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Knowledge Exchange Activities and Performances in Software Industry Clusters: Focus on Firm Size Effect

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Abstract

Purpose: This research investigates the differences in knowledge exchange activities and performances between startups and large companies in software industry clusters. **Research design, data, and methodology:** Six independent factors of human resource information, R&D and technology, marketing knowledge, government support information, strategic knowledge, and cooperation information were extracted to test the firm size effect in the relationships with two performance factors such as satisfaction with industry cluster location and satisfaction with financial performances. Data were collected through a survey of entrepreneurs, managers, and employees and tested by statistical analysis methodologies. **Results:** Three independent factors of human resource information, R&D and technology, and cooperation information were particularly significant in the relationship with both dependent factors. Strategic knowledge significantly affected financial performance. Knowledge exchange activities were more important in startups than in large companies for all eight factors. **Conclusion:** Policies for software industry clusters need a different approach for startups and large companies.

Keywords: Software Industry, Innovation Cluster, Knowledge Exchange Activities, Firm Size, Performances

JEL Classification Code: D22, D83, L86, M13, O25

1. Introduction

Industry clusters for software industries are developed by locating various startups and medium and large companies in specific geographical districts. Startups are generally accommodated in incubators or office buildings constructed for small and medium companies. Large companies locate in the district constructing independent office buildings in the district. The district often provides merits such as tax benefits, relatively cheap land costs, low rent, facility sharing, knowledge exchange opportunities, various supporting functions, etc. The ultimate goals include growing specific industries by promoting interactions, cooperation, and collaborations between adjacent institutions and companies. In particular, promoting knowledge exchanges is critical to achieving the initial goals of industry clusters. Thus, many industry clusters tend to locate near prominent universities or research institutes. In particular, software industry clusters show the tendency to locate within or near large cities to attract highly qualified talents (Cho, 2019). Various public or semi-public functions and business services functions are also included in the industry clusters to promote innovations.

However, the behaviors and interactions in knowledge exchange activities can differ between startups and large companies, even though they are in a single geographical

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district. Startups and small companies often lack resources and capabilities within their organizations. Interaction and cooperation with adjacent institutions and companies can be significant sources for gathering information and knowledge for innovation. Thus, incubators and industry clusters can provide channels for knowledge exchanges for these companies. It can be different for large companies with superior resources, networks, and capabilities within their organizations.

This study investigates the differences in knowledge exchange activities and performances between startups and large companies in software industry clusters as an expanded study to the previous research on the relationship between knowledge exchange activities and performances in startups and small and medium companies (Cho & Cho, 2020). This study tests the differences in knowledge exchange activities for human resources information, R&D and technology, marketing knowledge, government support, strategic knowledge, and cooperation information in the software industry clusters. This study has five chapters. The first chapter is the introduction to this study. The second chapter deals with the background of this research, including the literature review, hypothesis, and research model. The third chapter addresses the research methodology and the results of the analysis and test. The differences in knowledge exchange activities and performances between startups and large companies are discussed in this chapter based on data analysis and hypothesis tests. The fourth chapter is the conclusion of this study.

2. Research Background

2.1. Knowledge Exchange Activities in Industry Clusters

Diverse knowledge exchanges are critical for innovations as significant merits in locating in software industry clusters (Cho, 2019). Multiple factors of accessibility to large cities, human resource availability, business model characteristics, and company size also influence the location of software companies. In particular, industry clusters can be an excellent environment for knowledge exchanges for startups and small and medium companies (Cho & Cho, 2020). Although internet networks can be an infrastructure for virtual industrial clusters for the software industries (Caballero et al., 2001, Nowak & Grantham, 2000), the research results say that geographical proximity can still promote innovations through knowledge exchanges. The software industry appears to form industrial clusters in the areas within or near metropolitan cities (Campbell-Kelly et al., 2010; Jeon & Lee, 2013). As representative cases, India has software industry clusters in multiple cities developed by central or local governments, including Bangalore and Hyderabad. China also has several well-known software industry clusters in Dalian, Xian, and Shanghai. Korea also has several software industry districts in Guro and Pangyo. This study focuses on the differences in knowledge exchange activities and performances between startups and large companies in software industry clusters.

2.2. Firm Size Effect

The firm size often explains the differences in internally possessed resources, capabilities, and networks, bringing about differences in their interactions, cooperation, and knowledge exchange activities. In the interview process for the previous study on the knowledge exchange activities and performances in startups and small and medium companies (Cho & Cho, 2020), multiple respondents mentioned the differences in knowledge exchange activities and performances according to firm size and possessed resources. However, few studies have dealt with the firm size effect on knowledge exchange activities in software industry clusters. Thus, this study investigates and tests the company size impact on knowledge exchange activities and performances in software industry clusters.

2.3. Hypotheses and Research Model

Industry clusters promote innovations of located companies through knowledge exchanges, sharing of facilities, and other location merits (Cho, 2012). Multiple factors of knowledge-sharing culture, leadership, information system networks, promotion activities for knowledge exchanges, and human interactions can influence performance. Companies can easily get the necessary information and knowledge for human resources, technologies, marketing, strategic insights, and cooperation from various sources in industry clusters. Interactions between various institutions in software industry clusters enhance the competitive advantage (Zhao et al., 2009) and improve performance through cooperation and collaboration (Zhan, 2012).

This study investigates the differences between startups and large companies in critical factors reflecting the characteristics of knowledge exchange activities, including human resources information, R&D and technology, marketing knowledge, government support, strategic knowledge, and information for cooperation. The first five factors come from the previous study on knowledge exchange activities in startups and small and medium enterprises (Cho & Cho, 2020). The sixth factor is newly added in this study to reflect various characteristics of knowledge exchange activities in industry clusters. In

addition, the factors reflecting the performance of knowledge exchange activities, including satisfaction with industry cluster location and financial performances, are also tested.

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2.3.1. Human Resources Information

The software industry is a representative industry significantly influenced by human resources and talents (Cho, 2019, Cho & Cho, 2020). This factor often affects the competitiveness of software businesses. (Aryanto, 2015; Agrawal et al., 2012; Arora et al., 2001; Arora & Athreye, 2002; Fitzgerald et al., 2008; Jan et al., 2012; Patibandla & Petersen, 2002). For this reason, software industry clusters are often formed near outstanding universities to easily secure highly qualified human resources and talents (Chaminade & Vang, 2008; Puangpronpitag & Phongsiri, 2012). The characteristics of knowledge exchange activities for human resources information can be different between startups and large companies. Startups can have various limitations in possessing various channels to secure prominent talents, making them more dependent on industry cluster networks and activities. In contrast, large companies can have various channels to attract outstanding human resources and talents, including self-possessed channels and industry cluster networks. From the discussions, hypothesis 1 is developed.

H1: Knowledge exchange activities for human resources information will be more important in startups than in large companies in industry clusters.

2.3.2. R&D and Technology

The R&D and technology information is critical for innovation in the software industry. The knowledge exchange activities for R&D and technology have generally different characteristics according to the technology levels pursued (Cho, 2019). Human interactions are not so critical for knowledge exchange activities for low-level technologies because these are often available online. However, R&D and technologies for high-tech levels often require cooperation or collaboration between companies, research institutes, and universities (Cho, 2019). To do that, many global software companies have their R&D centers in multiple locations worldwide (Nowak & Grantham, 2000). The knowledge exchange activities in R&D and technology can also be different between startups and large companies, depending on the possessed resources and capabilities. In particular, knowledge exchange activities for R&D and technology can be more critical for startups often lacking internal resources and broad cooperation networks. In contrast, the demand for knowledge exchange activities in large companies within industry clusters can be smaller because they often have various intern resources and cooperation channels broadly in a country or across the world. From the discussions, the following hypothesis is developed.

H2: Knowledge exchange activities for R&D and technology will be more important in startups than in large companies in industry clusters.

2.3.3. Marketing Knowledge

The software industry can develop by building various virtual industry clusters (Caballero et al., 2001) and conducting sales and marketing online (Nowak & Grantham, 2000). Thus, the need and demand for knowledge exchange activities between adjacent companies and institutions can decrease to some extent in some software companies that deal with intangible products. However, human connections and interactions still work as critical channels for tacit knowledge exchanges. Many entrepreneurs and employees in software industries answer that human networks are still critical channels for collecting market or buyer information (Cho, 2019), although online channels work as new channels. In particular, information and knowledge for marketing and sales decisively affect the success or failure of businesses in startups that have to pioneer new markets and customers. Large companies can gather information and knowledge through various channels, using various local and global networks. Thus, testing the difference in knowledge exchange activities for marketing knowledge between startups and large companies is worth investigating. From the discussions, the following hypothesis 3 was established.

H3: Knowledge exchange activities for marketing knowledge will be more important in startups than in large companies in industry clusters.

2.3.4. Government Support Information

Previous studies point out that government policy plays a critical role in forming software industry clusters in many cases, whether the function is direct or indirect. Arora et al. (2001) emphasize that government policy played a critical role in developing many software technology parks in India in the early stage of development. Outstanding low-wage human resources and appropriate timing of entry into the global market were also essential factors in the growth of the software industry in the country. Government policies for the regional innovation and national innovation system to support university-industry-government cooperation played a critical role in forming and developing industrial clusters in addition to individual company roles in the Bangalore software industry district (Chaminade & Vang, 2008). Federal government support also played an important role in the United States in the early stage of software industry

development (Mowery & Langlois, 1996). Generally, government policies to nurture or develop software industries play an important role in the early stage of industry development. Recently, governments have carried out various plans and activities in many countries to support the software industry. Representative policies include tax reduction, R&D support, low-interest loans, and other funding channel provisions. For startups and small and medium companies that lack internal resources and capabilities, the information and knowledge on government policy and support can be more important than in large enterprises. Therefore, differences in knowledge exchange activities for government policy and support between startups and large companies are worth testing. Hypothesis 4 is developed from these discussions.

H4: Knowledge exchange activities for government support information will be more important in startups than in large companies in industry clusters.

2.3.5. Strategic Knowledge

The software industry is a representative sector where the competitive environment and technology trends change rapidly. Thus, companies need information and knowledge for strategic decisions and choices, whether small or large companies. Many companies also need strategic cooperative relationships for strategic alliances, R&D collaborations, subcontracting, and project consortiums. For these reasons, many companies cooperate globally (Nowak & Granham, 2000), forming virtual industry clusters (Caballero et al., 2001). The interaction, behavior, and cooperation patterns to get strategic knowledge can differ between startups and large companies in software industry clusters. From these discussions, the following hypothesis 5 is built.

H5: Knowledge exchange activities for strategic knowledge will be more important in startups than in large companies in industry clusters.

2.3.6. Cooperation Information

Software companies build cooperative relationships for knowledge sharing, co-marketing, project collaboration, and others in industry clusters or beyond. Some companies build cooperative relationships by building virtual industry clusters online (Caballero et al., 2001). Many software companies cooperate globally for various purposes (Nowak & Granham, 2000). Cooperation or collaboration can be a more critical issue for startups and small-sized companies that essentially require external resources and capability to achieve their intended goals or conduct large-sized projects. Large companies also need various cooperation information for R&D, human resources and talent search, and subcontracting, but they can depend less on the internal networks in industry clusters. Hypothesis 6 tests the differences in knowledge exchange activities for cooperation information between startups and large companies.

H6: Knowledge exchange activities for cooperation information will be more important in startups than in large companies in industry clusters.

2.4. Performances

Satisfaction with cluster location and financial performances can be dependent factors influenced by knowledge exchange activities, including human resources information, R&D and technology, marketing knowledge, strategic knowledge, and cooperation information. However, the satisfactions of companies with their cluster location and financial performances stemming from knowledge exchange activities in industry clusters are also meaningful enough on their own. The satisfaction measures themselves can be critical references in building industry cluster policies for software industries. The differences in satisfaction between startups and large companies can also provide policymakers with significant implications. The following hypotheses 7 and 8 test the differences in satisfaction with cluster location and financial performances enabled by the cluster location between startups and large companies.

H7: There will be differences in satisfaction with cluster location regarding knowledge exchange activities between startups and large companies in industry clusters.

H8: There will be differences in satisfaction with financial performances regarding knowledge exchange activities between startups and large companies in industry clusters.

2.5. Research Model

The research model in this study reflects the eight hypotheses developed. <Figure 1> shows the research model, focusing on the firm size impact on knowledge exchange activities and performances between startups and large companies. Statistical analysis methodology, the independent t-test, is adopted to test the hypotheses. This research additionally analyzes the relationships between knowledge exchange activities and performances through multiple regression analysis to increase understanding of the industry cluster impacts.

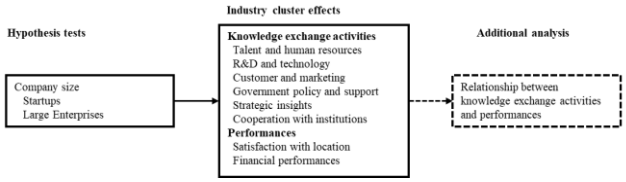

Figure 1: Research Model

3. Empirical Study

3.1. Survey

The data for this study were obtained through a questionnaire survey on entrepreneurs, managers, and employees in various sizes of software companies located in industry clusters in Korea. Statistical analysis methods were employed to analyze the data set and test the hypotheses. Table 1 is the demographics of companies and respondents who participated in this study. Data were collected from multiple software innovation clusters in South Korea, including Guro, Pangyo, Busan Centum, Changwon, and Daegu, to reflect general characteristics.

The survey included as many companies as possible to reflect different characteristics that can vary along with different companies and avoid bias in analysis results. Thus, only one to three questionnaires for startups and seven to ten questionnaires for large-sized companies were allowed for each company. The survey was conducted for one year, from March 2020 to February 2021. This survey used a seven-point scale to measure answers. The analysis used a total of 206 questionnaires from 89 different companies.

Table 1: Demographics

Sortation	Number(%)	Sortation	Number(%)
Company size		Respondent age	Average 31
Startups	96 (46.6)	In 20s	63 (30.6)
Large	110 (53.4)	30s	87 (42.2)
		40s	37 (18.0)
Number of companies		50s and higher	19 (9.2)
Startups	67 (75.2)		
Medium	12 (13.5)	Education	
Large	10 ((11.2)	Diploma	3 (1.5)
		Bachelor	169 (82.0)
Number of employees		Master and higher	34 (16.5)
1-50	96 (46.6		
50-100	30 (14.6)	Position	
100-500	23 (11.2)	Management	41 (19.9)
500-1000	30 (14.6)	Middle	39 (18.9)
Over 1000	31 (15.0)	Employee	126 (61.2)

3.2. Research Instrument

A structured questionnaire was developed for knowledge exchange activities and performances in software industry clusters, referring to relevant previous studies. Some questions were modified to adjust to the research purposes of this study specialized in software companies in industry clusters. An exploratory factor analysis was conducted to develop a data set for the analysis process, employing the principal components analysis and the Verimex rotation method. The analysis results identify six factors for knowledge exchange activities and two factors for the performance well, as initially intended.

Table 2: Exploratory factor analysis

Factors and Variables	Factor loadings		Cronbach's Alpha	
	S	L	S	L
Human resources information				
Cluster location helps secure outstanding personnel.	.860	.764	.945	.871
Cluster networks provide various talent information.	.784	.823		
Cluster location helps solve human resource problems.	.871	.773		
Cluster location is advantageous in securing talented people	.819	.859		
R&D and Technology				
Cluster location helps acquire R&D and tech knowledge.	.665	.564	.932	.855
Cluster location helps solve technology problems.	.597	.857		
Cluster location promotes technology innovation.	.601	.686		
Cluster location is advantageous for getting tech knowledge.	.607	.791		
Marketing knowledge				
Cluster location helps obtain various market knowledge.	.737	.787	.949	.886
Cluster location helps obtain customers and sales information.	.781	.782		
There are channels for marketing knowledge exchanges.	.617	.827		
It is easier in clusters to obtain customer and market knowledge.	.758	.752		
Government support				
It is easy to obtain government policy and support information	.739	.655	.948	.797
Knowledge sharing and exchange for gov policy are active.	.683	.851		
There are various knowledge exchange channels for policy matters.	.788	.677		
Strategic knowledge				
Cluster location helps understand the competitive environment	.702	.736	.946	.845
It helps obtain strategic knowledge of the industry and market.	.622	.669		
It helps identify a position in the industry and competition.	.772	.853		
It helps understand a company's capabilities and competitiveness.	.696	.796		
Cooperation information				
Cluster location helps search companies for collaborations.	.706	.809	.921	.761
Cluster location enables to build of cooperative relationships.	.759	.700		
Cooperation and collaboration help run businesses	.673	.675		
Satisfaction with industry cluster location				
Cluster location is relatively satisfactory	.827	.768	.961	.857
Cluster location is helpful for business activities	.873	.804		
Cluster location is advantageous for business growth	.840	.748		
Cluster location contributes to improving competitiveness	.853	.770		
Cluster location is helpful for innovation.	.831	.766		
Satisfaction with financial performances				
Cluster location helps reduce costs.	.890	.829	.941	.859
Cluster location contributes to improving sales and profit.	.816	.881		
Cluster location helps improve firm's financial status	.855	.866		

<Table 2> shows the result of the research instrument development. Knowledge exchange activities include the factors of human resources information, R&D and technology, marketing knowledge, government support, strategic knowledge, and cooperation information. The performances regarding knowledge exchange activities include satisfaction with industry cluster location and satisfaction with financial performances. The eigenvalues were acceptable for all factors for startups and large companies at over 2.00. The total variances were relatively high and acceptable at 87.8, 88.0 for startups, 75.2, and 70.4

for large companies. The Cronbach alpha values were also high at over .921 for startups and over .761 for large companies, indicating acceptable and satisfactory reliability. The factor loadings were also relatively high and acceptable at over .597 for all factors. The factor analysis results indicate that all eight factors are properly identified as intended with acceptable requirements and standards. This analysis made the research instrument and data set for the next analysis and testing process.

3.3. Firm Size Effect

The firm size impact on knowledge exchange activities and performances in software companies located in industry clusters are tested by a statistical analysis method, a two-tailed independent t-test. The independent t-test methodology is adopted to compare the means between two different respondent groups. The result of the analysis is summarized in <Table 3>. The means of measured values for all eight factors show apparent differences between startups and large companies by 4.03 and 3.61, respectively, as shown in the table. The measured values of all eight factors are higher in startups than in large companies. This result indicates that startup companies conduct knowledge exchange activities more actively than large companies and are more satisfied with their industry cluster location and financial performance. Large companies are relatively less active than startups in knowledge exchange activities and less satisfied with industry cluster location and financial performances, although the average of all measured values is quite high at 3.61 on 7 point scale.

Table 3: Firm Size Effect

Factors	Startups and small		Large companies		t-test		Test
	AVE	S.D.	AVE	S.D.	t	*p*	
HR	3.87	1.21	3.48	.64	2,971	.003**	All Accept
RT	4.00	1.27	3.62	.61	2.811	.005**	
MK	3.81	1.17	3.53	.71	2,072	.040**	
GS	4.13	1.23	3.48	.52	5.060	.000**	
SK	4.01	1.13	3.58	.70	3.284	.001**	
CO	4.29	1.15	3.86	.44	3.665	.000**	
LO	4.16	1.30	3.93	.55	1.728	.086*	
FS	3.95	1.35	3.43	.74	3.474	.001**	
ME	4.03		3.61				

HR: Human Resource information, RT: R&D and technology, MK: Marketing knowledge
GS: Government support, SK: Strategic knowledge, CO: Cooperation knowledge
LO: Location satisfaction, FS: Financial satisfaction, ME: Mean for all

The results of the independent t-test also support the existence of significant differences in knowledge exchange activities and performances between startups and large companies. All factors show significant differences in the mean values between startups and large companies. In the two-tailed t-test, the differences in mean values are significant at the significance level of .05 if the p-value is lower than 0.1. Thus, the results say that all factors have significant differences in the mean values between startups and large companies. Therefore, all hypotheses established in this study are accepted based on the independent t-test, strongly supporting the hypothesis that a difference exists in knowledge exchange activities and performances between startups and large companies. The results say that the firm size can be a critical factor considered in promoting innovations and developing industry cluster policies.

3.4. Relationship with performances

The relationships between the knowledge exchange activities and performances are additionally analyzed through multiple regression analysis to compare the relationship between startups and large companies and increase understanding of industry cluster impacts in the software industry. The satisfaction with industry cluster location and financial performances become dependent factors in these analyses. The average values were input for the analyses. The multicollinearity test results indicated that they were not problematic for the independent and dependent factors with the tolerances indices of .169 ~.465, .485~.661, and the VIF values 2.152~5.923, 1.513~2.063 for startups and large companies, respectively. Myers (1990) says that multicollinearity can be problematic when the tolerance indices are 0.1 or less and the VIF values are ten or higher. The result indicates that the data gained from the survey are appropriate for multiple regression analysis.

Table 4: Satisfaction with Industry Cluster Location

Factors	Coefficient		Beta		t value		*p*-value	
	S	L	S	L	S	L	S	L
HR	.317	.165	.300	.195	3.447	2.209	.001**	.029**
RT	.172	.310	.173	.345	1.38	3.504	.236	.001**
MK	.305	.104	.279	.136	1.19	1.324	.033**	.188
GS	.007	.104	.007	.100	2.16	1.077	.952	.284
SK	.055	-.024	.048	-.03	.060	-.335	.660	.738
CO	.173	.266	.155	.216	.441	2.308	.171	.023**
CN	.118	.559			.364	1.334	.717	.185
Statistics	Startups R .844, R Square .713 F 33.483 (p=.000) Durbin-Watson 1.731				Large R .686, R Square .471 F 15.292 (p=.000) Durbin-Watson 1.875			

*CN: Constant

Table 4 summarizes the result of multiple regression analysis between knowledge exchange activities and satisfaction with industry cluster location. The R-square values are relatively high at .713 and .471. The Durbin-Watson ratio was also acceptable at 1.731 and 1.875. The regression models are also significant, with the F value of 33.483 and 15.292 and a *p*-value of .000 for startups and large companies, respectively. The results say that talent information and marketing knowledge significantly affect satisfaction with the industry cluster location (p values .001, .033) for startups. For large companies, the factors of talent information, R&D and technology, and cooperation information significantly affect satisfaction with the industry cluster location.

Table 5: Satisfaction with Financial Performance

Factors	Coefficient		Beta		t value		*p*-value	
	S	L	S	L	S	L	S	L
HR	.317	-.304	.229	-.264	2.213	-2.93	.037**	.004**
RT	.172	.472	.380	.387	2.129	3.846	.036**	.000**
MK	.305	.083	-.107	.081	-.673	.766	.503	.445
GS	.007	-.001	.044	-.001	.326	-.011	.745	.992
SK	.055	.318	.256	.299	1.886	3.208	.063*	.002**
CO	.173	.366	.026	.220	.188	2.297	.851	.024**
CN	.118	-.060			.754	0.103	.453	.918
Statistics	Startups R .747, R Square .558 F 17.276 (p=.000) Durbin-Watson 1.543					Large R .668, R Square .447 F 13.869 (p=.000) Durbin-Watson 1.689		

*CN: Constant

Table 5 shows the results of analyses between knowledge exchange activities and satisfaction with financial performances. The R-square values are relatively high, with .558 and .447. The Durbin-Watson ratio was also acceptable at 1.543 and 1.689. The regression models are also significant, with an F value of 17.276 and 13.869 and a *p*-value of .000 for startups and large companies, respectively. The results say that human resources information and R&D and technology significantly affect satisfaction with financial performances (p values .037, .036) for startups, while the factors of talents information, R&D and technology, strategic knowledge, and cooperation information significantly affect satisfaction with the financial performances for large companies.

4. Summary and Discussion

Many countries develop innovation clusters of software industries that are industrial districts for various software firms to promote technology development and industrial ripple effects in innovations. Industry clusters promote innovations through cooperation, collaboration, knowledge exchanges, and facility sharing between adjacent companies and institutions. However, the characteristics using the merits of industry clusters can be different between startups and large companies. The analysis and test results indicate that the characteristics of knowledge exchange activities and performances are significantly different between startups and large companies in the software industries. The results also say that knowledge exchange activities can play critical roles in determining performances in industry clusters, although some independent factors are not significant. The results support that knowledge exchange activities can be an important factor in promoting innovations and deciding company locations. In particular, knowledge exchange activities for human resource information, R&D and technology, and marketing knowledge play critical roles in the relationships with performances.

A previous study on the relationships between knowledge exchange activities and performances proved significant impacts of talent information, R&D and technology, and customer and marketing information in startups and small and medium companies (Cho & Cho, 2020). In particular, the impact of knowledge exchange activities for R&D and technology appeared significant for all three dependent factors including satisfaction with knowledge spillover, industry cluster location, and financial performance. This research is different from the previous one in focusing on the differences in knowledge exchange activities and performances in software companies in industry clusters. The firm size impacts provide important implications for policymakers. The results of multiple regression analysis provide a chance to compare the varying relationships between different company groups. Human resource information, R&D and technology, marketing knowledge, and strategic knowledge appear significant in multiple sizes of company groups in software industry clusters. Cooperation information appears significant only for large companies.

5. Conclusion

This study investigated the characteristics of knowledge exchange activities and performances in software industry clusters, particularly focusing on the differences between startups and large companies. Statistical analysis and tests say the existence of apparent differences between the two groups. Startups show more active knowledge exchange activities and higher satisfaction with performances than large companies in industry clusters. However, knowledge exchange activities are still important in large companies. The average measured value is 3.61, higher than the medium, on 7 point scale. In addition, the result of multiple regression analysis shows that knowledge exchange activities can significantly affect the satisfaction with industry cluster location and financial performances in both startups and large company groups, although significant factors can be different along with firm size.

Although the software industry has characteristics that can cooperate through the internet or virtual industry clusters, knowledge exchange activities between adjacent institutions in industry clusters can still significantly influence relevant performances. However, research results say that the effect of knowledge exchange activities is more serious for startups that do not possess sufficient resources and capabilities in their organizations than large companies, although they are critical for all companies. This result implies that startups and large companies can utilize their industry cluster location differently, providing meaningful implications for promoting innovations and developing industry cluster policies.

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