The Empirical Study on the Location Determinants of Fortune Global 500 Companies*

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< Abstract >

본 연구에서는 포춘 글로벌 500 기업의 입지 결정 요인을 분석하였다. 먼저, 글로벌 500대 기업에 대한 1차 전수 조사 후, 이들 중 국내에 진출한 포춘 기업 199개를 대상으로 DB를 구축하였다. 실제 연구 표본은 설문을 통해 자료를 구득할 수 있던 포춘 기업 70개이다. 이들 기업의 경영진을 대상으로 직접 면접 설문을 실시하였다. 주요 설문 내용에는 집적, 시장, 노동, 정부 정책, 인프라, 지리적 접근성 등 6개 입지 요인이 포함되었다.

실증 분석을 통해 주요 연구 가설을 검증 할 수 있었다. 첫째, 노동 요인은 FDI가 국가단지(경제자유구역과 산업단지) 진입에 긍정적인 영향을 미쳤다. 둘째, 정부 정책 요인은 FDI가 국가단지(경제자유구역과 산업단지) 진입에 긍정적인 영향을 미쳤다. 셋째, 인프라 요인은 FDI가 국가단지(경제자유구역과 산업단지) 진입에 긍정적인 영향을 미쳤다. 그러나 집적 요인, 시장 요인, 지리적 접근성 등의 요인은 FDI의 입지 결정에 긍정적인 영향을 미치지 못했다. 이러한 연구 결과는 FDI의 국내 진입에 노동, 정부 정책과 인프라 등의 요인이 중요했다는 것을 실증적으로 확인해 준다. 향후 국내 진출을 준비하는 우량 포춘 기업들의 유치 전략에 적극 활용할 필요가 있을 것이다.

key word : Location determinants, Binary logistic regression analysis, Fortune global 500 companies

I. Introduction

Foreign investment by multi-national enterprises ("MNEs") has a positive impact on regional economies in host countries. A foreign direct investment (FDI) enterprise is a company that invests abroad directly from home country. Worldwide FDI industrial spillover effects are stronger for Greenfield-type manufacturing industries than for service industries. Therefore individual countries are competing ferociously to attract FDI companies by offering optimum locations while MNEs are accelerating their globalization and regional integration efforts. According to United Nations research in year 2006 , the laws about FDI were amended 2,266 times from 1992 to 2005 across the world; 94% of those amendments aimed to create a better economic environment for FDI. Unlike what MNEs have previously moved to new locations to find an efficient production base with low labor costs, they now aim to achieve global business management through national or regional locations. Host countries promote location policies to attract FDI, planning mobility to world market.

Today, it is important to comprehend the location determinants of FDI in order to enact effective location political measures by Government. In particular, these determinants should be studied from the practical viewpoint of FDI companies in their selection of a certain country and their decision to move to the national complex (FEZs and ICs)[1]in that country.

Korea has shown poor FDI results, even though its foreign investment law was revised as the Foreign Investment Promotion Act in November 1998 and policies were altered to give priority to the promotion and support of FDI. According to periodic data for the ratio of inward FDI stock to UNCTAD nominal GDP (Figure 1), the inward-FDI-stock-to-nominal-GDP ratio is approximately 10%, which is much lower than the global average. Korea belongs to the below-potential group of countries, in other words, it has high potential for FDI but poor results(Kim and Kang, 2012; UNCTAD, 2011).

〈Figure 1〉 Evolution of the inward - FDI - stock - to - nominal - GDP ratio
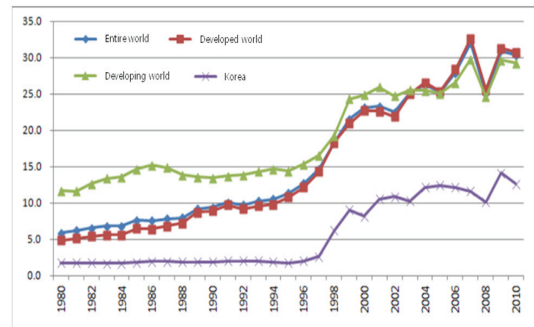
Source) Based on Web label 28 in UNCTAD (2011) as cited in Kim and Kang (2012, p. 4)

Korea had 508 industrial complexes (ICs), 7 free trade zones (FTZs), and 6 free economic

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1) The national complex has Free Economic Zone, Industrial Complex and Free Trade Zone designed by Government. They are combined IC into FEZ, or FTZ. IC has more small size but vast area rather than those two area.

〈Table 1〉 % of NC(national complex) contrasted with total South Korea Land

Total South Korea land	FEZ	FTZ	IC	Total NC among the total South Korea's land	Total Foreign IC among the total NC
100,188.10km²	0.39%	0.005%	1.025%	1.43%	0.75%

zones (FEZs) as of January 2012. They cover a total area of 1,437.981 ㎢, of which only 10.736 ㎢ are exclusive foreign industrial complexes as shown in Table 1. This is a direct consequence of Korea's poor inward FDI performance despite the vast industrial areas constructed to achieve economic development, employment creation, and inter-industry ripple effects in Korea. Korea's inward FDI companies has been centered currently in the metropolitan area.

Furthermore, there is a need to analyze the location determinants of the industrial areas constructed for FDI, because location selection, which reflects corporate characteristics, serves as the basis for analyzing the regional environment entry preference for different industries, thus identifying the most considered location determinants(Jung, 2008). Many previous studies applied determinants used by foreign studies to figure out their inward FDI(Wu and Stranger, 2000; Hogenbirk and Narula, 2004; Cheng and Kwon, 2000). And also there are empirical studies for South Korea inward FDI(Hwang, 2010; Lee, 2011; Kang, 2009). But there is a limit of sample reliability due to low response from rural enterprises and uncertainty of the survey respondent. This study makes a difference from other studies by handling FDI location determinants of not any general non-Fortune companies but Fortune Global 500 companies. As many foreign researchers applied the determinants of previous studies to find out their inward FDIs, South Korea's location determinants are also expected to have different perspective upon these previous studies. Also, there were no sufficient previous studies to analyze location determinants of inward FDI, nor any studies reflecting on the location determinants considered by the final decision-makers at FDI companies. Thus, we attempted to overcome the limits of previous studies, which have relied exclusively on existing quantity statistics, by discerning the reality-based location determinants from the responses of the decision-makers at Fortune Global 500 companies currently operating in Korea. Furthermore, the location determinants of Fortune Global 500 companies are representative of those of non-Fortune companies(Park, 2012). By analyzing these location determinant preference factors, we aim to present a foundation for future policy-making related to the establishment of the national complex (FEZs and ICs) conducive to vitalizing inward FDI and thus providing strategic implications perspective.

II. Theoretical Background

Conventional location theories considered labor, price, and land value to be important for location selection. This is called vertical FDI. Horizontal FDI refers to the movement taken to curtail costs by means of trade. Currently, as FDI moves toward foreign platforms, vertical and horizontal characteristics are intermingled when considering all relevant factors such as the environment, cost-effectiveness, and market regulations(Krugman and Obstfeld, 1997; Yeo and Lee, 2009). Research has been conducted on many theories related to FDI companies, classifying them into market-oriented, export-oriented, resource-oriented, efficiency-seeking, production-oriented, and so on. These theories have changed depending on the type of industrial organization(Hymer, 1960; Vernon, 1966). The ownership, location, and internalization advantage (OLI) theory established by Dunning (1988, 1993) contributed greatly to this theoretical development, enhancing the importance of location.

FDI firms' entry into foreign markets depends on business motivation, and the competition with other companies begins by securing location advantages in investment countries. In pursuing corporate internationalization strategies, finding new locations abroad for subsidiary companies has become a crucial factor, and investment motivation constitutes the structure of MNE investment. Thus, an excellent location becomes a competition site for similar industries as their subsidiary companies seek to move into that location to achieve their goals in compliance with their internationalization strategies. They move to expand their field of operations, even in cases where the market in the investment country is not attractive (Benito et al., 2003). At the initial stage of business, the location-related decision determines the dimension of investment, and location selection is crucially associated with business outcomes (Rho, 1994).

1. Location Determinants

This study focused on discovering location determinants, which can also serve as determining factors for attracting FDI to Korea, to promote the regional economy and strengthen the national competitive edge. Industries dominated by MNEs are moving toward cutting-edge practices through advancing information technology and are thus achieving rapid market expansions. Accordingly, FDI-related location selection abroad involves detailed factors that reflect corporate characteristics (Do and Lee, 2008). Many previous studies have examined the location determinants for manufacturing and service industries, only a few converging on the location include the following. Marjoliein et al.,(2003), applying Marshall's agglomeration theory, stated that, among the location determinants, the agglomeration factor had a positive influence; the importance of production capacity was emphasized. This factor used as variables, high

regional gross production, PCI and foreign firms agglomeration by Woodward Rolfe(1993), Yeo and Lee(2009), and Dinh Thi Thanh Binh(2009). According to Cheng and Kwon (2000), the national complex designed by China traced FDI for 10 years, they verified that market factor used as size, accessibility, and growth rate had the most positive influence. In particular, the market size of an investment country indicates the country's economic size and development(Loree and Guisinger, 1995). When moving abroad, MNEs seek to find the potential area for market expansion(Lipsey, 1999; Ajami and BarViv, 1984). Lee and Jo(2000) traced FDI into Korea, for a decade of 1984-1995, they verified that the size of market is increased, the volume of FDI is increased. Well-built social infrastructure such as roads and supply chains are very important to MNE's industrial activities. To choose regions, relatively, the level of public infrastructures give the positive effects as a one of location determinants(Wheeler and Mody,1992; Basile et al.,2008). Friedman et al., (1992) analyzed location determinants of manufacturing-related FDI firms that invested in certain U.S. states and confirmed that market, labor, government policy, and infrastructure factors were significant(Wu and Strange,2000). Swenson(1994, 2000) conducted studies on tax benefits offered by government policies and found that companies entering

Western Europe were more sensitive to taxes. In particular, he stated that government policies offering tax relief and other acquisition tax cuts played a crucial role in attracting manufacturing-related MNEs. In contrast, a great number of scholars regard the tax rate as exercising a negative influence(Grubert and Mutti, 1991). Woodward and Rolfe(1993) applied a conditional logic model to location determinants of FDI forms that invested in the Caribbean Basin from 1984 to 1987, and reported that GNP, tax, the size of FEZs, and agglomeration were positive, while labor cost showed a negative influence. Hogenbirk and Narula(2004) performed a conditional logit analysis on FDI companies located in port regions in Europe and found that market, labor, and government policy factors had a negative influence, while infrastructure and geographical accessibility, used as variables, port and metropolitan accessibility, had a positive influence. Carlton (1983) conducted a study on factory location selection of manufacturing-oriented companies and demonstrated that energy cost, existing concentrations of employment, and government policy had a positive influence. The operational definitions of the factors and variables used in the previous studies are summarized in Table 2.

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2) The example of Q 15), "Real Estate development (ie;factory,head office building) & investment taxes (AT = acquisition tax; RT = registration tax) are appropriate".

3) The example of Q 16), "Government agency accessibility(various license and permit related administrative service) is good."

4) The example of Q 23), "Accessibility to Central Business District is good".

〈Table 2〉 Major research on location determinant factors & variables

Factor	Variables	Reference	Results
Agglomeration	High Production Capacities	Marjoliein et al.,(2003)	+
	High Regional Gross Production	Woodward and Rolfe(1993), Yeo and Lee(2009)	+
	High PCI(per capital income)		
	Foreign Firms Agglomeration	Woodward and Rolfe(1993), Yeo and Lee (2009), Dinh Thi Thanh Binh(2009)	+
Market	Size	Loree and Guisinger(1995), Cheng and Kwon(2000), Wu and Strange(2000), Friedman et al.,(1992)	+
	Good Accessibility		
	High Growth Rate		
	High Share		
Labor	Good Relations (between employer and employee)	Hwang,K.J(2010), Friedman et al.,(1992)	+
	High Productivity	Wu and Strange(2000)	+
	High Skill		
	Low Wage	Carlton(1983)	+
		Woodward and Rolfe(1993)	-
Government Policy	Public Tax Exemptions	Grubert and Mutti(1991)	−
		Swenson(1994,2000)	+
	High Support Service (incentive, support fund)	Carlton(1983), Friedman et al.,(1992), Swenson(1994,2000)	+
		Wheeler and Mody (1992)	−
	Proper Real Estate Development Investment Taxation(ex: burden tax, AT/RT[2]tax)	Carlton(1983)	+
	Easy Government Accessibility[3]	Wu and Strange(2000)	+
Infrastructure	Low Electricity and Energy	Carlton(1983)	+
	High Social Infrastructure (ex: road & SOC)	Wu and Strange(2000), Friedman et al.,(1992), Wheeler and Mody(1992), Basile(2004), Basile et al.,(2008)	+
	High Linkage with other province	Wu and Strange(2000)	+
	High Supply Chain Management	Wu and Strange(2000), Wheeler and Mody(1992)	+
Geographical Accessibility	Airport and Seaport Accessibility	Hogenbirk and Narula(2004)	+
	IT Port Accessibility (Internet)	Lipsey(1999)	−
	CBD[4] Accessibility	Hogenbirk and Narula(2004)	+
	Financial Accessibility[5]		+

After reviewing all of the previous studies shown above, we finally used six variables used by Cheng and Kwon(2000), Friedman et al.,1992), Wood and Rolfe(1993), Wu and

5) Headquarters of a banking and security complex

Strange(2000), Carlton(1983), and Hogenbirk and Narula(2004) as factors and rearranged them to create 24 variables taken from other previous studies and suitable for the circumstances in Korea. The following hypotheses were established to identify which location determinants affect Fortune Global 500 companies in their decisions to move to the national complex(FEZs/ICs).

Hypothesis 1: Agglomeration factors have a positive influence on FDI firms moving into the national complex(FEZs/ICs). (Woodward and Rolfe, 1993; Marjoliein et al., 2003; Dinh Thi Thanh Binh, 2009; Yeo and Lee, 2009).

Hypothesis 2: Market factors have a positive influence on FDI firms moving into the national complex (FEZs/ICs). (Friedman et al., 1992; Cheng and Kwon, 2000; Wu and Strange, 2000; Loree and Guisinger, 1995).

Hypothesis 3: Labor factors have a positive influence on FDI firms moving into the national complex (FEZs/ICs). (Carlton, 1983; Friedman et al., 1992; Wu and Strange, 2000).

Hypothesis 4: Government policy factors have a positive influence on FDI firms moving into the national complex (FEZs/ICs). (Carlton, 1983; Friedman et al., 1992; Swenson, 1994, 2000).

Hypothesis 5: Infrastructure factors have a positive influence on FDI firms moving into the national complex (FEZs/ICs). (Carlton, 1983; Wheeler and Mody, 1992; Wu and Strange,

2000).

Hypothesis 6: Geographical accessibility factors have a positive influence on FDI firms moving into national complex (FEZs/ICs). (Hogenbirk and Narula, 2004).

To verify the hypotheses of this study, the following analysis method, data collection, and empirical analysis results are suggested.

III. Method and Analysis

This study conducted a questionnaire survey to analyze the location determinants of Fortune Global 500 companies that have moved into Korea. First, frequency analysis was performed on the research samples. Second, 24 variables and 6 influencing factors were assigned to each corresponding item using a Likert Five-digit Scale[6] and the final independent variable was determined by removing variables that degraded reliability and conducting a factor analysis. Location was set to be a dependent variable and divided into urban centers and the national complex (FEZs/ICs).

Lastly, as most studies used binary logistic regression (Kittipraps and McCann, 1999; Cheng and Kwon, 2000) and conditional logit model (Hogenbirk and Narula, 2004; Wu and Strange,

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6) The 24 questions survey for this study was designed to measure location determinant variables based on 6 factors (agglomeration, market, labor, government policy, infrastructure, and geographical accessibility) in table 2. The definition and examination of the variables for developing hypothesis of this study are explained in this page. Also, the location determinant variables measurement was done by Likert Five-digit Scale being "1=strongly disagree", "3=neutral", "5=strongly agree".

〈Table 3〉 Demographic information for the Fortune Global 500 enterprises

Category		Frequency (N=70)	Percentage (%)
Gender	Male	62	88.6
	Female	8	11.4
Citizenship	Foreigner	31	44.3
	Korean	39	55.7
Title	Chairman/CEO/Vice President	31	44.3
	Director/COO/CFO	22	31.4
	Middle Senior Manager/Manager	17	24.3
Location	Urban	38	54.3
	National complex(FEZ/IC)	32	45.7
Industry	Service	39	55.7
	Manufacture	31	44.3
Business	Manufacture	31	44.3
	Food/Accommodation	1	1.4
	Logistic	4	5.7
	Retail and wholes sale	16	22.9
	Finance and Insurance	12	17.1
	IT related	6	8.6
Home Country	USA	26	37.1
	Europe(Germany, Swiss, France, Sweden , UK, Island, Netherland)	42	60
	Asia(Japan,Hongkong)	2	2.9

2000), and nested logit model (Barrios et al., 2006) to extract location determinants, a model of the location determinants of Fortune Global 500 companies was proposed by using a binary logistic regression to extract important determinants.

1. Data Collection

This study contains the collected data on Fortune Global 500 companies that entered Korea from October to the end of December 2011. Final surveyed number were 199 companies in Fortune Global 500 lists in South Korea by January 2012. A direct visit survey was conducted from January 2nd, 2012, to May 30th, 2012. The final questionnaire survey has been done with 70 companies targeted CEOs and executives (CFO, COO, director) who participated in determining their companies' entry into new locations. The spatial range included urban centers and the national complex (FEZs/ICs) in which those Fortune Global 500 companies are located.

2. Results

1) Demographic Background of Respondents

The gender proportion of 70 Fortune Global 500 companies was predominated by males (88.6%, n = 62); there were only 8 females (11.4%). The response rate was higher for Korean nationals (55.7%, n = 39) than foreigners (44.3%, n = 31). In terms of job title, 31 persons (44.3%) were Chairmen/CEOs/Vice-Presidents, which is the highest figure, while 22 persons (31.4%) were Directors/COOs/CFOs and 17 persons (24.3%) were Middle Senior Managers or Managers. By location area, 38 companies (54.3%) were located in urban areas, and 32 companies (45.7%) in industrial areas (FEZs/ICs). By industry, 39 companies (55.7%) were related to services, which were the highest figure, while 31 companies (44.3%) were related to manufacturing. By business, 31 companies (44.3%) were related to manufacturing, which was the highest figure, while 16 companies (22.9%) were related to retail and wholesale sales, 12 companies (17.1%), to finance and insurance, 6 companies (8.6) to IT, 4 companies (5.7%) to logistics; and 1 company (1.4%) to food/accommodation. By home country, 42 companies (60%) were from Europe, which was the highest figure, while 26 companies (37.1%) from the United States and 2 companies (2.9%) were from Asia as shown in Table 3.

2) Reliability

Prior to the analysis, a reliability analysis was performed on the variables to examine the consistency of the results by repeatedly measuring a given concept. When many items are used to measure the same concept, the internal consistency reliability method is used most often. In this method, the reliability of measuring instruments is increased using Cronbach's alpha coefficient, by removing the items that degrade reliability. If Cronbach's alpha coefficient is over 0.6 in all indexes of the component factors, the measured variable is reliable (Churchill, 1979; Lee, 2006).

The reliability test on each factor was done in this study. As the result, Question items 4, 12, 17, and 21 regarding the agglomeration, labor, infrastructure, and geographical accessibility factors, respectively, were removed, because they were deemed inappropriate through reliability analysis (as shown in Table 4-9).

(1) The Cronbach's alpha value of all four variables was 0.58, while it was 0.68 after removing "04" from the question items regarding agglomeration factors as shown in Table 4.

〈Table 4〉 Agglomeration factors–total statistics

Variable	Scale mean if item deleted	Scale variance if item deleted	Squared multiple correlation	Alpha if item deleted
01	10.1857	5.777	.240	.604
02	10.3714	4.469	.570	.323
03	10.5714	4.625	.588	.320
04	10.2286	6.614	.118	.680

(2) The Cronbach's alpha value of all four variables included in market factors was 0.829, which was considered appropriate as shown in Table 5.

〈Table 5〉 Market factors―total statistics

Variable	Scale mean if item deleted	Scale variance if item deleted	Squared multiple correlation	Alpha if item deleted
05	11.5000	7.326	.736	.750
06	11.5857	7.319	.605	.808
07	11.5286	7.644	.678	.776
08	11.9286	6.995	.624	.802

(3) The Cronbach's alpha value of all four variables was 0.78, while that was 0.804 after removing "12" from the items regarding labor factors. Finally, this item was removed, as a survey showed that the wage level of Korean workers was considered an insignificant factor as shown in Table 6.

〈Table 6〉 Labor factors―total statistics

Variable	Scale mean if item deleted	Scale variance if item deleted	Squared multiple correlation	Alpha if item deleted
09	10.6143	7.516	.601	.717
10	10.2571	6.773	.670	.677
11	10.0714	7.372	.652	.692
12	10.7143	8.207	.427	.804

(4) The Cronbach's alpha value of all four variables included in government policy factors was 0.883, which was considered appropriate as shown in Table 7.

〈Table 7〉 Government policy factors―total statistics

Variable	Scale mean if item deleted	Scale variance if item deleted	Squared multiple correlation	Alpha if item deleted
13	8.4286	10.306	.581	.836
14	8.1571	9.149	.742	.765
15	8.5429	9.469	.693	.787
16	8.2571	10.165	.679	.795

(5) The Cronbach's alpha value of all four variables was 0.78, while that was 0.849 after removing "17", included in infrastructure factors as shown in Table 8.

〈Table 8〉 Infrastructure factors―total statistics

Variable	Scale mean if item deleted	Scale variance if item deleted	Squared multiple correlation	Alpha if item deleted
17	10.6143	7.110	.378	.849
18	9.7714	6.585	.716	.676
19	10.2286	6.440	.673	.691
20	9.9714	6.202	.655	.697

(6) The Cronbach's alpha value of all four variables was 0.79, while that was 0.807 after removing "21", included in geographic accessibility factors as shown in Table 9.

〈Table 9〉 Geographic Accessibility factor―total statistics

| Variable	Scale mean if item deleted	Scale variance if item deleted	Squared multiple correlation	Alpha if item deleted
21	11.4714	6.427	.460	.807
22	11.3571	5.682	.710	.682
23	11.5286	6.282	.619	.731
24	11.6714	5.470	.628	.723

3) Descriptive Statistics

Descriptive statistics were performed on all items secured by the reliability analysis to comprehend the concentration trend and variance of variables and to determine the data characteristics. Generally, Fortune Global 500 companies appeared to consider market factors (from 05 to 08) equally important. This signifies that MNEs regard market factors as important when they move into Korea. In particular, they considered the market potential, including market size, market accessibility, and market growth in order as shown in Table 10.

4) Factor Analysis

A total of six factors were extracted after examining eigenvalues (greater-than-1 criterion) and Scree plot in Figure 2 (slope does not change much from the seventh factor) to determine the number of factors to be retained. These factors have an explanatory power of 73.715% as shown in Table 11.

〈Figure 2〉 Scree plot for location determinants
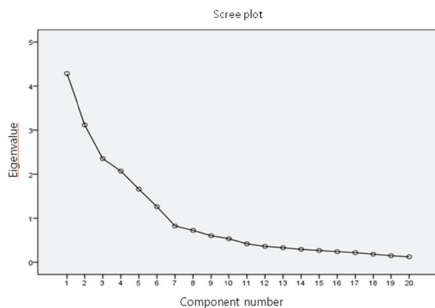
The varimax rotation method, including Kaiser normalization, was used to facilitate the interpretation of factors extracted from the factor

〈Table 10〉 Descriptive statistics results

Factor	Varia bles	FDI Number	Min imum	Max imum	Mean	Std.D
1	01	70	1.00	5.00	3.6000	1.13444
	02	70	1.00	5.00	3.4143	1.10981
	03	70	1.00	5.00	3.2143	1.04802
2	05	70	1.00	5.00	4.0143	.99990
	06	70	1.00	5.00	3.9286	1.13344
	07	70	1.00	5.00	3.9857	.98530
	08	70	1.00	5.00	3.5857	1.18558
3	09	70	1.00	5.00	3.2714	1.10232
	10	70	1.00	5.00	3.6286	1.19384
	11	70	1.00	5.00	3.8143	1.08070
4	13	70	1.00	5.00	2.7000	1.24353
	14	70	1.00	5.00	2.9714	1.27372
	15	70	1.00	5.00	2.5857	1.26826
	16	70	1.00	5.00	2.8714	1.15371
5	18	70	1.00	5.00	3.7571	.93925
	19	70	1.00	5.00	3.3000	1.01224
	20	70	1.00	5.00	3.5571	1.08529
6	22	70	1.00	5.00	3.9857	.97048
	23	70	2.00	5.00	3.8143	.90558
	24	70	1.00	5.00	3.6714	1.09969

Note: Std.D = standard deviation, percentage in parentheses.

analysis. The matrix values of the rotated components, acquired using the varimax rotation method, are shown in Table 12. Factor 1 is Government Policy, including 4 variables , Public Tax Exemptions (13), High Support Service (14), Proper Real Estate Development Investment Taxation (15), and Easy Accessibility (16). Factor 2 is Market, including 4variables, Size (05), Good Accessibility (06), High Growth rate (07), and High Share (var08). Factor 3 is Infrastructure, including 3 variables, High Social Infrastructure (18), High Linkage with other provinces (19), and High Supply Chain Management (20). Factor 4 is Labor, including 3 variables, Good Relations (09), High Productivity (10), and High Skill (11). Factor 5 is Geographic

⟨Table 11⟩ Total variance explained

Compon ent	Initial Eigen Values			Extraction Sum of Squared Loadings			Rotation Sum of Squared Loadings		
	Total	% of Variance	Cumulativ e %	Total	% of Variance	Cumulativ e %	Total	% of Variance	Cumulativ e %
1	4.284	21.420	21.420	4.284	21.420	21.420	2.745	13.724	13.724
2	3.117	15.586	37.006	3.117	15.586	37.006	2.737	13.685	27.408
3	2.352	11.760	48.766	2.352	11.760	48.766	2.473	12.364	39.773
4	2.070	10.350	59.116	2.070	10.350	59.116	2.462	12.309	52.082
5	1.659	8.294	67.411	1.659	8.294	67.411	2.330	11.651	63.733
6	1.261	6.304	73.715	1.261	6.304	73.715	1.996	9.982	73.715

Note: Extraction method = Principal component analysis

⟨Table 12⟩ Rotated component matrix A

Variables	component					
	1	2	3	4	5	6
01	.155	-.077	.377	.301	-.176	.518
02	-.050	.216	-.102	.031	.125	.892
03	-.146	.072	-.086	-.086	.147	.879
05	.175	.847	-.019	-.029	.025	.166
06	.052	.739	.060	.234	-.014	.173
07	-.034	.843	-.083	-.061	.213	-.085
08	-.062	.804	.152	-.002	.007	.016
09	.093	.075	.038	.799	.007	.031
10	-.015	.025	.133	.864	-.115	.052
11	.114	-.007	.186	.805	.077	-.024
13	.672	.074	.035	.431	.036	-.241
14	.860	.004	.131	.086	.152	.003
15	.824	.035	.145	.007	-.201	-.080
16	.840	.027	.125	-.016	.006	.060
18	.146	.070	.842	.080	.189	-.049
19	.129	.077	.755	.176	.283	-.017
20	.134	-.014	.875	.117	.059	-.032
22	.058	.179	.323	.092	.729	-.002
23	-.023	-.003	.124	.015	.859	.106
24	-.034	.053	.067	-.127	.862	.078

Note: Extraction method = Principal component analysis Rotation method = Varimax with Kaiser normalization A: Rotation converged in six iterations.

Accessibility, including 3 variables, IT port (22), CBD (23), and Financial (24). Finally, Factor 6 is Agglomeration, including 3 variables, High Production Capacity (01), High Regional Gross Production (02), and High PCI (03).

5) Binary Logistic Regression

Logistic regression analysis is a statistic method widely used to find the relationship between qualitative dependent variables and independent variables. In particular, it is used in case of binary logistic regression for variables whose dependent variable (Y) value is 0 or less than 1. A basic model of binary logistic regression analysis is as follows.

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 X_1 + \cdots + \beta_p X_p$$

Where $\pi = P(Y = 1 | X_1, X_2, \cdots, X_p)$

and $\pi/(1-\pi)$ indicates the odds of an event occurring relative to not occurring (Park et al., 2009).

To analyze the location determinants of Fortune Global 500 companies located at the two types of location sites, we used a binary logit model that estimates the logistic regression coefficient under the assumption that location site

type (urban center is "0" and the national complex [FEZs/ICs] is "1") is a dependent variable and the six explanatory factors are nonlinear between independent variables.

The result of binary logistic regression analysis is a model value of 27.936 in Table 13, which denotes the difference between the -2 log likelihood of a model that only includes an intercept and the -2 log likelihood of a model that adds independent variables (government policy factors, market factors, infrastructure factors, labor factors, geographical factors, agglomeration factors). Its significance was shown to be 0.000. As this is much lower than the significance level of 0.05, this model is proven statistically significant. According to the model summary in Table 14, the Nagelkerke R-square is .440. This indicates that 44% of the changes in the entire group of response variables explain the model.

⟨Table 13⟩ Omnibus tests of model coefficients

		Chi-square	df	sig
Step 1	Step	27.936	6	.000
	Block	27.936	6	.000
	Model	27.936	6	.000

⟨Table 14⟩ Model summary

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	68.590	.329	.440

Note: Regression analysis regards the values of Cox and Snell's R-square and Nagelkerke's R-square as corresponding to R-square.

⟨Table 15⟩ Variables in the equation

		B	S.E	Wald	df	sig	Exp (B)
1 step a	Government policy	1.075	.353	9.280	1	.002	2.931
	Market	-.018	.298	.004	1	.952	.982
	Infrastructure	.913	.368	6.163	1	.013	2.493
	Labor	.831	.323	6.605	1	.010	2.295
	Geographic Accessibility	-.448	.335	1.793	1	.181	.639
	Agglomeration	-.288	.285	1.019	1	.313	.750
	constant	-.263	.301	.764	1	.382	.769

Note(1): **, ***: Significant at the 5% and 1% confidence levels, respectively.

Note(2): As logistic regression analysis does not use a least square method, Wald statistics are used to verify the significance of independent variables instead of t-statistics. Wald = $\frac{\beta^2}{\sigma^2}$

Relying on the above results, the hypotheses 3,4 and 5 were chosen that state that Labor factors (Hwang, 2010; Friedman et al., 1992; Wu and Strange, 2000; Carton, 1983), Government Policy factors (Carlton, 1983; Grubert and Mutti, 1991; Swenson, 1994, 2000) and Infrastructure factors (Carlton, 1983; Wheeler and Mody, 1992; Basile et al., 2008) have a positive influence on FDI firms' site selection in the national complex (FEZs/ICs).

Based on the results of the analysis of location types in Table 15 above, a binary logit model of location determinants for Fortune Global 500 companies is as follows.

$$\ln\left(\frac{\pi}{1-\pi}\right) = -0.263 + 1.075 \times \text{government policy} - 0.018 \times \text{market} + 0.913 \times \text{infrastructure} + 0.831 \times \text{labor} - 0.448 \times \text{geographic} - 0.288 \times \text{agglomeration}$$

where

$$\pi = p(\text{location} = 1 \,|\, \text{government policy}, \text{market}, \text{infrastructure}, \text{labor}, \text{geographic}, \text{agglomeration})$$

If we look at the accuracy of the classification (Shown in Table 16), 84.2% were accurately classified for 38 companies in urban & sub-urban

area (32 cases), and 75% were accurately classified for 32 companies in FEZs/ICs area (24 cases). Overall accuracy is 80%.

⟨Table 16⟩ Variables in the equation

		Forecast		
		location		accuracy
		Urban	FEZs/ICs	
location	Urban	32	6	84.2%
	FEZs / ICs	8	24	75%
overall				80%

With the 3 significant variables, the analysis results are as follows(as shown in Table 17).

⟨Table 17⟩ Variables in the equation

		B	S.E	Wald	df	sig	Exp(B)
1st epa	Government policy	1.064	.343	9.614	1	.002	2.897
	Infrastructure	.884	.353	6.279	1	.012	2.420
	Labor	.802	.314	6.506	1	.011	2.229
	constant	-.287	.293	.985	1	.328	.751

Based on the results of the analysis, a binary logit model of location determinants for Fortune Global 500 companies is as follows.

$$log\left(\frac{\pi}{1-\pi}\right) = -0.287 + 1.064 \times goverment\ policy + 0.884 \times infrastructure + 0.802 \times labor$$

that is,

$$\pi = p(location = 1 \mid goverment\ policy, infrastructure, labor)$$

$$= \frac{e^{-0.287 + 1.064 \times goverment\ policy + 0.884 \times infrastructure + 0.802 \times labor}}{1 + e^{-0.287 + 1.064 \times goverment\ policy + 0.884 \times infrastructure + 0.802 \times labor}}$$

As we can see from the results above, the odds increase by exp(1.064) = 2.897 = 289.7% when government policy factor increases 1 unit with infrastructure and labor being the same, and in case of infrastructure increases 1 unit when government policy and labor are the same, the odds increase by exp(0.884) = 2.420 = 242%. Also the odds increases 229% in case of labor.

Moreover, if B has the positive (+) sign, it is likely to be classified into a group whose internal value is 1, meaning high possibility of deciding location into the national complex, if it has the negative (-) sign, it is likely to be classified into a group whose internal value is 0, meaning high possibility of deciding location into the urban area. Finally, significance should be considered when the independent variables are separated into two classification groups. Using a binary logit model, the statistical significance of p < 0.05 was met by the government policy (B=1.064, Wald=9.614), infrastructure(B=0.884, Wald=6.279), and labor factors(B=0.802, Wald=6.506) as the location determinants of Fortune Global 500 companies, and the final model was established thereupon. Thus, a model that includes these highly significant three variables will be useful for distinguishing location area. The implication is that if three factors increase, or satisfying in national complexes that companies want to move, the possibility is high of the companies deciding to move to that new location.

IV. Implications and Conclusions

In this study, we extracted reality-based location determinants from a questionnaire survey targeting 70 Fortune Global 500 companies located in Korea.

According to data from the Ministry of Knowledge Economy (2009) covering the 15 years from 1993 to 2007, service industry for FDI were concentrated in the Seoul Metropolitan Area. This remains unchanged today.

One Fortune Global 500 companies has an effect of attracting two to four outstanding non-Fortune companies. This is because a Fortune Global 500 companies is accompanied by subsidiary companies and support-service industries for spillover effects. Therefore, analysis of the location determinants of Fortune Global 500 companies is important in that it represents the location determinants of non-Fortune companies (Park, 2012). UNCTAD(2012) reports that many countries are strengthening their implementable investment policy plans to attract FDI. The FDI-related inflow of investment was over 50% (of GDP) in developing countries from 2010 to 2011. China had the highest proportion of FDI, while Korea had the lowest. It is estimated that FDI inflow's future prospects will reach $1,630−1,925 trillion in 2013 and up to $1,700−2,110 trillion in 2014. Korea should attempt to attract some of FDI investment volume expected in Asia.

The results of this study are as follows. First, both individual local bodies that build the national complex and government should establish more comprehensive policies at a national level to foster. According to the correlations of the variables by factor, Fortune Global 500 companies considered the following in decreasing order of importance: (1) high support services such as incentives, problem handling, technical and administrative support services provided by the government or local bodies, are well established, (2) easy government accessibility such as permit and authorization related administrative service, is good, (3)proper real estate development investment Taxation such as burden AT and RT, are appropriate, and (4) public tax exemption such as corporate and local taxes, exporting & tariff exemption are available. Here we consider one important point that our tax reduction as part of incentives were not high consideration in choosing location.

Second, the labor factors in order of importance were high productivity, high skill, and good relationship between employer and employee. According to an actual questionnaire survey, by contrast, most Fortune Global 500 companies stated that Korean labor wages were not high and they did not consider them important.

Finally, as for infrastructure factors, establishment of distribution-related supply chain management, development of roads and social overhead capital, and connectivity of regional

industries were regarded as important. This is because one Fortune Global 500 companies entry means subsequent entry of its many subsidiary companies. Fortune Global 500 companies have diversified businesses. First, subsidiary companies related to the parent company move into new location sites. Thereafter, non-Fortune Global enterprises under world-wide contracts enter the selected location sites to provide relevant assistance and product services. This appears to be the reason for the importance they put on the infrastructure established in provincial areas.

The factors described above play a crucial role in Fortune Global 500 companies' decisions to move into national complex. Regions in which government policy, labor, and infrastructure factors are well established appear location's advantages. Therefore, These factors will attract other Fortune Global 500 companies as well as purity FDI companies.

Despite these implications, this study has some limitations, including quantitative and temporal limitations due to collectable sample data. Among the limitations, the reason why considerable numbers among Fortune 500 companies are leaving South Korea except their marketing office in Metropolitan Area is unknown. And also, there is a boundary to analysis as micro view, rather than macroscopic analysis. To prevent reduction of Fortune companies numbers in the national complex, The location satisfaction's factor at present area should be analyzed for further studies.

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