results
Financial support * Infra Factors	Adopt (have positive effect)
Financial support * Institutional Factors	Reject (do not have positive effect)
Financial support * Social Factors	Reject (do not have positive effect)

These results partially support the preceding research results of Kaufmamn and Tödtling (2002) in that direct financial aid is effective solution to the financial bottleneck phenomenon of innovative company and that appropriate connection with direct

support, such as consulting and workshop, through management system is necessary to optimize the effect of financial aid. In this perspective, the result of empirical analysis emphasized that active financial support from government is necessary.

This study stands in the perspective that creation and promotion of innovation cluster activation components are not easy, but government policy may allow partial realization of the goal. In the discussion for innovation clusters, it is generally agreed that imitating Silicon Valley is not feasible, but central and regional governments of all countries around the world are striving for creation of innovation performance through establishing innovation clusters similar to the Silicon Valley.

Therefore, this study suggested new framework for analysis through verifying the hypothesis drawn from preceding references related to component factors of innovation clusters through empirical analysis based on this critical mind. At the same time, this study is meaningful in that it suggested various theoretical and political implications for growth and strategy of innovation clusters in the perspective of technological management.

However, the study has limitations: the number of samples was comparatively small to generalize other innovation clusters, and the study focused on recently established innovation clusters as its study subjects. These limitations need to be considered in the future studies.

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