

A Study focused on how Korean IT Service Firms were financially impacted since the restrictions on participation of large firms

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Abstract The government has strengthened the system of restricting participation of large corporations to limit participation in national information system construction projects and to increase participation of SME software companies. This study analyzes the financial performances of small and medium sized IT firms in Korea three years prior and 3 years after the restrictions on participation of large firm. A sample of 121 small and medium-sized IT services firms were classified into 3 groups and statistical techniques (T-test and one-way ANOVA) were used for the purpose of the analysis. In the three years after the restriction of participation of large corporations, the total assets and sales of the medium and small IT service firms were positive, but the operating profit and net profit were negative. There were many worries about the introduction of the restriction on the participation of large corporations, but many were stabilized. However, the negative impact was more pronounced for SMEs. Therefore, the reduction effect of SME IT service companies is different from the first legislative purpose of enforcing the restriction system of large enterprises, so we propose to revise the policy.

Key Words : Government IT, IT Marketing, IT Policy, IT Service, Management Information

1. Introduction

This Enforcement Decree of the Software Industry Promotion Act was revised in February 2004 and the lower limit was announced in March. In addition, the number of integrated orders of national institutions have been increased. Small and mid-sized Software firms have less opportunities for business participation, and large-firm-oriented ordering practices have continued. In May 2012, the government revised the Software Industry Promotion Act to strengthen the participation system of large enterprises, such as restricting participation in information system

construction projects of national institutions regardless of business amount, for firms with cross-shareholding restrictions [1].

First of all, based on the provisions of the Software Promotion Act, in a review of regulation and deteriorating profitability due to the recession of SMEs the monopoly as a medium-sized company and the entry of foreign firms would have little benefit for SMEs [2]. In conclusion, it is necessary to assess the economic impacts considering the domestic and foreign markets by analyzing the effectiveness of the new policy and regulation. We analyzed the drop in OP margin as the proportion of public IT

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projects to sales increased. In the case of SMEs, the OP margin declined by 16.7% if the share of public IT projects increased by 10% [3-5]. In this paper, we analyze financial data to see how the restriction on participation in Public Informatization project - held IT firms in cross-shareholding firms have been influenced by mid and small-sized IT service firms since January 2013. We consider the financial data three years before the implementation of the restrictions on participation of large corporations (2011, 2012, and 2013) and three years after (2014, 2015, and 2016). On a sales basis, a group of firms with more than 100 billion won in sales amounted to A group, 30 firms with less than 50 billion won and less than 100 billion won were classified into B group, and 69 firms with less than 50 billion won were classified into C group. Based on the total of 121 firms, revenue increased by 21% after restrictions on large-enterprise participation restrictions but Operating profit decreased by 7.3%, which is consistent with the analysis of existing researchers. In particular, sales of A group, which is a mid-size company, increased by 11.49%, but operating profit decreased by 17.49%. The purpose of this paper is to present the growth model of IT service firms in Korea through statistical analysis t-test and one-way ANOVA [6-9].

2. Research Method

2.1 Research model

This study analyzes the performance of Korean IT firms. To analyze the performance of IT firms, we set up a

research model as shown in Fig. 1. On the one hand, we considered the years before (2011, 2012, 2013) and on the other hand the years after (2014, 2015, 2016) restricting participation of large firms. By this standard, we conduct a before & after analysis of the variables such as total assets, total assets, sales, operating profit, and net profit. Second, we analyze the mean of total assets, total assets, sales, operating profit, and net profit by company grade, and analyze the difference between groups through post analysis.

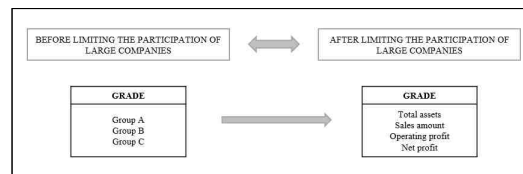


Fig. 1. Research model

2.2 Research hypothesis

This study analyses the performance of small and medium sized IT firms in Korea, 3 years prior and 3 years after the restriction on participation of large firms. Based on the results of this study, we suggest the implications of securing market competitiveness for Korean small and medium sized IT firms. The research hypothesis to analyze this is centered on the research model in Fig. 1.

Research hypothesis 1: there will be a difference between before and after restricting the participation of large firms in the public informatization project and the middle and small IT service firms (sample firms : 121 firms).

Research hypothesis 2: there will be a difference between before and after

restricting the participation of large firms by company grade.

(1) A group of firms (22 sample firms with sales of more than 100 billion won) will be different before and after restrictions on participation in large firms. (2) B group firms (30 firms with sales of less than 100 billion won and 50 billion won or more) will be different before and after restrictions on participation in large firms. (3) C group firms (69 sample firms with sales of less than KRW 50 billion) will be different before and after the restrictions on participation of large firms.

Research hypothesis 3: there will be a difference in company performance by enterprise grade (Group A, Group B, Group C).

(1) After limiting the participation of large firms, there will be a difference in company performance (general, total assets, sales, operating profit, net profit). (2) Before limiting the participation of large firms, there will be a difference in company performance (general, total assets, sales, operating profit, net profit).

3. Hypothesis verification and results analysis

3.1 Target sample corporation

In 2013, the total number of IT service firms was 4596, with 4375 having sales of less than 10 billion won (95.2%) [10,11]. In this paper, only 121 IT service firms are adopted, and the criteria excluded from the remaining sample are as follows. (1) Since 4,375 firms with sales of less than 10 billion won have a high indirect participation rate,

such as subcontracting, rather than directly participating in public informatization projects, since there is no effect on restrictions on participation in large-enterprise projects, they are excluded from the sample firms. (2) Of the 221 firms with more than 30 billion won in 2013, 19 affiliated firms (exceeding 500 billion won) belonging to the large enterprise group are excluded. We also excluded eight firms belonging to a large group of firms exceeding 30 billion won. (3) Among the firms exceeding 30 billion won, game specialists, telecommunication corporations, specialists in the production of electric products, and specialists in hardware products were excluded from participating in the Government IT business. (4) Some firms, such as SK (one of Korea's largest conglomerates), have difficulty in distinguishing only IT service sales because of multiple business areas (non-IT sector), and the non-IT sector influenced other data when adopted. They are excluded from the sample firms. (5) If the company's sales or net loss is large and the six-year financial statements do not have continuity, the data would have a distorted effect on the mean of other data. (6) Although the restriction on participation in large corporations took effect in January 2013, the financial data would have been affected in 2014, and the financial data for 2013 was before the restriction on participation in large firms [12-14].

3.2 Results analysis

The analysis is done accordingly to restriction of participation of large firms.

Research hypothesis 1: there will be a difference between before and after restricting the participation of large firms in the public informatization project and the middle and small IT service firms. The results of the analysis of the corresponding sample of this hypothesis are as seen in Table 1.

Table 1. Analysis before and after restricting participation of large corporations (General 121 firms)

Variable	N	Mean	S.D	t	ρ
Post_General-pre_General	121	21845.017	32278.077	7.445	0.000**
Post_Total assets-pre_Total assets	121	11257.769	19201.639	6.449	0.000**
Post_Sales amount-pre_Sales amount	121	11569.562	16478.781	7.723	0.000**
Post_Operating profit-pre_Operating profit	121	-224.421	4319.954	-0.571	0.569
Post_Net profit-pre_Net profit	121	-757.893	5831.270	-1.430	0.155

(unit: one million won, Post = after restricting participation of large corporations, pre = before restricting participation of large corporations, *: $\rho \leq .05$, **: $\rho \leq .01$)

First, the result of the comprehensive response sample test of all firms showed that the mean of the responding difference after the restriction of participation of large firms in total after excluding the restriction of participation of large firms was 21845.017 and the S.D was 32278.077, The value of t is 7.445 and the probability of probability is 0.000, which is less than the significance level of 0.05. There is a difference between

the overall total after restricting the participation of large firms and the total before restricting participation of large firms. The value of t-value is 6.449 and the probability of probability is 0.000, which is smaller than the significance level of 0.05. Therefore, there is a difference in the total assets before big business participation and big business participation restriction. After limiting the participation of large corporations, the mean of sales was 11569.562 and the S.D was 16478.781. The t-value is 7.723 and the probability of probability is 0.000, which is less than the significance level 0.05. Therefore, there is a difference in the sales amount before big business participation and big business participation restriction. In addition, after limiting the participation of large firms, the mean of operating profit is -224.421 and the S.D is 4319.954. The t-value is -0.571 and the probability of probability is 0.569, which is greater than the significance level of 0.05. Therefore, there is not a difference in the operating profit before big business participation and big business participation restriction. After limiting the participation of large firms, the mean of net profits was -757.893 and the S.D was 5831.270. The t-value is -1.430 and the probability of probability is 0.155, which is larger than the significance level of 0.05, so there is no difference in net profit before and after the restriction of participation.

Research hypothesis 2: there will be a difference between before and after restricting the participation of large firms by company grade.

(1) A group of firms will be different

before and after restrictions on participation in large firms.

The results of the analysis of the corresponding sample of this hypothesis are as seen in Table 2.

Table 2. Group A, Analysis before and after restricting participation of large corporations

Variable	N	Mean	S.D	t	ρ
Post_General-pre_General	22	37890.545	46538.615	3.819	0.001**
Post_Total assets-pre_Total assets	22	25000.409	34172.052	3.432	0.003**
Post_Sales amount-pre_Sales amount	22	18198.455	21573.700	3.957	0.001**
Post_Operating profit-pre_Operating profit	22	-1283.136	6039.078	-0.997	0.330
Post_Net profit-pre_Net profit	22	-4025.182	10803.651	-1.748	0.095

(unit: one million won, Post = after restricting participation of large corporations, pre = before restricting participation of large corporations, *: $\rho \leq .05$, **: $\rho \leq .01$)

First, the results of A group firms with total sales of over 100 billion won showed that the mean of the data for the counterparts after subtracting the pre-restraint of restricting the participation of large firms in the overall after restricting the participation of large firms was 37890.545 and the S.D was 46538.615, t-value is 3.819 and the probability of significance is 0.001, which is smaller than the significance level of 0.05. Therefore, there here is a difference between the overall total after restricting the participation of large firms and the total

before restricting participation of large firms. After limiting the participation of large corporations, the mean of total assets was 25000.409 and the S.D was 34172.052. The value of t is 3.432 and the probability of significance is 0.003, which is less than the significance level of 0.05. Therefore, there is a difference in the total assets before big business participation and big business participation restriction. After limiting the participation of large firms, the mean of sales was 18198.455 and the S.D was 21573.700. The t-value is 3.957 and the significance probability is 0.001, which is smaller than the significance level 0.05. Therefore, there is a difference in the sales amount before big business participation and big business participation restriction. In addition, after limiting the participation of large corporations, the mean of operating profit is -1283.136 and the S.D is 6039.078. The value of t is -0.997 and the probability of significance is 0.330, which is larger than the significance level of 0.05. Therefore, there is not a difference in the operating profit before big business participation and big business participation restriction. After limiting the participation of large corporations, the mean of net profits was -4025.182 and the S.D was 10803.651. The t-value is -1.748 and the significance probability is 0.095, which is greater than the significance level of 0.05. Therefore, there is not a difference in the net profit before big business participation and big business participation restriction.

(2) There will be a difference between the B group firms before and after the restrictions on participation in large firms.

The results of the analysis of the corresponding sample of this hypothesis are as seen in Table 3.

Table 3. Group B, Analysis before and after restricting participation of large corporations

Variable	N	Mean	S.D	t	ρ
Post_General-pre_General	30	36000.100	38394.589	5.136	0.000**
Post_Total assets-pre_Total assets	30	15118.267	16882.800	4.905	0.000**
Post_Sales amount-pre_Sales amount	30	20930.500	19790.496	5.793	0.000**
Post_Operating profit-pre_Operating profit	30	127.267	6379.008	0.109	0.914
Post_Net profit-pre_Net profit	30	-175.933	5799.851	-0.166	0.869

(unit: one million won, Post = after restricting participation of large corporations, pre = before restricting participation of large corporations, *: $\rho \leq .05$, **: $\rho \leq .01$)

The mean of the data of the counterparts after subtracting the restriction of the participation of the large enterprises in the general enterprise after limiting the participation of the large enterprises was 36000.100, the S.D was 38394.589, the t-value was 5.136 and the significance probability was 0.000, which is less than the significance level 0.05. Therefore, there here is a difference between the overall total after restricting the participation of large firms and the total before restricting participation of large firms. After limiting the participation of large corporations, the mean of total assets was 15118.267 and the S.D was 16882.800. The t-value is 4.905 and

the probability is 0.000, which is smaller than the significance level 0.05. Therefore, there is a difference in total assets before restricting participation of large firms and before restricting participation of large firms. After limiting the participation of large firms, the mean of sales was 20930.500 and the S.D was 19790.496. The t-value is 5.793 and the significance probability is 0.000, which is less than the significance level 0.05. Therefore, there is a difference in sales amount before restricting participation of large firms and after restricting participation of large firms. In addition, after limiting the participation of large corporations, the mean of operating profit is 127.267 and the S.D is 6379.008. The value of t is 0.109 and the probability of significance is 0.914, which is larger than the significance level of 0.05. Therefore, there is not a difference in operating profit before restricting participation of large firms and after restricting participation of large firms. After limiting the participation of large corporations, the mean of net profits was -175.933 and the S.D was 5799.851. The t-value is -0.166 and the significance probability is 0.869, which is greater than the significance level of 0.05, so there is no difference in net profit before and after the restriction of participation.

Research hypothesis 3: there will be a difference between the C group firms before and after the restrictions on participation in large firms.

The results of the analysis of the corresponding sample of this hypothesis are as seen in Table 4.

Table 4. Group C, Analysis before and after restricting participation of large corporations

Variable	N	Mean	S.D	t	ρ
Post_General-pre_General	69	10574.667	15507.350	5.664	0.000*
Post_Total assets-pre_Total assets	69	5197.580	7970.615	5.417	0.000*
Post_Sales amount-pre_Sales amount	69	5386.029	8761.573	5.106	0.000*
Post_Operating profit-pre_Operating profit	69	-39.768	1965.799	-0.168	0.867
Post_Net profit-pre_Net profit	69	30.826	2319.678	0.110	0.912

(unit: one million won, Post = after restricting participation of large corporations, pre = before restricting participation of large corporations, *: $\rho \leq .05$, **: $\rho \leq .01$)

The mean of the data of the counterparts after subtracting the restriction of the participation of the large enterprises in the general enterprise after limiting the participation of the large enterprises was 10574.667, the S.D was 15507.350, the t-value was 5.664 and the significance probability was 0.000, which is less than the significance level 0.05. Therefore, there here is a difference between the overall total after restricting the participation of large firms and the total before restricting participation of large firms. After limiting the participation of large corporations, the mean of total assets was 5197.580 and the S.D was 7970.615. The t-value is 5.417 and the probability is 0.000, which is smaller than the significance level 0.05. Therefore, there is a difference in total assets before restricting participation of large firms and before restricting participation of large firms. After limiting the participation of

large firms, the mean of sales was 5386.029 and the S.D was 8761.573. The t-value is 5.106 and the significance probability is 0.000, which is less than the significance level 0.05. Therefore, there is a difference in sales amount before restricting participation of large firms and before restricting participation of large firms. In addition, after limiting the participation of large corporations, the mean of operating profit is -39.768 and the S.D is 1965.799. The t-value is -0.168 and the probability of significance is 0.867, which is larger than the significance level of 0.05. Therefore, there is not a difference in operating profit before restricting participation of large firms and before restricting participation of large firms. After limiting the participation of large corporations, the mean of net profits was -30.826 and the S.D was 2319.678. The t-value is 0.110 and the significance probability is 0.912, which is greater than the significance level of 0.05, so there is no difference in net profit before and after the restriction of participation.

Research hypothesis 3: there will be a difference in company performance by company grade (Group A, Group B, Group C).

In this study, the analysis of variance was used to compare and analyze the differences in total business, total assets, sales, operating profit, and net profit of IT firms. Before and after the limit of large enterprises, total assets, sales, operating profit, and net income were all included in the total variables.

(1) After limiting the participation of large firms, will be a difference in company performance (general, total assets, sales,

operating profit, net profit).

The results of the analysis after restricting the participation of large firms to this hypothesis are as follows. In order to verify whether there is a significant difference between the total assets, total assets, sales, operating profit, and net profit, One-way ANOVA was performed. Table 5 summarizes these results. For the meaningful results, we compared the mean size between groups through post analysis. The statistics of the total variables summed up for each variable, verification result is the F value was 83.487, and the ρ value was 0.000, for the total assets, the t-value is 30.456 and the ρ value is 0.000, for sales amount, the t-value is 257.512, the ρ value is 0.000, In the operating profit, the t-value is 7.015, the ρ value is 0.001, for the net profit, the t-value was 6.655 and the ρ value was 0.002. Thus, it can be seen that there is a difference in total company, total assets, sales, operating profit, and net profit by company grade.

Table 5. Analysis by company grade after restricting participation of large firms

Variable	Grade	Mean	S.D	F	ρ
1. General	Group A	343208.636	202038.770	83.487	0.000**
	Group B	154441.967	54258.528		
	Group C	53658.928	29917.081		
	SUM	131291.860	142108.369		
2. Total assets	Group A	162160.55	158902.529	30.456	0.000**
	Group B	64751.27	36856.649		
	Group C	25954.55	21479.592		
	SUM	60338.30	87142.961		
3. Sales amount	Group A	170840.82	53818.100	257.512	0.000**
	Group B	82460.60	20444.653		
	Group C	25999.49	11889.356		
	SUM	66332.90	60751.612		
4. Operating profit	Group A	5903.86	9551.519	7.015	0.001**
	Group B	3997.87	7871.970		
	Group C	1009.97	1976.369		
	SUM	2640.57	6090.669		
5. Net profit	Group A	4303.41	6984.819	6.655	0.002**
	Group B	3232.23	6237.381		
	Group C	694.91	2194.661		
	SUM	1980.09	4795.886		

(*: $\rho \leq .05$, **: $\rho \leq .01$)

The First, there was a difference overall total between group A, group B, and group C after the restriction of participation in large firms. Second, the results show that there is a difference in the total assets between Group A, Group B, and Group C after restriction of participation by large firms. Third, after restricting the participation of large corporations, the sales were found to be different in group A group,

group B group, and group C group. Fourth, there was no difference between A group and B group after restricting participation of large corporations, and there was a difference between C group and A & B groups. Finally, net profits after restricting participation of large corporations were not different between A group and B group, and there were differences between C group and A & B groups.

(2) Before limiting the participation of large firms, will be a difference in company performance (general, total assets, sales, operating profit, net profit).

The results of the analysis after restricting the participation of large firms to this hypothesis are as follows. In order to verify whether there is a significant difference between the total assets, total assets, sales, operating profit, and net profit, One-way ANOVA was performed. Table 6 summarizes these results. For the meaningful results, we compared the mean size between groups through post analysis. The statistics of the total variables summed up for each variable, verification result is the t-value was 76.962, and the ρ value was 0.000, for the total assets, the t-value is 28.436 and the ρ value is 0.000, for sales amount, the t-value is 195.572, the ρ value is 0.000, In the operating profit, the t-value is 15.432, the ρ value is 0.000, for the net profit, the t-value was 12.628 and the ρ value was 0.000. Thus, it can be seen that there is a difference in total company, total assets, sales, operating profit, and net profit by company grade.

Table 6. Analysis by company grade before restricting participation of large firms

Variable	Grade	Mean	S.D	F	ρ
1. General	Group A	305318.091	192061.362	76.962	0.000**
	Group B	118441.867	41977.708		
	Group C	43084.261	28729.518		
	SUM	109446.843	130134.917		
2. Total assets	Group A	137160.14	140979.466	28.436	0.000**
	Group B	49633.00	28367.877		
	Group C	20756.97	20392.524		
	SUM	49080.53	76104.856		
3. Sales amount	Group A	152642.36	60197.224	195.572	0.000**
	Group B	61530.10	14484.277		
	Group C	20613.46	9465.371		
	SUM	54763.34	56338.509		
4. Operating profit	Group A	7187.00	8767.061	15.432	0.000**
	Group B	3870.60	5255.518		
	Group C	1049.74	1441.870		
	SUM	2864.99	5184.199		
5. Net profit	Group A	8328.59	13807.846	12.628	0.000**
	Group B	3408.17	3732.849		
	Group C	664.09	1933.806		
	SUM	2737.98	6867.815		

(*: $\rho \leq .05$, **: $\rho \leq .01$)

First, there was a difference overall total between group A, group B, and group C before the restriction of participation in large firms. Second, there was no difference in total assets between B group and C group before restricting participation of large corporations, and there was a difference between A group and B and C groups. Third, the results show that there is a difference in the sales between group A, group B, and

Group C before restriction of participation by large firms. Fourth, before restricting the participation of large corporations, the operating profit were found to be different in group A group, group B group, and group C group. Finally, net profits before restricting participation of large corporations were not different between B group and C group, and there were differences between A group and B and C groups.

4. Conclusion

This study is based on the restriction of participation of firms with limited mutual investment (called "large corporations" in this paper) in the government public information market in January 2013 (the amendment of the Software Industry Promotion Act) in the Republic of Korea. This study analyzes the financial impacts of these restrictions on small and medium sized IT service firms. A sample of 121 small and medium-sized IT services firms were classified into groups named A, B and C, and statistical techniques were used to assess them such as T-test and one-way ANOVA. In the three years after the restriction of participation of large corporations, the total assets and sales of the medium and small IT service firms were positive, but the operating profit and net profit were negative. Particularly, the negative effects were more pronounced for medium-sized firms, which are group A firms. This finding will continue to affect medium to small-sized IT service firms. This negative effect on medium and small-sized IT service firms is different from the first legislative

purpose of enforcing the restriction system of large firms, and policy proposals should be sought to find solutions. There were several concerns at the time of the introduction of this system, but much of it was stabilized. The statistical analysis of this part will be added in the next paper.

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