



# Abstract

## **Analysis of Firms' Performances and Suggestions of Industrial Ecosystem Establishment in the Innovation Cities**

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### **Chapter 1**

Since the moving of firms into innovation cities have started in earnest in 2014, there is a significant lack of systematic research and studies targeting such firms. Moreover, in accordance with the launch of the Innovation Cities Season 2 promoted by the current government, there is a dire need to construct an industrial ecosystem for each innovation cities. Furthermore, as the government is currently planning the additional relocation of public institutions in the capital area, preemptive measures are necessary for upcoming relocation.

This research aims to analyze the quantitative and qualitative performances of relocation into the innovation cities, by studying firms

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that have moved into the innovation cities. Based on the analysis, the purpose of this research is to enhance synergy between firms and related industry-academia-research institutes in that regions, and furthermore, to suggest specific policy improving measures to establish the innovative city-centered regional industrial ecosystem.

The main contents of this study are as follows; Chapter 2 outlines the policy for promoting innovation cities, demonstrates the performance on attracting firms and hiring employees, and then looks at cases of relocation of domestic and foreign public institutions. In chapter 3, an survey is conducted to compare the difficulties and performances of firms between the inside and outside innovation cities. Chapter 4 promotes an empirical analysis on the performance of firms and the industrial ecosystems comparing the inside firms and outside firms in the innovation cities by using the Employment Insurance DB and the results of our surveys. Finally, chapter 5 summarizes the results of this study, and then suggests specific policy measures to improve the performance of firms in innovation cities.

This study makes several contributions to the literature. While previous studies focused on outputs of the entire innovation cities such as increasing employees or number of firms. Meanwhile, this study focuses on the outcomes that are made after firms' relocation into innovation cities. Also, the existing research was a macro research focusing on relocated public institutions based on the "Innovation Cities Season 1". On the other hand, this study is a micro-research focusing on firms · industries to promote the "Innovation Cities Season 2". In addition, in previous studies, the industrial ecosystem has been studied without a definition. In this study, the industrial ecosystem is defined.

The analysis is conducted based on the analysis framework and components that are set to meet the definition.

## Chapter 2

Along with the construction of the new administrative capital during the Roh Moo-Hyun Administration, the innovation cities project was promoted to facilitate dispersion of population and firms from the capital area into the local regions through the relocation of public institutions, thereby promoting balanced development between the capital and non-capital regions. To this end, the government started to construct 10 innovation cities from 2007, completed the projects in 2013, and has now completed the relocation of 153 public institutions.

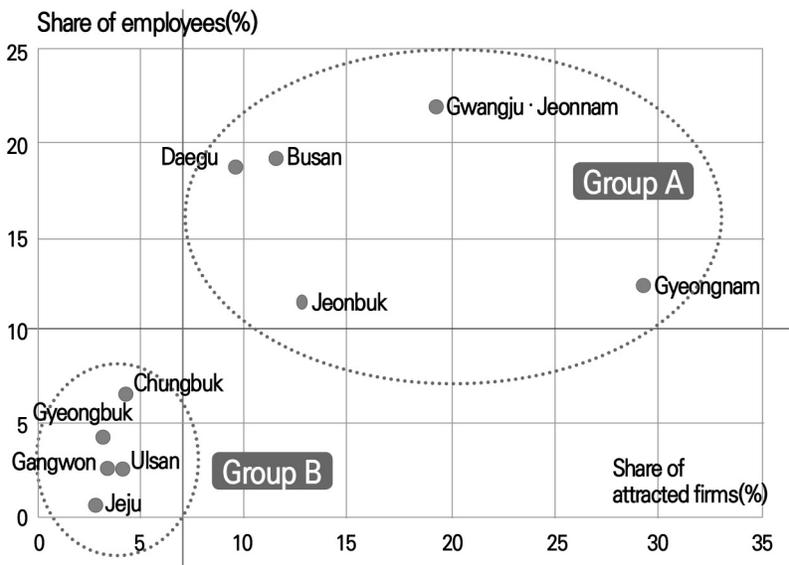
Such relocation of public institutions in the capital area was also conducted in Europe. In the case of Britain and Sweden, the relocation was implemented two to three times from the 1960s to the 70s until recent. The differences between these countries and Korea are that public institutions were not spatially grouped in one place like innovation cities in Korea, but are located individually. In addition, there were no policy measures in such countries to support private firms or to enhance synergy with public institutions. As a result, according to existing empirical studies, it was analyzed that these countries did not significantly contribute to the creation of new jobs or population growth in the local regions.

How is in Korea cases? We would like know the performances in innovation cities in Korea, this study assessed it by categorizing in-

novation cities into type A, the cities having homogeneous public institutions which belong to representative industries of each innovation cities, and simultaneously having natural science or engineering institutions, and type B, which have none of such conditions. The performances were measured by factors such as the number of attracted firms and the number of employees in the innovation cities.

As a result of calculating the shares of each innovation cities in the total number of tenant firms or the total number of workers, two groups were divided and shown in the diagram. Higher level, Group A consists of five innovation cities, including Gyeongnam, Gwangju · Jeonnam, Busan, Daegu, and Jeonbuk, while lower level, Group B consists of the rests five innovation cities. In the end, it was analyzed that only about half of Korean innovation cities are achieving good performances.

The Share of Attracted Firms and Employees by Each Innovative Cities



### Chapter 3

In this surveys, various types of quantitative and qualitative performances and difficulties were investigated for firms that have moved into nine innovation cities (except Jeju). The group of firms surveyed include approximately 300 firms, which are about one-fifth of the firms in the innovation cities. The comparing group included approximately 300 firms, which are located nearby innovation cities. The major performance results were compared as shown in <Table>.

Results of the analysis shows firms in the innovation cities showed generally better results in qualitative evaluation such as location conditions and public supports. This results may be on the ground that the knowledge-based service firms are suitable to urban location and also the major firms type in the innovation cities. Also the conditions for participation in various types of national projects were favorable in the firms of innovation cities. However, compared inside firms to outside firms in the innovation cities, the latter had generally a little larger size and longer history, and showed better results in quantitative evaluation such as sales of firms.

**Comparisons of Survey by Major Items of  
Firms located Inside and Outside the Innovation Cities**

		Items	Inside Innovation Cities	Outside Innovation Cities
Regional sector	Quali- tative	Conditions of starting business	○	
		Conditions of living	○	
Business sector	Quanti- tative	Having research institutes		○
		Numbers of research personnel		○
		Employment increment	△	△
		Sales increment		○
	Quali- tative	Degree of changes in R&D investment in the last 5 years	○	
		Degree of changes in research personnel in the last 5 years	○	
		Degree of employment changes in the last 5 years	○	
		Degree of sales changes in the last 5 years		○
		Degree of changes in business capability in the last 5 years	△	△
		Competitiveness of neighboring firms	○	
Industrial sector	Quali- tative	Degree of Industrial base & location	○	
		Degree of agglomeration of related downstream and upstream industries		○
		Easeness of procurement of production factors	○	
		Degree of network establishment	○	
Policy sector	Quali- tative	Satisfaction with participation in national projects	△	△
		Satisfaction with local government supports	○	

Note: ○ for relatively stronger areas, △ for similar areas.

## Chapter 4

In this chapter, it is empirically analyzed the statistical characteristics and performance changes of firms inside the innovation cities.

First of all, the distribution of firms in the innovation cities by region based on Employment Insurance DB shows, Gyeongnam accounted for the most, 23.6%, followed by Gwangju · Jeonnam, Jeonbuk with 21.4% and 17.7%, respectively. In addition, when looking at the distribution by size of firms inside the innovation cities, firms with fewer than five employees accounted for the largest share with 60.2%, followed by 16.1% with 5-9 people, 15.5% with 10-29 people, and so on. Among the analysis targets, the shares of firms established in innovation cities was 60.4%, which was about 1.5 times higher than that of 39.6% of those who moved into innovation cities. Looking at types of relocation by region, in the case of Busan (52.0%) and Daegu (68.0%), more than 50% of all tenant firms have moved to innovation cities from another metropolitan regions.

In the empirical analysis, between the average changes in the number of workers immediately before moving (period t-1) into the innovation cities and one year after the moving (period t+1) were compared by the t-test based on the date of moving in (period t). As a result, the average employment per company increased from 13.3 persons before moving into the innovation cities to 14.6 persons after. The t-test results showed significant differences between two at the 5% significance level. However, while the average sales of firms in the innovation cities increased from 3.9 billion Won to 4.6 billion Won per year, in the results of t-test there was no significant differences be-

tween two.

In addition, the number of full-time workers in firms inside and outside the innovation cities was similar, about 5.5 persons in the initial period. However, in the year after the location of the firms in the innovation cities, the number increased to approximately 9 persons in the inside firms, and approximately 7 persons in the firms outside. As a result of the t-test, it was analyzed that the number of full-time workers in firms inside the innovation cities increased more at a 1% significance level.

Next, in the 4 fields of industrial ecosystem, such as location and settlement conditions, agglomeration of related downstream and upstream industries, procurement and accessibility of factors of production, the degree of network establishment, t-test was performed to assess the difference between firms inside and outside the innovation cities. As a result, there was no differences between two group firms related to the location and settlement conditions, and agglomeration of related downstream and upstream industries. However, regarding procurement and accessibility of factors of production and the degree of network establishment, the firms inside the innovation cities gave significantly higher degree of positive evaluation.

Finally, the performance of firms in the innovation cities can be affected not only by their own innovation capability but also by the surrounding industrial ecosystem, it were analyzed by least squares regression (OLS) as these two groups as independent variables. As a result of the analysis, it was found that having a research institute had a significant positive effect on increasing employments. Among the elements of the industrial ecosystem, it was analyzed that the more a large

consumer market nearby, the more universities and research institutes within the region, and the more active exchanges and cooperation are, the higher the possibility of employment increases. In the case of location, it was analyzed that locating inside the innovation cities had a positive and significant effect on the employment increase than locating outside.

## Chapter 5

In this chapter, comparison is made between quantitative indicators such as employment and sales performance, of firms inside and outside the innovation cities, utilizing the results of our survey results (〈Table 3-31〉) and empirical analysis (〈Table 4-28〉). As a result of the analysis, locating inside the innovation cities shows a positive effect as employment increases, compared to firms outside the innovation cities. However, when reviewing the change in sales in accordance with whether located in the innovation cities or not, there was no difference between two groups.

Otherwise, as a result of comparing qualitative indicators such as the industrial ecosystems of firms in and outside the innovation cities, by survey results (〈Table 3-31〉) and empirical analysis (〈Table 4-29〉), firms in the innovation cities showed significantly good performances. In the t-test of differences in location and settlement conditions, agglomeration of related downstream and upstream industries, firms inside the innovation cities did not show statistically significant results. But above two indicators showed a good difference numerically, com-

pared to those outside the innovation cities. As for procurement and accessibility of factors of production, the degree of network establishment, it was found to be significantly higher positive evaluation of firms inside the innovative cities.

Chapter 5 concludes with a summary of the policy implications carried by our analysis. First, in order to establish an innovation cities centered regional industrial ecosystem, we proposed to i) promote the development of Science City through improvement of settlement conditions, ii) secure industrial homogeneity and promote the agglomeration of related downstream and upstream industries, iii) secure the critical mass of industry-academia-research institutes of the leading industries to be fostered, and iv) activate the supply of locations to foster high-tech and knowledge-based industries. Second, in order to improve the performance of firms inside the innovation cities, we propose to i) promote the attraction of anchor firms through stronger incentives, ii) promote support projects for strengthening the innovation capabilities of inside firms, iii) promote the construction of human resources supply and demand platform, and iv) promote the projects to support of technology-based startup. Third, in order to foster regional industry linkages across the metropolitan region by utilizing innovation cities, we propose to i) establish networks and industrial development plans for each innovation cities, ii) support the establishment of metropolitan regional infrastructure to develop science parks, iii) enhance the degree of completion of industrial ecosystem through additional relocation of public institutions.