Determinants of Korean Domestic Shippers Location Choice Decision

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Abstract: This study examines the determinants of location decisions on domestic shippers. To do this, this study identifies with the aid of the location choice model. We have used Korea commodity flow survey collected by the inter-regional shippers and socio-economical data. The results suggest that the location of shippers depend on agglomeration economies, market size, as well as logistics activities. The influential factors of location choice are as follows. Firstly, the influence of travel time between shipping (receiving) area between shipper locations (plants) should be accounted for. The suggested models show a large volume of transportation for a short transportation time and a small volume for a long transportation time. This study finds that the more business exist in an area, the more firms locate in the area. Urbanization economies have an influential role in location choice in Korean shippers.

Key Words: *Shippers, location, urbanization, commodity flow survey*

1. INTRODUCTION

The whole activity of a firm ranging from establishment and growth to decline accompanies geographical activities, such as location choice, expansion, and moving of a business place. These two factors, firm activity and geographical pattern change, are closely interrelated and either invigorate or sink the regional (national) economy. Thus, recent studies (Dunne, 1994; Hartgen, 1990, and so on) have actively adopted an approach in terms of regional economy toward the life cycle of firms and business activities, which include location choice of a firm and geographical pattern change. Dunne et al.(1994), in the study on the British firms in 1980s, pointed out that firms show different survival rates depending on size, age, and development conditions. They also showed that the smaller the size of a firm is, the lower the firm's survival rate becomes, and big firms perform much more activities, for instance M & A, and last longer than small ones. Hartgen et al. (1990) explained that firms show a rotating cycle in regard to making a decision about their business places as time goes by. That is, firms go through a process of reaching at a status of satisfaction in the aftermath of choosing and moving to the best location and, then, considering relocation after conducting re-evaluation as their satisfaction rate declines due to the influence of various external factors.

Meanwhile, the growth and decline of a firm and the accompanied firm's spatial relocation in this process have functioned as very significant factors to consider in establishing and driving logistic policies of countries in Europe and America. In conjunction with this, Belderbos et al. (2004) and Belderbos et al. (2000), attempted to investigate correlations between firm’s spatial strategies and the changes in logistic system with a focus on the existence of regularity between the formation of agglomeration economy and spatial shifts of spatial patterns, owing to the entry of Japanese car industry into the US and the growth of the Chinese market, respectively.

According to Brouwer et al. (2004), there are three key factors of firm’s location choice decision as to logistic activity. Firstly, internal factors, such as firm size, affect firm’s decision making in this regard. It is not difficult to spot a tendency for big firms to stay at one location for a long time due to high moving costs, stability in terms of employment and shipment of goods. Secondly, external factors, such as market size, also play a huge role in selecting the location in this purpose. Alike the attribute of firm size, the more stable the consumption area is, the bigger the influence is. The last factor is a location factor for a certain area. We can easily assume that fast-growing area contains more attractive power than other areas.

Locating behavior of firms is closely related to national economy. In case of big firms, they tend to continuously affect regional economy for a long period, once they locate at an area, due to high moving costs and risks. Therefore, behavioral shifts of firms depending on traffic conditions of the area, change in market size, employment conditions (existence and non-existence of the union), and location policy of the government (tax policy etc.) would play a significant part in logistic policies of the government. The empirical studies, for instance Bartik (1985), have sufficiently discussed this part.

The purpose of this study is to analyze the factors of firm’s location choice with the consideration about the attributes of shipment of goods, market size, etc., confined to domestic shippers in the 3rd Korean commodity flow survey in 2005. Transportation modes for shipment (truck type of each ton class, private or commercial truck of each ton class, delivery service, etc.), shipping items, shipping areas, shipping time, types of shipping industry, prices of shipping goods, and firm size (number of employee) will be considered as

the attributes of shipment. As for market size variables, population for each area, area size, and number of business in the whole industry for each area are the factors taken into the consideration. As we have reviewed in the literature review part, most data used in the previous studies appeared in a type of aggregate data. It should be noted that the uniqueness of this study is built upon an individual firm's data.

The outline of this article is as follows. Section 2 reviews location choice shifts depending on shifts in logistic circumstances and also conducts case studies. Section 3 deals with the model structure for this study, and Section 4 go through all the details about the attributes of the data. Section 5 reports the estimated result of the model, and Section 6 gives a full summary of the study.

2. LITURATURE REVIEWS AND DISTINCTION OF THIS STUDY

2.1 Changes in logistic environments of firms

In the era of unlimited global competition, a concept of location for domestic firms is expanding from a dimension of reducing transportation costs to a dimension of considering not just transportation costs but also employment and element costs. Some underscore the advantage to domestic firms of selecting a location overseas in terms of reducing transportation costs and human labor, compared to confining themselves to national boundary. Therefore, understanding the factors of firm's location choice is a very important issue that is closely related to national logistic policies. Each type of foreign firms as well as domestic firms, suggested by Mariotti (2005), seek to relocate themselves in order to adapt to circumstances and develop. Firms could totally close their plants and move to either a nearby area (movement within a city) or other areas in the country (movement between regions) or to foreign countries. It could be one another option to place a branch in one of other areas, not carrying out a total closure.

South Korea is, also, one of the countries that have watched countless relocation of firms in accordance with rise and fall of firms during past several decades. Currently, South Korea shows the type of concentration, in which many firms tend to concentrate in the metropolitan area in pursuit of urbanization economies. It is, therefore, natural that gross regional products concentrate in the metropolitan area as well. The Korean government has promoted a policy of relocating the concentrated firm in the metropolitan area to other regions for the sake of balanced development of country. However, it has hardly been ever studied as to how firms consider those various policies with regard to relocation. In contrast, European countries have accumulated diverse and wide-ranging outcomes in the fields, such as plant relocation in 1950s and relocation of manufacturing industry to suburbs due to suburbanization in 1980-1990s. Neoclassical location theories also expand the firm's optimal location theory. For instance, Krugman (1995) and Fujita et al. (1999) count shipping costs, labor costs, capital costs, and market size as location factors.

In concurrence with a big change for firm's distribution activities in a macroscopic aspect, logistic circumstances in the domestic market are undergoing an enormous change. A notable change in South Korea from late 1990s up to the current point is that a small amount of diverse items are being shipped to diverse customers in a customized way within a short period of time, thanks to the development of shipping industry and internet distribution. This points out that most items on the shipping list need short distance transportation rather than

long distance transportation. Consequently, it underlines the importance of location strategy of firm's distribution center.

2.2 Firm's location choice factors

Academic discussions on the location of firm unfolded in 19th century. Weber (1929) founded the classical theory that the variables of occurrence of transportation costs and labor market are the factors of firm's location choice. This is important in that it was the first attempt to generalize the firm's locating patterns, but it was only limited to transportation costs and labor market. Also, it failed to give a sufficient explanation about location of modern firms based on developed transportation and communication technology. Among the studies on firm's location choice, Button et al. (1995) and Leitham et al. (2000) also gave an emphasis on transportation costs, showing that firms are willing to relocate if transportation costs for shipping increases due to traffic congestion. Leitham et al. (2000) analyzed the influence of transportation accessibility on selecting location of industry based on the stated preference approach. Road accessibility (for instance, within 5 minutes, 15 minutes, or 30 minutes form the highway), quality of the business, price, images surrounding the business, existence of mass transportation modes, distance from city center, quality of human labor, etc. were the factors in the consideration. Additional attribute variables included industry categorization, number of employees, associated area, age of firm, period of business at the current location, location of the holding firm, and so on.

However, many firms nowadays acknowledge that, due to development of transportation and communication technology, movement of labor and capital is mobile without an obstacle and tend to select locations in foreign countries. Brouwer et al. (2004) and Guimaraes et al. (2004) are the studies in this line and conducted a quantitative analysis on affecting factors on firm's location choice. Brouwer et al. (2004) argues that firm relocation is significantly affected by such factors as firm size, firm age, market size for the firm, and growth (quantitative growth, quantitative decline)/merge/acquisition. Guimaraes et al. (2004), based on the data of firm births in 1989 and 1997, analyzed the attributes of location choice utilizing such variables as market size, urbanization economies, localization economies, wage, land price, and tax. The result of the analysis is that market size, urbanization and localization of economies have shown positive values while the influences of wage, land price, and tax had negative values.

Hartgen et al. (1990) has conducted a sample survey on 1,000 firms in 100 counties of the state of North Carolina in the US. Main questions included an influence of transportation accessibility on the satisfaction degree as to a current location of a firm. The study's policy implications are as follows. Firstly, each county has a distinct economy structure and transportation accessibility structure. This points out that there is little possibility of success for a macroscopic regional economy model on the basis of a state. Secondly, transportation accessibility, in most cases, is not on the list of important factors of firm's decision making with regard to location.

Targa et al. (2005; 2006) are the studies on examining the relationship between transportation accessibility and economic activities. They empirically scrutinize the hypothesis that investment on transportation reduces shipping costs through improving accessibility of firms, thereby exerting positive influences upon the economy. Targa et al. (2005) conducted an empirical analysis while taking firm size of each industry as a dependent variable and transportation accessibility, agglomeration economies, regional characteristics, and regional accessibility as independent variables. The result is that the higher capacity and function of roads leads to the higher economic productivity. Targa et al. (2006), taking advantage of the

stated preference survey approach, analyzed an influence of transportation accessibility on relocation under various assumptions. The result implied that there exists a positive correlation between transportation and economic activities.

3. METHODOLOGY

3.1 Structure of the model

The methodology to analyze the factors of location choice is largely divided into a stated preference analysis and a revealed preference analysis. This study adopts the latter, which is a post analysis of the results revealed in the market. Therefore, we conduct location choice modeling (Destination Choice Modeling) for the purpose of analyzing location attributes. This is the method based Discrete Choice Analysis, among regression analysis, that fits into the discrete type of dependent variables. The fact that we have too many alternatives is problematic for estimating a model. This study takes the method of dividing the whole country into 247 zones (243 zones, excluding Jeju island) and extracting 9 alternatives, randomly. Several scholars (McFadden 1978, Daly 1982, Ben-Akiva 1985, Guimaraes et al. 2003) relied on this method.

The formula 1 below represents a utility function, and the formula 2 indicates that the utility is a function of size variable (S, population etc.) and generic variables (X, shipping transportation time in this study). D×X is introduced as a new variable in order to account for interaction since using just D variable (the variables such as used mode of transportation, shipping scale, items, type of industry etc.) makes estimating the model difficult.

$$U_j = V_j + \varepsilon \tag{1}$$

$$V_j = f(S_j, X_{ij}, D \times X_{ij}) \tag{2}$$

Here, U_j : probability utility function
V_j : deterministic utility function
ε : error term
i, j : location of receiving, shipping, and plant
S : socioeconomic attribute vector
X : travel time vector between i and j
D : firm's logistic activity attribute vector

3.2 Setting up independent variables

This analysis adopts the variables (travel time, number of business per area, population) as the basic independent variables, and the reminding independent variables are introduced through the process of creating a variable. The newly introduced variables are as follows. If the mode of transportation used for shipping is a private truck over 8 tons by loaded capacity, the truck variable will be regarded as 1. If it is less than 8 tons, the variable will go to 0. The same logic is applied to a commercial truck as the mode of shipping transportation as well as the shipment weight less than 1 ton. Since it is implausible to use a unique constant to an alternative due to the presence of too many alternatives, we are forced to take an interaction variable.

Also, we use socioeconomic indicators of each region in order to take into account of the influences of market size and urbanization economies. That is, we use the number of businesses of each industry and population.

4. DATA FOR ANALYSIS

4.1 Korean commodity flow survey data

As a number of countries conduct a commodity flow survey with a regular basis, the survey in Korea is also a national transportation survey stipulated in the Act of Transportation System Efficiency. It intends to construct the basic data for conducting an analysis on transportation demands through designing a method to survey the volume of shipment between the origin and the destination (O/D) and performing it. Explaining it in more details, the shipment O/D volume between the regions in the country is one of the key fields of the national transportation database. Therefore, it is utilized as the basic data for policy analysis and various transportation plans, which ranges from a national basic transportation network plan, a med-term investment plan on transportation facilities, and an allocation plan of transportation-related social overhead capital (SOC) facilities such as highways to a location plan of distribution facilities such as complex freight terminals. Since the 1st national survey in 1996, the 2nd survey was done in 2001 and the 3rd one in 2005. The survey is composed of 4 industries and 30 types of business, respectively.

- Industries (4) :
- Types of business (30) : 3 for mining, 23 for manufacturing, 3 for wholesale and retail, 1 for transportation and warehousing

Main contents of the survey are composed of the number of employee, the general status like the sales, annual shipping record, and annual transportation tonnage. The general status consists of types of business, main items, location, number of employee, and the sales. For annual shipping record, monthly shipping record of 2004, a monthly average shipping record, shipment weight of each item, price of products, addresses of senders and receivers, modes of transportation, a main mode of transportation in case of multiple modes, and inter-modal stations are put into the data. During a 3-day flow survey, we obtained name of shipment, item numbers (categorization table of shipping items), businesses of senders and receivers (categorization table of standard industry), addresses of senders and receivers, shipment weight (tons), price of shipment, used mode of transportation, transportation costs, travel time, and shipping frequency.

4.2 Basic statistics of the data for analysis

The data used for analysis are on shipping attributes during 3 days and it was constructed through collecting detailed businesses types of four location types of manufacturing industry, which were selected in this study. In order to calculate travel time, we relied on the network built by the national transportation database center at the Korea Transport Institute. Travel time between 243×243 zones (excluding Jeju island and Ul-leung island) has been calculated under the condition of free flow, and it was used to decide travel time between businesses and origins or between businesses and destinations.

For the sake of discussion on the analysis, we use the following concept. If a certain firm A locates in a material-oriented area, it is highly likely that the firm would locate near a

receiving area. By the same toke, a shipping-oriented firm would locate near a shipping area rather than a receiving area. We categorized the location types of Korean manufacturers into four types, as shown in the following Table 1. For instance, the consumer area location type industry has a high propensity to locate in the metropolitan area whereas the basic resource type industry mainly tends to locate in an industry complex, which ensures the supply of a certain raw material. This study intends to analyze the factors of each location type of four manufacturing industries, illustrated in the below Table 1.

Table 1: Location type of Korean manufacturers

Type	Attributes of location	Industry Details
Consumer area location type industry	- have a strong propensity to locate in metropolitan area	17 textile products, 18 garments and fur products, 19 leather, bags, harness, shoe manufacturing industry, 22 publication, printing and documentation medium manufacturer, 25 rubber and plastic products, 36 furniture and the rest manufacturing industry
Raw material location type industry	- locate in an area that either produces or ensures the supply of raw material - relatively tend to locate evenly across the country	15 groceries, 16 tobacco, 20 lumber and wooden products, 21 pulp, paper and paper products, 26 nonmetallic minerals
Basic resource type industry	- mainly locate in a large-scale coastal industry complex	23 coke petroleum refined products, 24 compound and chemical products, 27 primary metals, 37 recycled resources
Processing industry / Processing and assembling industry	- foot-loose industry that is relatively free from limitations regarding location - have a strong propensity to agglomerate in a certain area	28 assembled metal products, 29 other machine and equipments, 30 machines for business, calculation and accounting, 31 other electronic machine and electronic converter, 32 image, sound, communication equipments, 33 medical treatment, precision and optical instruments, 34 automobiles and trailers, 35 other transportation equipments

Looking at sample data of each location type reveals that the consumer area location type industry received goods 2474 (number of shipment) and shipped 1893 (number of shipment) during 3 days. The consumer area location type industry shows a rather big difference between travel time of receiving (about 47 minutes) and shipping (about 37 minutes).

With regard to the weight variable, weight of received goods is about 500kg heavier than shipped goods, while the variables of number of employee, number of business/area, and population present similar figures of receiving and shipping. The raw material location type industry showed 1769 (number of shipment) of receipts and 964 (number of shipment) of shipments. The time taken for receipt was about 5 minutes longer than shipping time. In addition to, it should be noted that the shipping location has more employees whereas the receiving location is almost twice as big as the shipping location in terms of the variable of number of employee/area.

In case of the sample data of the basic resource type industry, four types of industry displayed 1100 (number of shipment) of shipping and 2752 (number of shipment) of receiving goods. Taking a look at the attributes of main key variables, we get to know that weight at receiving is greater than weight at shipping and about 50 minutes are taken for shipping while 46

minutes are taken for receiving on average. The longer travel time for shipping reveals that the shipping location has more deviation than the receiving location. The processing industry and the processing/assembling industry have 8 types of industry, which shipped 3984 (number of shipment) and received 2727 (number of shipment) during 3 days. Upon considering the attributes of each of four location types, the consumer area location type industry and the raw material location type industry have spent more time on receiving goods than shipping, and vice versa for the basic resource type industry, the processing industry and the processing/assembling industry. The variable of number of business/area has a higher value for all the industries, excluding the consumer area location type industry, at the receiving point than the shipping point. When it comes to the weight variable, the consumer area location type industry and the basic resource type industry show that they deal with heavier goods at the time of receiving goods than shipping, and the result was reversed for the raw material location type industry, the processing industry and the processing/assembling industry. Lastly, all the industries except for the basic resource type industry have the higher number of employee at the shipping location.

In order to examine relation between location and accessibility, we took a look at the average travel time and standard deviation between plants and shipping areas. It takes the longer average travel time from the receiving location to the shipping location than from the shipping location to the receiving location for the consumer area location type industry and the raw material location type industry. The result was reversed for the basic resource type industry, the processing industry and the processing/assembling industry. Meanwhile, the longest travel time from the receiving location to the shipping location appears in the basic resource type industry.

Table 2: Basic statistics of the data for analysis for consumer and raw material types

(unit: person, minute, kg, number of business/㎡, person)

		Mean	Standard deviation	Number of samples
The consumer area location type industry (attributes of receipt)	Number of employee	33.84	53.26	2,474
	Travel time for receiving	46.64	73.01	2,474
	Weight at receiving	3,729.53	7,832.05	2,474
	Number of business/area	745.76	1,181.03	2,474
	Population	319,044	1,476,804	2,474
The consumer area location type industry (attributes of shipment)	Number of employee	34.99	60.93	1,893
	Travel time for receiving	36.39	62.67	1,893
	Weight at shipping	3,211.66	6,588.15	1,893
	Number of business/area	751.07	1,311.79	1,893
	Population	302,910	146,561	1,893
The raw material location type industry (attributes of receipt)	Number of employee	25.12	40.72	1,769
	Travel time for receiving	48.64	70.45	1,769
	Weight at receiving	6,355.32	10,904.68	1,769
	Number of business/area	663.84	1354.01	1,769
	Population	28,2056	147,710	1,769
The raw material location type industry (attributes of shipment)	Number of employee	29.54	34.85	964
	Travel time for receiving	44.93	68.42	964
	Weight at shipping	6,877.65	12,064.81	964
	Number of business/area	359.51	764.21	964
	Population	259,399	135,055	964

Table 3: Basic statistics of the data for analysis for basic and processing industry types

(unit: person, minute, kg, number of business/㎡, person)

		Mean	Standard deviation	Number of samples
The basic resource type industry (attributes of receipt)	Number of employee	28.87	44.56	2,752
	Travel time for receiving	46.81	74.36	2,752
	Weight at receiving	7,498.45	11,461.8	2,752
	Number of business/area	393.32	665.99	2,752
	Population	313,739	141,831	2,752
The basic resource type industry (attributes of shipment)	Number of employee	24.72	36.48	1,100
	Travel time for receiving	49.87	80.01	1,100
	Weight at shipping	6,430.73	11,192.7	1,100
	Number of business/area	345.68	635.97	1,100
	Population	307,425	128,549	1,100
The processing industry and the processing/assembling industry (attributes of receipt)	Number of employee	34.65	57.15	2,627
	Travel time for receiving	40.44	70.65	2,627
	Weight at receiving	3,918.45	8,378.82	2,627
	Number of business/area	495.40	780.99	2,627
	Population	327,361	140,513	2,627
The processing industry and the processing/assembling industry (attributes of shipment)	Number of employee	38.08	57.54	3,984
	Travel time for receiving	44.45	70.48	3,984
	Weight at shipping	4,099.53	8,563.11	3,984
	Number of business/area	389.55	597.79	3,984
	Population	318,154	143,230	3,984

In order to examine relation between location and accessibility, we took a look at the average travel time and standard deviation between plants and shipping areas. It takes the longer average travel time from the receiving location to the shipping location than from the shipping location to the receiving location for the consumer area location type industry and the raw material location type industry. The result was reversed for the basic resource type industry, the processing industry and the processing/assembling industry. Meanwhile, the longest travel time from the receiving location to the shipping location appears in the basic resource type industry. More detailed data descriptions for these data sets are shown in the study of Kim et al. (2007).

Table 4: Average travel time between receiving area, plant, and shipping area

(Unit: minute)

	Receiving area ↔ Plant	Shipping area ↔ Plant	Receiving area ↔ Shipping area
The consumer area location type industry	46.6 (73.0)	36.4 (62.7)	39.0 (61.29)
The raw material location type industry	48.6 (70.44)	44.9 (68.4)	40.6 (57.94)
The basic resource type industry	46.8 (74.4)	49.9 (80.0)	56.5 (67.55)
The processing industry and the processing/assembling industry	40.4 (70.6)	44.4 (70.5)	45.0 (59.93)

Note: The number is travel time and ( ) is standard deviation of the variable.

5. RESULTS AND IMPLICATIONS

5.1 Results

The methodology adopted in this study can be applied to many research purposes through dividing the market by shipping items, employment scale, and industry types. Nevertheless, this study estimated a model with a division into shipping and receiving of four location types of manufacturing industry. The estimate result implies that statistical significance of the model is fairly high for all the four location types of manufacturing industry. A huge difference between the log likelihood value at convergence and the same value at the initial stage satisfies the Chi-square test. The rho square values, which is a standard to judge overall explanatory power of a model, is placed between 0.3 ~ 0.4, thereby signaling the explanatory power of the model is excellent.

The influential factors of location choice are as follows. We explain a receiving model and shipping model simultaneously with a focus on the used variables. Firstly, the influence of travel time should be accounted for. A negative value implies that it takes a form of a negative exponential function in the traditional gravity model. In other words, both of receiving and shipping show a large volume of transportation for a short transportation time and a small volume for a long travel time. Adjusting the result of estimate to each location type, we can see that the absolute value of coefficient for a shipping model is bigger than a receiving model in the consumer area location type industry and the raw material location type industry while the result is reversed in the basic resource type industry and the processing industry and the processing/assembling industry. This indicates that the consumer area location type industry and the raw material location type industry tend to locate with a relatively greater emphasis on the shipping location. However, there is little difference between the receiving and shipping models of all four types of industry. It is interesting, though, to note that market areas are considerably being overlapped with shipping areas and receiving areas as putting together previous Tables 2 and 3 and Table 4 above. We can find that the estimated result in this study is different from that when we attempt to explicate it in conjunction with previous Table 1, in which 23 types of manufacturing industry are categorized into four types. We also find that 23 types of manufacturing industry show the same direction.

In order to test an influence of urbanization economies, we take account of the variables of number of business/area and population. The outcome of estimating the model, including both variables simultaneously, is a positive (+) value for number of business/area and a negative (-) value for population in both shipping and receiving models. This outcome results from a high correlation between the two variables. Table 5 is the outcome of estimating a model for number of business/area only. The positive (+) coefficient means that the more businesses exist in an area, the more firms locate in the area. Switching number of business/area with population gives the positive value, indicating that the bigger the scale of population gets, the more firms locate in the area. Therefore, we can discover that both shipping and receiving show an economy of cohesion in four categories of industry.

Lastly, a mode of transportation and weight of shipment less than 1 ton turn out to be the influential variables. Private trucks over 8 tons shows a negative value while commercial trucks have a positive value. The positive value means that the large trucks over 8 tons are being used for long distance transportation. However, the negative value means they are for short distance transportation. A high labor cost of operating owner-driving trucks leads to the

preference for large trucks. The variable of weight less than 1 ton affects short distance transportation more than long distance transportation.

5.2 Policy Implication

It is possible to obtain the following policy implications from the results of this study. The outcome of analysis indicates the existence of urbanization economies due to a definition effect, which is a function of the variables of number of business/area and populations. Also, we found that receiving area, shipping area, and firms are significantly being overlapped with market areas in metropolitan area. A policy implication from these results is that manufacturing industry in Korea is under the considerable influences of urbanization economies. Of course, it is necessary to forecast the influences of various attribute variables (for instance, providing an incentive through taxation) on the policy of moving firms to small regions, thereby increasing the effectiveness of the policy. However, based on the result of this study, the effectiveness of the policy might be dubious.

6. CONCLUSIONS AND FURTHER RESEARCHES

6.1 Conclusions

Korean government has conducted a nationwide commodity flow survey every five years as a measure to improve national freight transport system since 1996. The most recent one was the third survey in 2005 and inputted into database. This study analyzed the determinants of domestic shipper's location choice, based on the most recent survey data. The used data are as follows in detail. Firstly, the locations of shipping and receiving area, receiving and shipping items, modes of transportation, travel time, and transportation cost for individual shipping and receiving during the recent conducted distribution survey on firms have been picked out for use. Secondly, we collected socioeconomic indicators of shipper's locating areas. Then, we adopted a location choice model and analyzed the determinants of location choice decision from utility function of firm's location choice.

We found that firm's location choice is closely related to market scale (i.e., urbanization economies) and travel time of receiving and shipping and, also, that firms share considerable portions of receiving and shipping areas. An additional finding is that the kinds of trucks for receiving and shipping and the scale of receiving and shipping volume play important role. In order to maximize the utility of shippers in logistics cost, a high labor cost of operating owner-driving trucks leads to the preference for large trucks in long distance trips.

6.2 Further researches

This study took into account of population, number of manufacturers/area, and number of wholesalers and retailers upon the basis of dividing 247 zones. However, if a larger city or a province is used for a dividing unit and divers industries are considered for analysis, it will be possible to obtain more significant results. This kind of analysis accommodating different area units will enable us to grasp the effect of localization economies upon a certain industry. In this case, travel time would have to use the unit of 247 zones and the socioeconomic indicators of a larger city or a province should be dependent on the more aggregate data. This study is confined to domestic shippers when analyzing the determinants of a firm's location choice. However, the attributes of importing and exporting shipments would not be the same as domestic shipments. Imports and exports have no small part of the whole distribution of South Korea. Therefore, it appears to provide a significant motivation for further study.

Lastly, this study analyzed the attributes of location choice based on revealed preference. However, it is also necessary to adopt a stated preference method in order to understand the intention of overseas expansion in pursuit of inexpensive and stable labor supply as well as the intentions to move firms due to traffic congestion and the government's policy of moving firms to regions. In doing so, we will be able to find out the influential factors of firm's decision making under the rapidly changing logistic circumstances during recent years and apply them to establish the future firm location policies of the government.

Table 5: Result of estimates (with considering shipment weight)

		Receiving		Shipping	
The consumer area location type industry	Name of variable	Coefficient	t-value	Coefficient	t-value
	Travel time	-0.0157	-60.12	-0.0175	-57.49
	Log(number of business/area)	0.1318	24.21	0.1370	20.29
	private over 8 tons	-0.0110	-5.66	-0.0100	-2.54
	Commercial over 8 tons	0.0093	27.17	0.0106	21.59
	Less than 1 ton	-0.0048	-4.88	-0.0077	-5.66
	Number of observation	2474		1893	
	Log likelihood value at zero	-22576.24		-15015.40	
	Log likelihood value at convergence	-17516.47		-10803.50	
	Rho square value	0.224		0.280	
The raw material location type industry	Name of variable	Coefficient	t-value	Coefficient	t-value
	Travel time	-0.0175	-64.86	-0.0190	-53.94
	Log(number of business/area)	0.1014	20.55	0.0414	6.12
	private over 8 tons	0.0125	17.88	0.0031	0.33
	Commercial over 8 tons	0.0073	21.38	0.0082	17.68
	Less than 1 ton	-0.0040	-3.10	-0.0087	-3.50
	Number of observation	1769		964	
	Log likelihood value at zero	-26530.09		-15538.63	
	Log likelihood value at convergence	-20474.08		-11578.79	
	Rho square value	0.228		0.254	
The basic resource type industry	Name of variable	Coefficient	t-value	Coefficient	t-value
	Travel time	-0.0148	-74.04	-0.0155	-50.56
	Log(number of business/area)	0.1204	32.19	0.1278	19.75
	private over 8 tons	-0.0028	-5.47	-0.0159	-9.41
	Commercial over 8 tons	0.0053	22.30	0.0109	28.15
	Less than 1 ton	-0.0056	-5.25	-0.0043	-2.64
	Number of observation	2752		1100	
	Log likelihood value at zero	-48406.35		-16628.99	
	Log likelihood value at convergence	-37846.01		-12966.10	
	Rho square value	0.218		0.220	
The processing industry and the processing/assembling industry	Name of variable	Coefficient	t-value	Coefficient	t-value
	Travel time	-0.0183	-64.50	-0.0155	-80.26
	Log(number of business/area)	0.1956	34.68	0.1784	42.21
	private over 8 tons	-0.0105	-7.67	-0.0022	-3.47
	Commercial over 8 tons	0.0066	17.48	0.0103	41.54
	Less than 1 ton	0.0010	1.28	-0.0032	-4.72
	Number of observation	2627		3984	
	Log likelihood value at zero	-25134.49		-39672.72	
	Log likelihood value at convergence	-16891.71		-30189.72	
	Rho square value	0.328		0.239	

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