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Retail Outlet Clustering of the Imported Automobile Distributors in Korea*

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Abstract

Purpose – This paper aims to analyze the distinct pattern of clustering of imported automobile distributors and provide evidence for the phenomenon using Korean data.

Research design, data, and methodology – In this paper, we use data from Korea Automobile Importers & Distributors Association of 23 foreign automobile brands to evaluate the degree of concentration of showrooms using locational Gini index. We identify possible causes for the high level of clustering from two perspectives; 1) on the distributors' side and 2) on the customers' side.

Results – We find a very strong locational concentration of imported automobile showrooms within close vicinity in the major cities and districts in Korea. Locational Gini coefficients are 0.1024 at the national level, 0.1836~0.3763 at city level, and 0.3941~0.4311 at district level on a [0,0.5] scale.

Conclusions – Luxury foreign automobile customers tend to shop extensively around multiple brands prior to their ideal model selection. Accordingly, the imported automobile distributors cluster together close to their direct competitors in order to give a good comparison opportunity for the potential customers. This will maximize the probability of the visits of potential customers and lead to successful sales performance.

Keywords: Imported Automobile Distributors, Locational Gini Coefficient, Optimal Retail Location, Clustering, Conspicuous Consumption.

JEL Classifications: D12, L62, L81.

1. Introduction

We observe a dozen of showrooms of luxury imported automobiles along Banpo-daero near Seocho subway station in Seocho-dong, Seoul right below the Seoul Arts Center. More sporty Porsche is located in the less crowded nearby Nambu Circular way. You can easily walk around the area to visit Mercedes-Benz, Audi, Lincoln, Jaguar, or Volvo showrooms in the vicinity. This clustering is also found along Dosan-daero near Apgujeong subway station and Yeongdong-daero near Samseong subway station in Gangnam area. This extraordinary locational concentration phenomenon of closely competing suppliers extends to other major cities in Korea such as Busan, Daegu, Incheon, Gwangju, and Daejeon. Automobiles are now nearly a necessity in most developed countries including Korea. Imported automobiles are very popular nowadays in Korea but are substantially more expensive than domestic brands. Hence, foreign brand automobiles are rather considered a luxury good. Owning a high-end domestic car or a foreign brand is perceived as conspicuous consumption. Not everyone who wishes to own a foreign brand car can have one. Automobiles are also durable goods. Average holding time of a car by a private owner is more than 5 years and often 10 years or longer both for domestic and foreign brands.

There are numerous research works in the retail location decision. Converse (1949) and Huff (1963, 1964) adopt gravitation theory. Berry and Garrison (1958) adopt a hierarchical class system. Ghosh and Craig (1986) introduce a modified covering model employing both distance and non-distance factors. For our study in deciding the factors of

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locating the showrooms of imported automobiles, distance factors alone cannot explain the prevalent clustering within a narrow area in most major cities. There must be other important factors that affect the patronage of imported automobile consumers apart from the distance from the location of customers to the distributors. Previous research suggest as non-distance factors population or number of consumers (Converse, 1949; Berry & Garrison, 1958; Huff, 1963, 1964; Ghosh & Craig, 1986; Gauri, Pauler & Trivedi, 2009), number of stores, products or services (Berry & Garrison, 1958; Huff, 1963, 1964), number/existence of competing trade centers (Converse, 1949; Huff, 1964; Ghosh & Craig, 1986), size of trading area often as a substitute for population (Huff, 1963, 1964; Gauri et al., 2009), traveling time often as a substitute for distance (Huff, 1963, 1964; Ghosh & Craig, 1986), retail structure (Pacione, 1974), annual fee, turnaround time, and operating hours especially for services (Ghosh & Craig, 1986), and choice/comparison opportunity (Lewis & Traill, 1968; Jensen-Butler, 1972). Gauri et al. (2009) analyze the grocery retail shop performance using block groups rather than individual stores as the unit of analysis. Drezner, Drezner, and Kalczynski (2011, 2012) adopt cover models to evaluate the potential market share increase by improving existing facilities or creating new facilities into the existing facilities of the firm's own and the competitors. Drezner et al. (2011, 2012) solve the generalized binary linear fractional programing problem using a branch and bound approach and also with several heuristic algorithms including greedy heuristic, ascent algorithm, and tabu search. Drezner et al. (2011, 2012) recognize the importance of attractiveness of the facilities and not just the distance from a demand point to the facilities. Nariu and Torii (2008) demonstrate an example of automobile manufacturer-distributor relationship in a study of a long-term relationship as transaction-specific assets, emphasizing the differences between Japan and the United States. Nariu and Torii (2008, pp.91-94) show that the lower the demand uncertainty is and/or the easier the adjustments of production and inventory are, the more beneficial and hence more likely the long-term relationships are.

We do not have much research work on the automobile distribution strategy, especially for Korea. Meanwhile, Krugman (2009, pp.564-565) clearly emphasizes the incentive to locate close to a large demand. We will confirm this argument using empirical data on imported automobile distributors in Korea and show the high concentration ratio of the showrooms in the affluent areas in major cities with large potential customers in the hinterland.

This paper is comprised of as follows. Section 2 reviews current literature on the subject. Section 3 illustrates the geographical distribution of imported automobile showrooms and evaluates locational Gini coefficients at various levels in Korea. Section 4 analyzes the possible causes of clustering. Section 5 concludes with a summary.

2. Literature Review

Quan and Youn (2016) review major theories on the consumer's store-choice models focusing on commercial sphere analysis theories. They compare the main analytic methods and advantages/disadvantages of the central place theory, law of retail gravitation, modified law of retail gravitation, probability model, modified probability model of the Japanese ministry of international trade and industry (MITI), multiplicative competitive interaction model, multinomial logit model, and cognitive-behavioral model. Converse (1949) illustrates several formulas about the law of retail gravitation. The proportion of the trade from the intermediate city to a town is proportional to the population ratio of the town with respect to its competing town and inversely proportional to the square of the ratio of distances of the two towns to the intermediate city (formula No.1). Converse (1949) also shows the breaking point as a distance from the home town, for the boundaries of a trading center's trade area, is proportional to the distance between the home town and a competing town and is inversely proportional to the square root of one plus the ratio of population of the competing town and the home town (formula No.2). We can see that formula No.2 of Converse (1949) can be derived from formula No.1 of Converse (1949). When applying to a very large difference in populations between two areas such as small towns in Northern Illinois and Chicago, Converse (1949, pp.383-384) suggests adopting cube instead of square of the ratio of distances in the division of trade and third square root instead of square root in the evaluation of the breaking point distance. This modification is to reduce the effect of the population difference between a small town and a metropolitan area such as Chicago because a very large city may have traffic congestion and difficulties in finding parking area.

Berry and Garrison (1958) study the functional bases of the central place hierarchy using data on 33 small towns in Snohomish County in Washington, US. Berry and Garrison (1958, p.147) classified the towns into three groups A (hamlets), B (villages), and C (towns) depending on the number of central functions each town has. Berry and Garrison (1958, pp.149-151) also divide the central functions into two categories; 1) 52 variates for which numbers of stores performing these functions vary from place to place and 2) 15 attributes for which central places either possess a unit performing this function or do not possess such a unit. Berry and Garrison (1958, pp.153-154) confirm the existence of the hierarchical system for Snohomish County. Huff (1963) points out the limitations of the retail gravity models and proposes a probabilistic model of shopping center trade areas. Huff (1963, p.85) selects two most important variables that affect the consumer's choice of shopping centers; 1) the number of items of the kind a

consumer desires that are provided by the shopping centers, and 2) the travel time from a consumer to the shopping centers. Huff (1963) suggests to substitute the square footage of selling space for the number of items. Travel time to the shopping centers work as an opportunity cost for the consumers. On the provision of estimating a parameter empirically, Huff (1963, p.86) proposes a model of probability of a consumer at a given point traveling to a certain shopping center for a given product. Huff (1963, p.87) then derives equiprobability contours circumscribing a shopping center as a series of zonal probability contours radiating from the shopping center. Huff (1963) also mentions the importance of the roles of number of consumers in each statistical unit, annual budget of the consumers, and number of trips made by the consumers in order to get the expected number of visits and the expected sales volume. Huff (1964) defines a trading area with an alternative method using probabilistic model of consumers choosing a particular shopping center which is either a single firm or an agglomeration of firms. Huff (1964, p.37) also proposes to estimate the exponential parameter of distances for individual products or services rather than arbitrarily assuming a value of 2. Huff (1964, p.37) suggests 2.723 for furniture and 3.191 for clothing as the value of the parameter with his pilot study. As in Huff (1963), Huff (1964, Figure 3) illustrates a sample retail trading area portrayed in terms of probability contours. Su and Youn (2011) utilize Huff (1964) gravity model to predict retail sales of local markets in a mid-sized city of Jinan, China. Su, and Youn (2011) find that the predicted retail sales of shopping malls are greater than those of department stores, super markets, and home appliance stores.

Lakshmanan and Hansen (1965) work on a retail market potential for the city of Baltimore, US. Lakshmanan and Hansen (1965) apply gravity models to predict the prospective growth of shopping goods floor space by 1970 and 1980 in the region. Lewis and Traill (1968) study the shopping potential and the demand for shops. Lewis and Traill (1968, p.321) emphasize the importance of choice opportunities as an attractive factor for customers especially for a durable, luxury good such as furniture rather than groceries. Lewis and Traill (1968, pp.324-325) also point out the problems of gravity models and assert that gravity models should be used to supplement quantitative analysis based on the operational forces and actual decision procedures of the consumers. Jensen-Butler (1972) criticizes the gravity model of Lakshmanan and Hansen (1965) and Huff (1963, 1964) with various potential theoretical and operational problems. Jensen-Butler (1972, p.70, p.72) mentions as theoretical problems the lack of theoretical base, neglecting the effect of socio-economic factors, and "the fact that regular slopes do not seem to be so common over short distances from the origin, hence the tendency of the model to over-predict short distance interactions close to centers." As operational problems, Jensen-Butler (1972, pp.73-74) points out the difficulties in choosing and measuring variables such as shopping center attraction indices, distance, and absence of ideal test of 'closeness of fit,' and the difficulty of identifying the zone centroids alongside other problems. Nevertheless, Jensen-Butler (1972, p.77) also proposes a few possibilities of probable refinements and developments of the gravity model. Pacione (1974) demonstrates the effectiveness of the basic gravity framework in explaining the attraction factor of shopping behavior provided the key variables are carefully selected. Pacione (1974, p.280) demonstrates that distance between home and shopping town, retail structure measured by the number of supermarkets, department stores, and national banks, and number of retail establishments in the intervening shopping centers are the most highly ranked variables in reducing the variation in the dependent variable which is the frequency of shopping. Ghosh and Craig (1986) show a conjoint analysis approach to determine optimal locations for new services. Applying the model to a network of service centers for repair and maintenance of microcomputers of a major computer manufacturer in the planning area with 164 towns, Ghosh and Craig (1986) find the optimal number of 5 service centers alongside the optimal locations that produce the highest expected net present value of aggregate profits. Increasing one more center will add substantial revenue but also increases the cost greatly and the net profit will fall.

Gauri et al. (2009) adopt block group level analysis to study market shares and performances for large chain grocery stores in the Northeast region of the US. Gauri et al. (2009, pp.511-512) assert that their market strength model at the block group level can be used to benchmark sales performance, market share of stores, and the intensity of competition in different block groups. Drezner et al. (2011, 2012) utilize cover models to evaluate the potential market share increase by improving existing facilities or creating new facilities with discrete number of demand points. Drezner et al. (2011) assume a given radius of influence while Drezner et al. (2012) propose a cover model with a variable radius of influence and find that joint case performs better than individual cases of improving current facilities or constructing new facilities. Drezner et al. (2012) compare the performance and running time of a number of algorithms in simulations to find optimal number of additional facilities and locations. Drezner et al. (2012) solve the generalized binary linear fractional programing problem using a branch and bound approach and also with several heuristic algorithms including greedy heuristic, ascent algorithm, and tabu search. Drezner et al. (2012) recognize the importance of attractiveness of the facilities and not just the distance from a demand point to the facilities. Kireyeva and Nurlanova (2014) study the formation of innovative clusters in Kazakhstan using GRP (gross regional product) and R&D activities. Kireyeva and Nurlanova (2014) adopt coefficient of localization to evaluate the potential location of cluster

formation. Kireyeva (2016) illustrates three main approaches for the formation of IT clusters; 1) core-periphery theory of spatial development, 2) industrial and regional theory, and 3) theory of new regional development. Kireyeva (2016) suggests to develop IT clusters in Kazakhstan as a main innovative platform for startup companies to accelerate the creation and development of new products and services in the country.

Krugman (1991, pp.5-6) emphasizes the striking feature of concentration in the geography of economic activity and treat this as evidence of increasing returns with the necessity of modelling imperfect competition. Krugman (1991, pp.9-10) gives an example of "the concentration of most U.S. manufacture of wind musical instruments in the tiny town of Elkhart, Indiana," and indicates a decisive role of history in determining the geography of real economies. Krugman (1991, pp.14-15) also mentions the interaction of increasing returns, transportation costs, and demand, leading to geographic concentration. Krugman (2009, pp.564-565) sends a clear message about the incentive to locate close to a large demand: "Increasing returns provide an incentive to concentrate production of any one product in a single location; given this incentive to concentrate, transport costs are minimized by choosing a location close to the largest market, and this location then exports to other markets." Although this statement refers mainly to interregional and international trade, it also has important implications for the concentration of distribution centers of luxury goods which carry a large fixed cost of maintaining a sales outlet. To paraphrase Krugman (2009)'s argument, 'for a luxury good which requires a substantial fixed investment to open a sales outlet, we need to concentrate distribution facilities in only few locations. Traveling costs of potential customers are minimized by choosing a location close to the largest demand, and this sales outlet will serve the wider market.' Potluri, Ansari, Challa, and Puttam (2014) analyze the conspicuous consumption behavior and identify the differences between Aryan (representative of northern India) and Dravidian (representative of southern India) population. Using survey data from 200 respondents, 100 each from Aryan and Dravidian population, Potluri et al. (2014) find distinctive features of conspicuous consumption of the two cultures; Aryan culture places more weight on fashion designer wear and high-end cars while Dravidian culture more on diamond & gold jewelry as Veblen (1899) products. Sung and Woo (2017) analyze the polarizing trend in Korean agriculture using size-weighted quantiles and normalized Gini coefficients for 2000-2015 period. Sung and Woo (2017) show that the farmland distribution of crops became more skewed and polarized while the livestock farms became larger in scale and more evenly distributed in Korea during the period.

As for the automobile distribution decision studies, we do not have much research on Korean market so far. We have a few research works on foreign markets. Nariu and Torii (2008) analyze the factors that affect long-term relationship between manufacturers and their distributors with examples of automobile distributors in Japan and the United States and also of other industries in Japan. Nariu and Torii (2008) emphasize the distinct phenomenon of prevalent long-term relationships of manufacturer-distributor especially in automobile industry and also in wholesale systems in Japan. Nariu and Torii (2008, pp.103-104) emphasize that because customers do some shopping for search goods before they decide what to buy, "manufacturers are very concerned about the level of knowledge salespersons have about sales technology and products." Nariu and Torii (2008, p.111) also point out the difference between keiretsu and long-term relations such that "keiretsu relations are common where there is large fluctuation in demand, while long-term relationships prevail in wholesale divisions where there is little risk." Vasiliauskas, Vilkelis, Zinkevičiūte and Batarliene (2010) propose a multi-criteria evaluation method for the European automobile distribution channels. Vasiliauskas et al. (2010, pp.363-365) develop a three-level system of evaluation; 1) an evaluation which integrates a complex criterion on the top, 2) integrated groups of criteria in four categories, and 3) initial evaluation criteria such as transport time and transport distance. Vasiliauskas et al. (2010, p.365) assert that multi-criteria evaluation does not restrict the number of evaluation alternatives or evaluation criteria and so is suitable for selection of distribution channels.

We summarize the literature on retail location studies in <Table 1>.

<Table 1> Summary of literature on retail locations

Researchers	Main research subjects
Quan & Youn (2016)	Location theories methodology Commercial sphere analysis
Converse (1949) Lakshmanan & Hansen (1965)	Retail gravity models
Lewis & Traill (1968) Pacione (1974)	Retail gravity models + Choice opportunities/attraction factors
Jensen-Butler (1972)	Criticism on retail gravity models
Berry & Garrison (1958)	Central place hierarchy
Huff (1963, 1964) Su & Youn (2011)	Probabilistic model of shopping centers
Ghosh & Craig (1986)	Conjoint analysis approach
Krugman (1991, 2009)	Increasing returns Locational Gini
Sung & Woo (2017)	Size-weighted quantiles Normalized Gini coefficients
Gauri et al. (2009)	Block group level analysis
Drezner et al. (2011, 2012)	Branch and bound approach Heuristic algorithms
Kireyeva & Nurlanova (2014) Kireyeva (2016)	Formation of innovative clusters
Nariu & Torii (2008) Vasiliauskas et al. (2010)	Automobile distribution
Veblen (1899) Potluri et al. (2014)	Luxury brand Conspicuous consumption

3. Imported Automobile Showrooms Clustering

3.1. Basic Statistics

We mainly use data from the Korea Automobile Importers & Distributors Association (KAIDA, https://www.kaida.co.kr/en/index.do?language=en) and Korean Ministry of the Interior and Safety (MOIS, http://www.mois.go.kr/frt/sub/a05/totStat/screen.do). <Table 2> shows the market share of domestic and imported automobiles in Korea since 1987. Since its inception in 1987 of the official import of foreign automobiles in Korea, the numbers and market share of imported automobiles have grown dramatically to 233,088 cars and 15.23% in 2017.

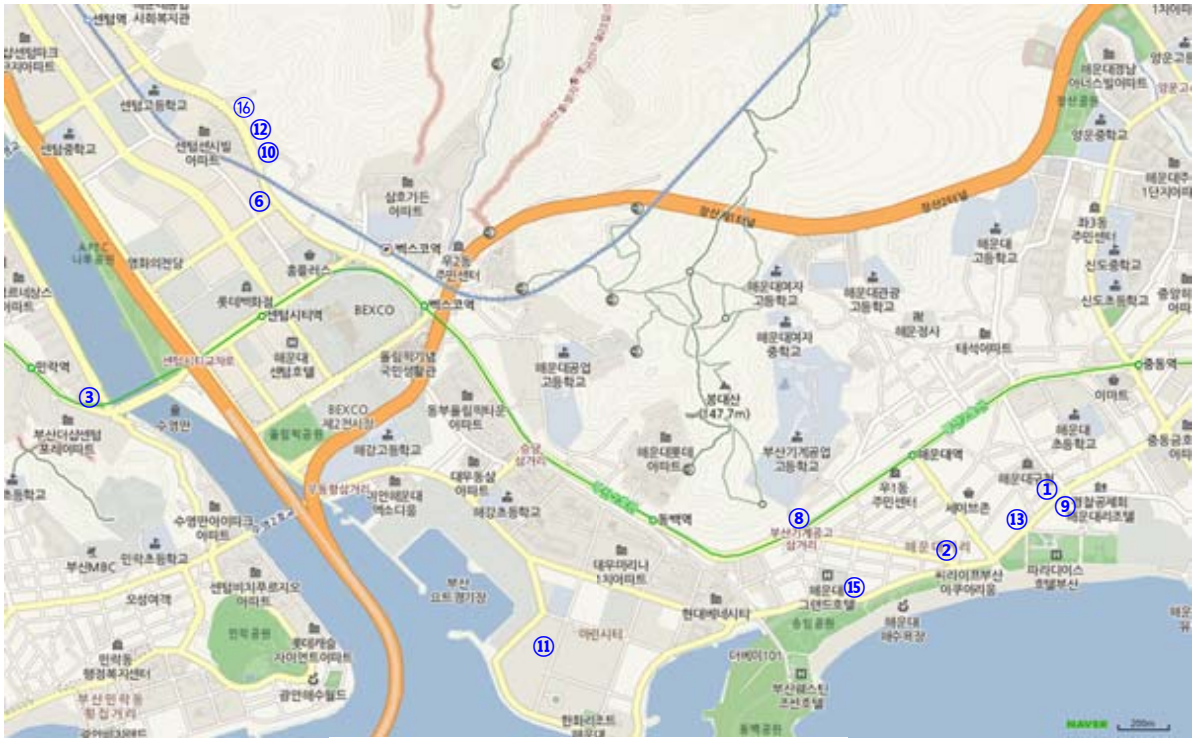
We show the regional distribution of imported automobile showrooms for the members of KAIDA in <Table 3>. High-end brands of Bentley and Rolls-Royce have their own subsidiaries and showrooms in Korea but are not the members of KAIDA. There are 23 brands in KAIDA and they have 516 showrooms in 16 regions of major cities and provinces across Korea(Sejong data is merged into Chungnam in <Table 3> BMW has 53 showrooms and Mercedes-Benz has 46 and each one of 23 brands has 22 showrooms nationwide on average. Across regions, Seoul hosts 149 showrooms, Gyeonggi 107, and Busan 38 showrooms. Several brands share common showrooms in the same space but we count them separately in this research. Chrysler, Fiat, and Jeep usually share their showrooms and Citroen and Peugeot, both from France, share their showrooms as well. Jaguar, Land Rover, and Maserati also share their showrooms in some areas. Further examples are the pair of BMW and Mini, pair of Ford and Lincoln, and pair of Mercedes-Benz and Porsche, in Haeundae and Suyeong districts in Busan.

<Table 2> Numbers of domestic and imported automobiles and share of imported cars in Korea

Year	Domestic			Imported	
	Production	Export	Sales (A)	Sales (B)	Share = B/(A+B)
1987	793,125	535,231	249,448	10	0.004%
1988	872,074	564,511	323,561	263	0.08%
1989	871,898	347,273	514,484	1,293	0.25%
1990	986,751	339,672	626,126	2,325	0.37%
1991	1,158,245	378,600	772,548	1,736	0.22%
1992	1,306,752	427,515	876,262	1,817	0.21%
1993	1,592,669	572,402	1,037,488	1,987	0.19%
1994	1,805,895	648,385	1,140,399	3,865	0.34%
1995	2,003,146	856,368	1,149,409	6,921	0.60%
1996	2,264,709	1,056,400	1,238,940	10,315	0.83%
1997	2,308,476	1,155,893	1,151,287	8,136	0.70%
1998	1,625,125	1,228,144	568,063	2,075	0.36%
1999	2,361,735	1,390,071	910,725	2,401	0.26%
2000	2,602,008	1,544,473	1,057,620	4,414	0.42%
2001	2,471,444	1,397,015	1,065,161	7,747	0.72%
2002	2,651,273	1,413,723	1,225,210	16,119	1.30%
2003	2,767,716	1,720,124	1,001,874	19,481	1.91%
2004	3,122,600	2,276,576	857,977	23,345	2.65%
2005	3,357,094	2,456,525	913,550	30,901	3.27%
2006	3,489,136	2,530,180	935,681	40,530	4.15%
2007	3,723,482	2,718,548	986,416	53,390	5.13%
2008	3,450,478	2,508,911	958,854	61,648	6.04%
2009	3,158,417	2,007,230	1,174,743	60,993	4.94%
2010	3,866,206	2,610,949	1,217,764	90,562	6.92%
2011	4,221,617	2,980,659	1,211,284	105,037	7.98%
2012	4,167,089	3,012,584	1,175,891	130,858	10.01%
2013	4,122,604	2,948,352	1,137,027	156,497	12.10%
2014	4,124,116	2,919,781	1,213,943	196,359	13.92%
2015	4,135,108	2,821,832	1,326,776	243,900	15.53%
2016	3,859,991	2,506,505	1,343,379	225,279	14.36%
2017	3,735,399	2,415,948	1,296,904	233,088	15.23%

Source: KAIDA, https://www.kaida.co.kr/en/index.do?language=en.

(a) Seocho, Seoul (n=22 brands, March 2018)



(b) Haeundae, Busan (n=16 brands, March 2018)

<Figure 1> Imported automobile showrooms distribution in Seocho and Haeundae districts, (Map from Naver.com)

<Table 3> Number of showrooms across brands and regions (2018 March)

Brand \ Region	Seoul	Busan	Daegu	Incheon	Gwangju	Daejeon	Ulsan	Gyeonggi	Gangwon	Chungbuk	Chungnam	Jeonbuk	Jeonnam	Gyeongbuk	Gyeongnam	Jeju	Sub-total
Audi	12	2	1	1	1	1	1	6	1	1	1	1	2	0	2	1	34
BMW	17	3	2	2	2	1	1	11	1	1	2	2	2	2	3	1	53
Cadillac	3	1	1	0	1	1	0	3	1	0	0	1	0	0	0	0	12
Chrysler	4	1	1	0	1	0	1	3	1	1	1	1	0	1	1	1	18
Citroen	3	0	0	0	1	1	0	4	0	0	0	1	0	0	0	1	11
Fiat	3	1	1	0	1	0	0	3	0	0	0	0	0	0	1	0	10
Ford	11	2	1	1	1	1	1	6	3	1	1	1	0	1	1	1	33
Honda	3	1	1	1	1	1	0	2	0	0	0	0	0	0	0	0	10
Infiniti	3	1	1	0	1	1	0	2	1	0	0	1	0	0	0	0	11
Jaguar	7	3	1	2	1	1	0	4	1	0	0	1	1	1	1	1	25
Jeep	4	1	1	0	1	0	1	3	1	1	1	1	0	1	1	1	18
Land Rover	7	3	1	2	1	1	0	4	1	0	0	1	1	1	1	1	25
Lexus	7	1	1	1	1	1	0	5	1	0	1	1	0	1	2	0	23
Lincoln	11	2	1	1	1	1	1	6	3	1	1	1	0	1	1	1	33
Maserati	4	1	1	0	1	1	0	2	0	0	0	0	0	0	0	0	10
Mercedes-Benz	12	5	2	2	1	2	1	10	1	1	1	2	1	1	3	1	46
MINI	6	1	1	2	1	1	1	6	0	0	0	0	0	0	1	1	21
Nissan	3	1	2	2	1	1	0	5	1	1	0	1	0	1	1	1	20
Peugeot	4	0	1	1	1	1	0	5	1	1	1	1	1	0	1	1	20
Porsche	3	1	1	1	1	1	0	3	0	0	0	0	0	0	0	0	11
Toyota	6	2	1	1	1	1	0	4	0	0	0	1	0	2	1	0	20
Volkswagen	10	3	1	1	1	2	0	6	2	1	1	1	0	1	1	1	32
Volvo	6	2	1	1	1	1	0	4	1	0	1	1	0	0	1	0	20
Sub-total	149	38	24	22	24	22	8	107	21	10	12	20	8	14	23	14	516

Source: KAIDA, https://www.kaida.co.kr/en/index.do?language=en.

3.2. Illustration of Showrooms Distribution

We show here a couple of examples as an illustration of actual distribution of imported automobile showrooms in Korea. <Figure 1> shows the distribution of showrooms in (a) Seocho, and (b) Haeundae districts as of March 2018. We use Naver map in <Figure 1> (http://map.naver.com/) as a background. Corresponding brand names indicated by serial numbers in the map are given in <Table 4>.

<Table 4> Brand names of imported automobile showrooms in Seocho and Haeundae districts

No.	Seocho	Haeundae
1	AUDI	AUDI
2	BMW	BMW
3	Cadillac (on the move to [③])	Cadillac
4	Chrysler/Fiat/Jeep	(Chrysler/Fiat/Jeep in Suyeong)*
5	Citroen/Peugeot	-
6	Ford/Lincoln	Ford/Lincoln
7	Honda	(Honda in Suyeong)*
8	Infiniti	Infiniti
9	Jaguar/Land Rover/Maserati	Jaguar/Land Rover
10	Lexus	Lexus/Toyota
11	Mercedes-Benz	Maserati
12	Mini	Mercedes-Benz/Porsche
13	Nissan	Mini
14	Toyota	(Nissan in Suyeong)*
15	Volkswagen	Volkswagen
16	Volvo	Volvo
17	Porsche (2km west of Chrysler)	-

* Suyeong is about 5km west of Haeundae.
Source: KAIDA.

3.3. Locational Gini Coefficients

In order to get a clear evidence of concentration of the imported automobile showrooms, we adapt 'locational Gini coefficients' as explained by Krugman (1991, pp.54-59) with appropriate modifications. Originally, Krugman (1991, pp.55-56) applied a locational Gini curve for an industry as follows. First, for each of the locational units, Krugman (1991) calculates both the share of total national manufacturing employment and the share of national employment in the industry. Then Krugman (1991) ranks the units by the ratio of these two numbers. Finally, Krugman (1991) runs down the ranking, keeping a cumulative total of both the sum of total employment share and the sum of employment share in the industry. So Krugman (1991, p.56) could draw an index of localization; the area between the curve and the 45-degree line. An industry that is not localized at all would have an index of 0 while one that is concentrated almost entirely in a region with small overall employment would have an index close to 0.5.

We modify the locational Gini index of Krugman (1991) as below. Each showroom has only a few staff members and shares very common features with their peers; 1) two or three floors with main display space, 2) meeting tables with clients, 3) one or two small offices, and 4) a moderate parking lot in front of or at the rear of the premises. Hence, we treat each showroom as an identical unit. We draw three locational Gini curves; 1) for 16 major cities and provinces as regions, with shares of population and shares of number of showrooms in each region, 2) for each of 6 major cities of Seoul, Busan, Daegu, Incheon, Gwangju, and Daejeon, with shares of population and shares of number of showrooms in each district ('gu' in Korean) within a city, and 3) for 4 districts of Seoul and Busan, with shares of population (and also of area in case of Seoul) and shares of number of showrooms at village ('dong' in Korean) level.

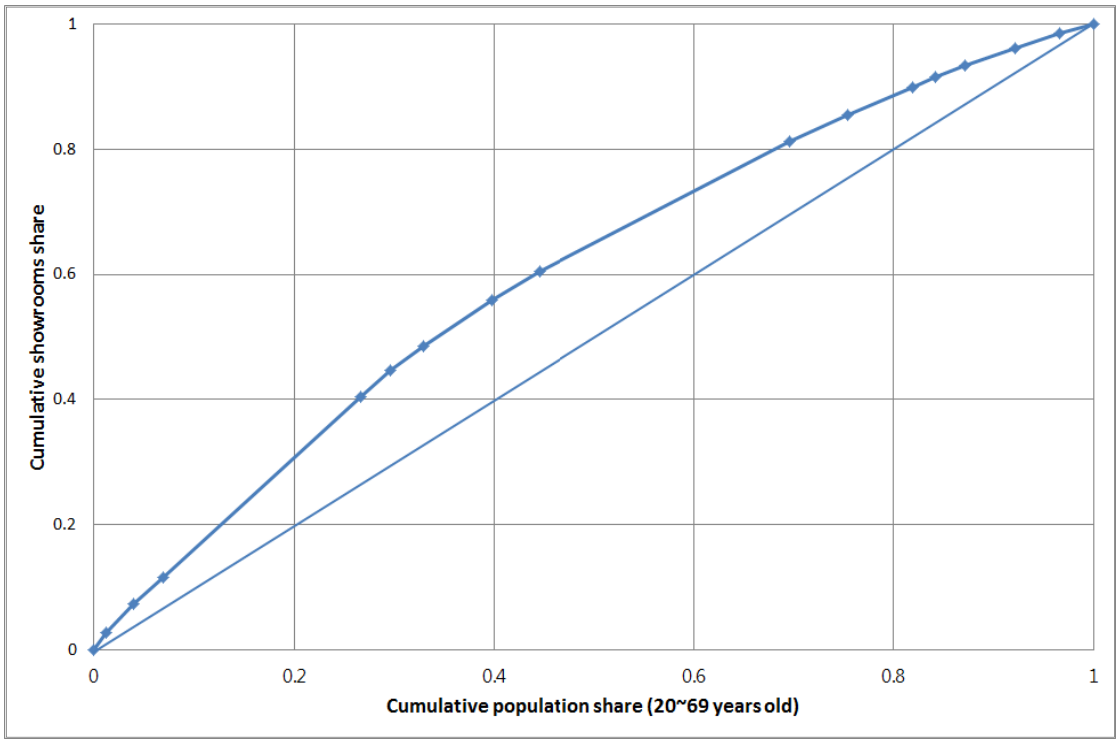
We find regional units and population data from the Ministry of the Interior and Safety (MOIS, http://www.mois.go.kr/ frt/sub/a05/totStat/screen.do). We show population in 17 major cities and provinces of Korea as of March 2018 in <Table 5>. Sejong data is merged into Chungnam in the locational Gini evaluation.

We show in <Figure 2> locational Gini curve at the national level using data for population of 20~69 years old for 16 major cities and provinces of Korea, who are supposed to be the absolute majority of imported automobile buyers. The diagonal is a 45-degree line. We can calculate the Gini coefficient of <Figure 2> to be 0.1024 using a spreadsheet such as Excel.

<Table 5> Population in 17 major cities and provinces of Korea (March 2018)

Regions	Total population	Population (20~69 years old)	Number of households	People per household
Nation	51,784,669	37,056,194	21,745,437	2.38
Seoul	9,838,892	7,325,755	4,237,610	2.32
Busan	3,463,103	2,528,852	1,471,933	2.35
Daegu	2,472,175	1,783,471	1,010,995	2.45
Incheon	2,951,442	2,160,547	1,195,636	2.47
Gwangju	1,462,033	1,027,435	595,079	2.46
Daejeon	1,497,572	1,077,234	617,219	2.43
Ulsan	1,162,074	853,196	459,655	2.53
Sejong	291,182	196,790	113,853	2.56
Gyeonggi	12,925,761	9,288,246	5,176,163	2.50
Gangwon	1,546,152	1,070,879	701,246	2.20
Chungbuk	1,594,708	1,113,636	695,818	2.29
Chungnam	2,119,468	1,447,298	928,944	2.28
Jeonbuk	1,848,066	1,248,841	800,209	2.31
Jeonnam	1,890,423	1,251,689	853,259	2.22
Gyeonbuk	2,683,661	1,856,210	1,195,846	2.24
Gyeongnam	3,377,516	2,371,137	1,411,062	2.39
Jeju	660,441	454,978	280,910	2.35

Source: Ministry of the Interior and Safety.



<Figure 2> National locational Gini curve for 16 major cities and provinces (20~69 years old)

Next, we draw regional Gini curves for 6 major cities. <Figure 3> shows six panels of regional Gini curves for Seoul, Busan, Daegu, Incheon, Gwangju, and Daejeon. The x-axis variable is cumulative population share (CPS) and the y-axis variable is cumulative showrooms share (CSS). Each panel except for Daejeon shows much larger Gini coefficients compared to the national Gini curve of <Figure 2>. Gini coefficients for the six cities are shown in <Table 6>. They are all well above 0.3 except for Daejeon.

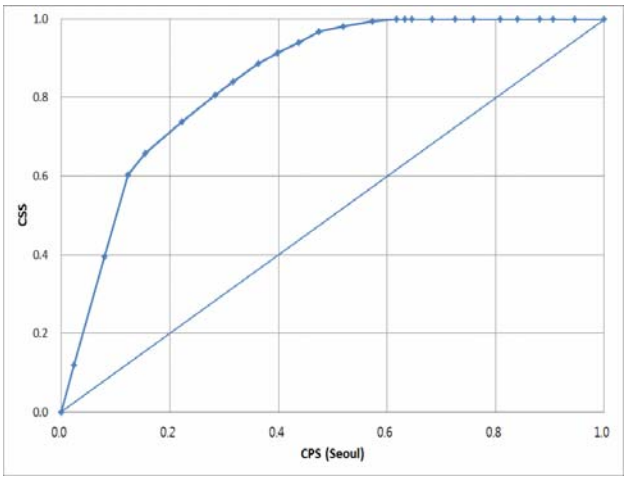
<Table 6> Regional locational Gini coefficients for six major cities

City	Seoul	Busan	Daegu	Incheon	Gwangju	Daejeon
Gini coefficient	0.3463	0.3647	0.3763	0.3293	0.3400	0.1836

Now, we show district Gini curves for two main clustering of Seoul and two of Busan, respectively. There are 22 villages ('dong' in Korean) in Gangnam-gu and 21 villages (three of them are administered by other villages, so there are 18 distinct units) in Seocho-gu. There are 18 villages in Haeundae-gu and 10 villages in Suyeong-gu in Busan. As we do not have data of population for disaggregated age groups at village (dong) level, we employ total population for district Gini curves. We apply two different Gini curves; 1) according to village population, and 2) according to village areas. Due to restrictions to data availability, we show both population-based and area-based Gini curves for Gangnam-gu and Seocho-gu, but only population-based Gini curve for Haeundae-gu and Suyeong-gu. The district locational Gini curves are shown in <Figure 4>. CAS denotes cumulative area share. District Gini coefficients for the four districts are shown in <Table 7>. We can see again in <Table 7> that the Gini coefficients are very high and are not much different between population-based and area-based Gini coefficients. They are even higher than the regional Gini coefficients of <Table 6>.

<Table 7> District locational Gini coefficients for four major districts

City	Seoul				Busan	
District	Gangnam		Seocho		Haeundae	Suyeong
Criterion	Population	Area	Population	Area	Population	Population
Gini coefficient	0.3974	0.4044	0.4239	0.4311	0.3941	0.4099



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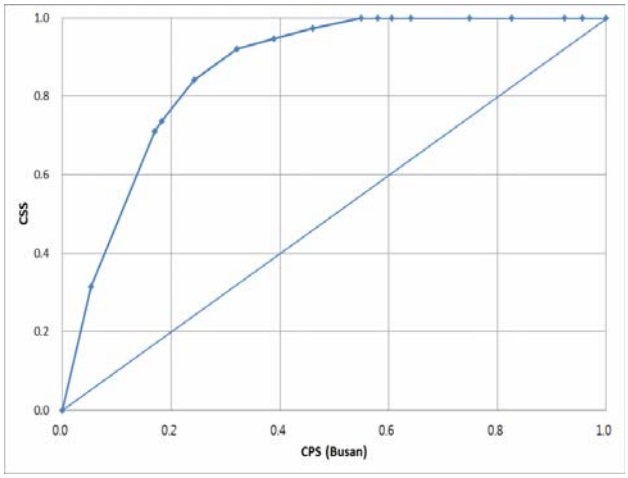

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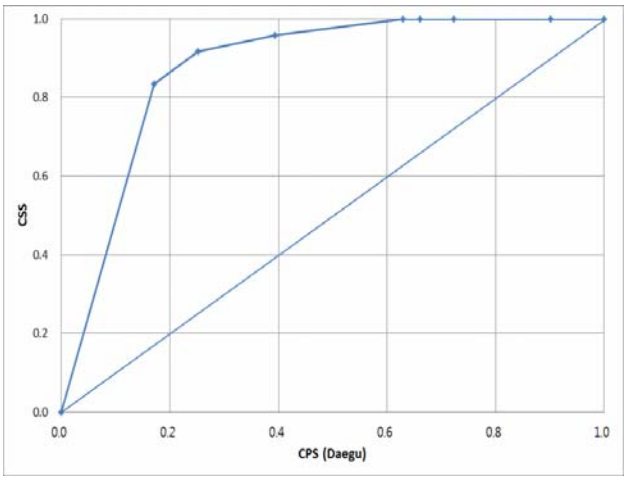

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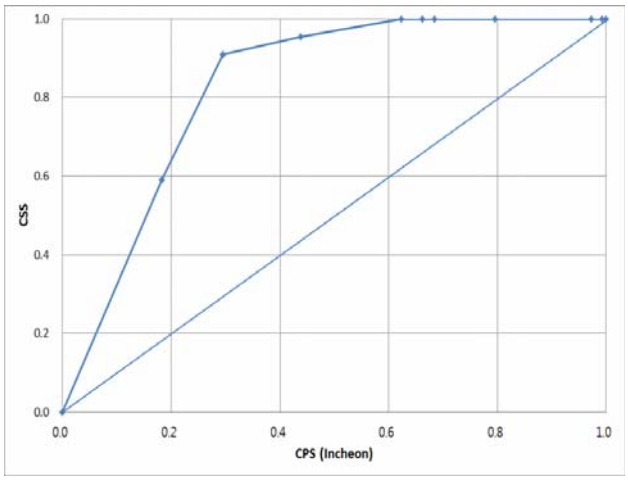

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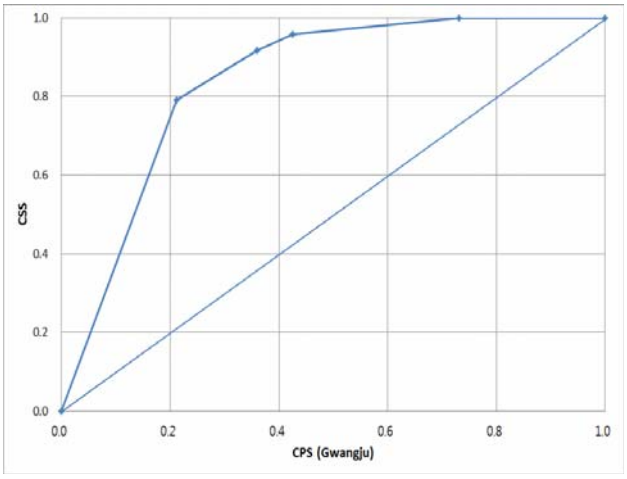

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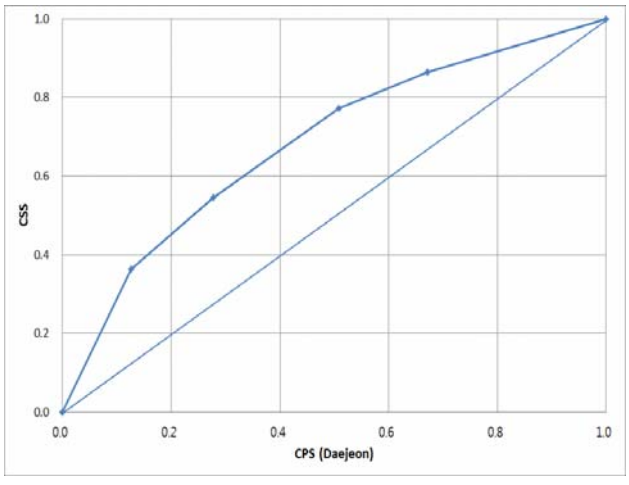

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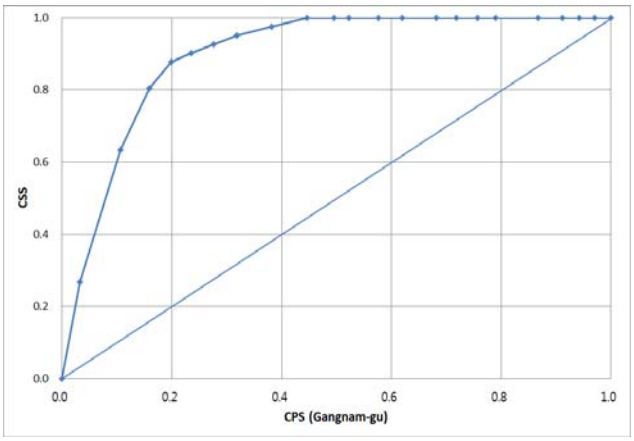
<Figure 3> Regional locational Gini curves for 6 major cities (20~69 years old)



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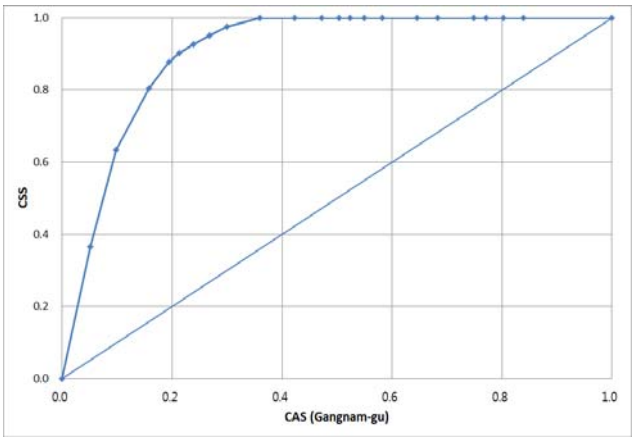

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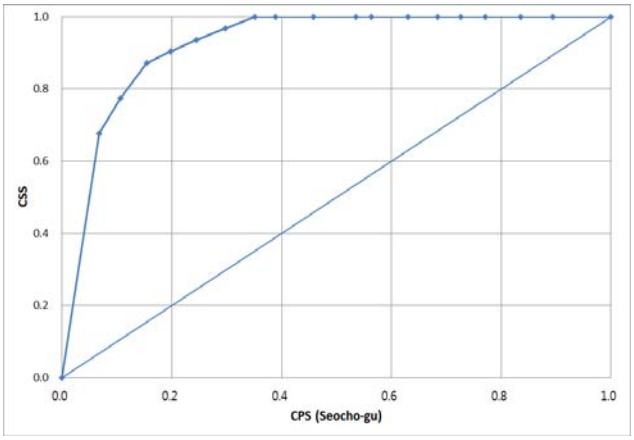

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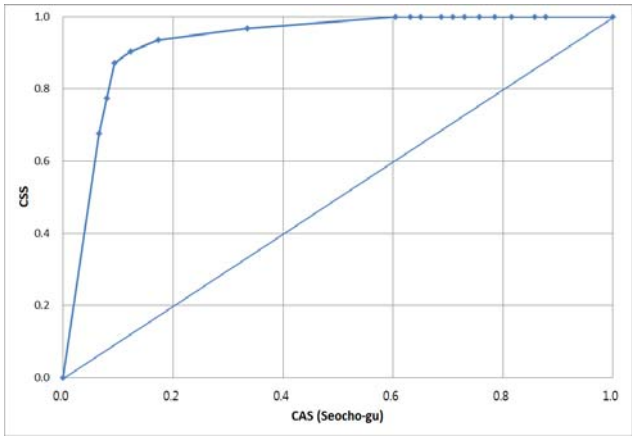

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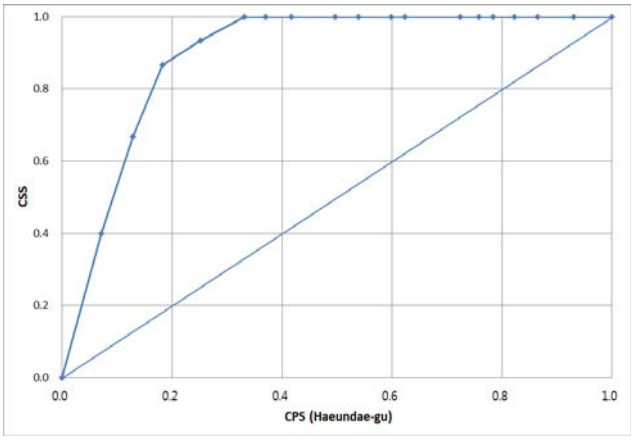

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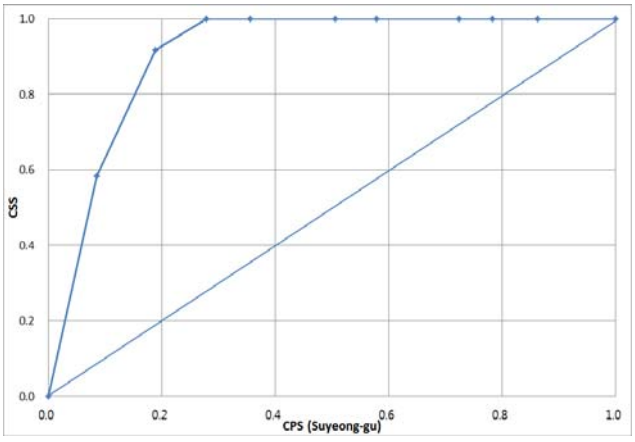

(f)

<Figure 4> District locational Gini curves for 4 districts of Seoul and Busan (all ages)

4. Analysis: Causes for the Clustering

Given the clear clustering phenomena of the imported automobile showrooms in Korea, explanations for the possible causes are in order. We approach the location selection problem of the showrooms from two sides; 1) from the distributors' perspective, and 2) from the customers' incentives. The main factors on the distributors' side would be the power to attract customers, strength of competition, and cost of maintaining a showroom. The main factors on the customers' side should include the convenience of visiting the showrooms, availability of comparable brands and models, and pleasant ambience.

4.1. Distributors' Perspective

We consider the factors that would affect the location decision about showrooms of imported automobile distributors.

4.1.1. Customer attraction power

Automobile showrooms are the first and almost unique contact point of customers with the automobile distributors. The showrooms must be located in an area with convenient travel and preferably with a good parking lot. They must have a very good visibility with tall, wide-open front façade. For these reasons, imported automobile showrooms need to find a place in a broad, main town avenue, especially in an affluent area.

4.1.2. Competition strength

Competition is strong in automobile market in Korea like in any other developed countries. Imported automobiles provide stratified but quite similar functions within a class. They have comfortable seats, high driving performance, and sleek appearance. Nonetheless, each brand and model contains its own distinctive features that appeal to the individual customers. They are similar but differentiated. If different brands and models stand nearby to each other, they would be vulnerable to easy comparison by the potential customers. Then, why do they cluster within close vicinity? The clustering of the showrooms may provide a good opportunity to the customers of comparison among possible choices with a great convenience. That may attract a large number of potential clients together to the venue and lead to a successful sales performance. In contrast, if an imported automobile distributor locates its showroom in a remote place out of a main cluster of competing brands, it will miss a great majority of potential customers.

4.1.3. Maintenance cost

In order to maintain and operate an automobile showroom, the distributors will need highly experienced sales people with perfect knowledge about the specifications, technology, performance, and other particulars of their own models as well as basic information about competitors' brands. They should also have a good manner, sense of humor, friendly attitude toward the customer. The sales person also needs to recognize and understand the preferences of the customers and be able to suggest an appropriate model for the clients. Imported automobiles are usually very expensive and require proper display and attendance at all time. Any distributor may find it highly costly to maintain a numerous duplicates of luxurious showrooms with large volume of expensive stocks, scattered all around a town. An imported automobile showroom is usually located in an affluent neighborhood and the rent cost will add substantially to the maintenance cost. There may be an optimal number of showrooms in any one city or region for a brand and the number must be far fewer than that of a domestic brand or ordinary consumables. However, if there are too few of them, then the cost of journey for the customers to travel to a nearest showroom, say in another city or provinces, would be uncomfortably high. Hence, we may need at least one or a few showrooms of any imported automobile brand in each major city or province.

4.2. Customers' Incentives

We consider here the factors that may affect the customers' choice of visiting a particular automobile showroom.

4.2.1. Convenience of visits

First of all, it should be convenient for a customer to visit a showroom. The main factor would be distance from the customer to the showroom and cost to travel. This cost could be measured by monetary expense, time to travel, availability of public transportation, or easy access from the main street. These factors again call for the need for a showroom to locate in a major avenue with good roads and public transport connections.

4.2.2. Brand comparability

As mentioned briefly above in subsection 4.1.2, an opportunity of easy comparison among different brands and models of imported automobiles are highly desirable for potential customers. The clustering of the showrooms can provide a comfortable chance of comparative and immediate assessments of different brands and also reduce greatly customers' time and inconvenience of moving around a long distance. This may be one main reason for why we observe such a high concentration of imported automobile showrooms in the vicinity of affluent areas.

4.2.3. Ambience pleasantness

Imported automobiles are fairly expensive and a luxury durable good. It may be a substantial investment for a

normal client even if he or she may be relatively well off. The potential customers care not only about the quality of the automobile itself but also about the pleasant ambience of the sales venue. That is why the imported automobile showrooms usually locate in opulent premises within a fashionable district.

4.3. Optimal Location Decision

Summing up the above empirical study of locational Gini coefficients and the analysis of factors of locating showrooms together, we may summarize the major factors of optimal location selection policy for the imported automobile distributors as follows.

- Requirement 1: Each brand need to operate at least one or a few but not too many showrooms within each major city or province.
- Requirement 2: Distributors need to locate their showrooms in a main avenue with good roads, convenient transport system, and fair geographical connections to main districts of affluent areas with a large mass of relatively well-off population in the hinterland.
- Requirement 3: Imported automobile showrooms need to be located in a close proximity to their competing brands for a fair and easy comparison opportunity for the potential clients.
- Requirement 4: Showrooms of imported automobiles need to find a place for their luxury brands in an opulent building with comfortable ambience inside and an attractive façade.
- Requirement 5: Imported automobile distributors need to be able to provide the customers with reliable financing options for their expensive investments.
- Requirement 6: Sales people of the imported automobile brands should have comprehensive understanding of the specifications, technology, driving performance of their own models as well as a reasonable knowledge about their competing brands. They must also possess a good manner, trustful appearance, and a fair grasp of the clients' interests.

The last two requirements may not be directly related to the location decision, but they are important factors nevertheless when the imported automobile distributors plan to open a showroom.

5. Conclusion and Limitations

5.1. Summary of Study Results

This paper has studied prevalent clustering phenomenon and major factors of location decision of the imported automobile distributors in Korea using data for 23 brands of KAIDA member companies. We have focused on the illustration of empirical distribution patterns of the showrooms of imported automobiles and tried to identify the factors that lead to these concentrating features rather than applying a particular locational theory such as a gravity model to the data. Hence, the study is basically illustrative and descriptive in nature. Nevertheless, we have applied a locational Gini analysis approach presented by Krugman (1991) to the recent data of imported automobiles in Korea at the national, city, and district levels and confirmed high level of clustering. At the national level, locational Gini coefficient for the imported automobile showrooms is 0.1024 out of a feasible range of [0,0.5] for the 16 major cities and provinces. At a city level for the six major cities of Seoul, Busan, Daegu, Incheon, Gwangju, and Daejeon, we have found the locational Gini coefficients are from the lowest of 0.1836 for Daejeon and the highest of 0.3763 for Daegu. At the district level for Gangnam-gu and Seocho-gu in Seoul and Haeundae-gu and Suyeong-gu in Busan, the locational Gini coefficients range between 0.3941 for Haeundae based on population shares and 0.4311 for Seocho based on area shares. Meanwhile, the locational Gini coefficients based on area shares are not much different from those based on population shares for Gangnam and Seocho.

In the analysis of possible causes for the clustering of imported automobile showrooms, we have proposed several factors both from the distributors' and customers' perspectives. On the distributors' side, we suggest three major factors; 1) customer attraction power, 2) competition strength, and 3) maintenance cost. On the customers' side, we also present three factors; 1) convenience of visits, 2) brand comparability, and 3) ambience pleasantness. More specifically, we may summarize the requirements for the location of showrooms of imported automobiles as follows. First of all, each brand needs to operate at least one or only a few showrooms within a major city or provinces. Second, the distributors need to locate their showrooms in a broad main avenue with a good travel service, especially in an affluent area with a large relatively well-off population in the hinterland. Third, and more interestingly, imported automobile showrooms need to find a place in a proximity to a cluster of their close competitors rather than in an isolated distant location in order to increase the probability of attracting the majority of potential customers. Fourth, the showrooms need to be located in a sumptuous setting with pleasant ambience inside and a good external facing. Fifth, although not directly related to location decision, importers of luxury international automobile brands need to be able to provide a reliable financing package as well as expert sales people with a good manner, comprehensive experience and knowledge about their own models but also reasonable understanding of their competing brands.

5.2. Expected Effects and Implications of the Study

The volume and the market share of imported automobiles in the Korean market have grown enormously since the beginning of their official imports in 1987 to present. The number of imported cars was only 10 units and their market share was a mere 0.004% in 1987. The import volume was well over 200,000 units per year and the market share of the imported automobiles was over 15% in 2017. The trend is continually rising. Automobiles are now more or less an essential necessity in Korea and other developed countries, but most imported cars are still a luxury for ordinary consumers. Imported car prices are generally much higher than their domestic counterparts. Automobiles are also a durable good and fairly expensive. We have currently 23 international brands as members of the Korean Automobile Importers & Distributors Association (KAIDA). There are also other foreign brands such as Bentley and Rolls-Royce which are not members of KAIDA but have sales representatives in Korea. This study is based on the member companies of KAIDA but the main results should apply in a similar way to non-member international automobile brands.

The importance of imported automobiles in Korean market is increasing and their presence is no longer an exceptional curiosity. Detailed understanding of the role and the operational characteristics of the imported automobiles is essential for the domestic manufacturers to prepare for the ever strengthening competition environments at home and abroad. As pure retail service providers, apart from limited repair and maintenance services, the location decision of the sales showrooms of imported automobile brands may have the utmost importance in their marketing strategy. The findings of intense clustering of the imported automobile showrooms and the analysis of their underlying causes in this study may have important implications for the domestic manufacturers in response to the rising international competition. The distinctive feature of clustering from the visual illustration of the distribution in two major districts of Seocho in Seoul and Haeundae in Busan gives us a clear image about the locational decision of the imported automobile distributors. These results may also help home automobile companies in formulating their overseas marketing and distribution strategy, although such application will require further study about foreign markets.

One most interesting feature of the distribution in this study is the clustering of closely competing brands within close vicinity. Although this clustering would increase direct competition among the competitors, it also creates a great opportunity of comparing different brands in the same area with substantial benefits to the clients. This clustering of imported automobile showrooms will attract a large number of potential customers to the venue and thereby lead to a successful sales performance for the distributors. Another possible cause for the clustering may be the cost factor of maintaining luxury showrooms with expensive stocks and highly experienced sales people in multiple areas. The imported automobile distributors need to focus on one or only a few ideal locations for their sales outlets with limited resources and also with some possible increasing returns effect. Hence, the imported automobile showrooms should be close to a large population of relatively well-off customers in a main avenue of an affluent area.

5.3. Study Limitations and Future Tasks

This paper has also limitations. This study is confined to a single industry of imported automobiles and also to Korean market only. The distribution features of the showrooms of automobiles in other countries may be fundamentally different from those of Korea because individual country may have its own idiosyncratic socio-economic conditions and different evolutionary history in the automobile industry. This research is mainly based on illustrative and descriptive method using real data rather than theoretical analysis. Although, we have adopted a locational Gini curve and evaluated corresponding Gini coefficients, we may introduce more rigorous theoretical basis into the analysis. We may also extend the study into other related industries or domestic automobile showrooms data in order to identify the differences in the distributional features between imported and domestic brands.

We have employed only population and area as explanatory variables along the number of showrooms for the locational Gini analysis, and thus we may consider other variables such as categories and prices of the automobiles, age and income distribution of the population, traveling convenience, other attraction facilities in the neighboring area, or brand image and customers' preferences that would affect the customers' brand choice and the distributors' selection of showroom locations. Such extension will require confidential and much more detailed data, and is deferred to a later research. Another desirable progress may be achieved if we employ longitudinal data over an extended period to identify the dynamic features of locational decision in addition to the cross-sectional characteristics of the current study.

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