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Stage Classification and Characteristics Analysis of Commercial Gentrification in Seoul

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Abstract: Recently, local shops and small houses in Seoul have been converted to cafes, western style restaurants, and large chain stores. These changes, recognized as commercial gentrification in residential areas, are now a big issue in Korean society. This phenomenon has some positive effects, such as the emergence of new consumption spaces and improved neighborhood images. However, this study concentrated on changes in regional characteristics, landscape, and industry homogenization. This study demonstrates the presence of a cyclical environmental change process commonly identified in areas of gentrification and identifies characteristics of individual stages of the gentrification process. The results indicate that medium-scale local stores in Stage 1 changed to small-scale food and beverage businesses in Stage 2. Then, in Stage 3, they changed to large-scale clothing retailers. In particular, the process of change from Stage 2 to Stage 3 revealed that, as the diversity of business types decreases, their uses change and the proportion of chain stores increases. In other words, although Stage 2 has the highest level of mixed use and density, indicating the greatest level of vitality, commercial gentrification to Stage 3 results in decreases in use, the number of aged buildings, and density. Thus, Stage 3 can be identified as the stage in which streets lose their vitality, as suggested by Jacobs. To maintain street vitality, it is suggested that commercial district management occurs during the transformation from Stage 2 to Stage 3 of commercial gentrification.

Keywords: gentrification; Seoul; Jane Jacobs; diversity; chain store; sense of place

1. Introduction

Local shops and houses in many residential areas in Seoul have recently changed to cafés, western style restaurants, large chain stores, and clothing stores. In this process, many observed side effects, including skyrocketing rent and a change in the composition of residents and sense of place, are currently becoming significant issues in Korea. Gentrification in Seoul changes the characteristics of neighborhoods. Chain stores established during gentrification homogenize the landscape and business types in these areas. Although the changes may have a negative impact on the competitiveness of the areas and may even degenerate the areas, Seoul's current policies fail to address these problems. In contrast, the city of Paris, France, has implemented policies to maintain commercial diversity when small local stores close as mid-sized and large stores open and single types of businesses monopolize certain areas.

Therefore, the present study aims to use visual quantitative data to verify the decrease in diversity and increase in homogenization due to gentrification in residential areas in Seoul, demonstrating the presence of a cyclical environment change process in areas of gentrification and identifying characteristics of individual stages of the gentrification process.

The significance of this study is that it can inform policy decisions in urban management when introducing a system to minimize the negative impact of commercial gentrification through the assessment and prediction of stages of commercial gentrification in the future.

2. Gentrification

The term gentrification was first used by Ruth Glass to refer to both physical improvement and social change in housing and the change in housing ownership [1]. This phenomenon took place as the middle class flowed into the old residential areas of the low-income working class. Since then, researchers have studied the cause of this phenomenon in large cities. Smith [2,3] explained the cause of gentrification using the rent-gap theory, which is based on concepts of potential land value and capitalized land value. Potential land value is defined as land value that can be capitalized on when land is best utilized. Capitalized land value is the value of the current use of the land. In existing, older neighborhoods, Smith argued that, although the capitalized land value is appraised as low, the potential land value rises with the expectation of redevelopment for high profit—gentrification occurs due to the gap between the two divergent land values. Meanwhile, Ley [4] argued that, as the manufacturing industry declined in cities, the workforce changed from industry workers to young professionals; their pursuit of cultural activities in the inner city increases the charm of the inner city and fosters gentrification.

In addition, some researchers explained the characteristics of the gentrification process by dividing it into stages in order to generalize the process. Researchers divided gentrification into four stages. In the first stage, a small number of people in the middle class move into the residential area of the working class or low income class and improve the environment. In the second stage, as the middle class moving into the area grows, real estate investment increases, and original residents are displaced. In the third stage, property values rise, and full-scale displacement of original residents occurs as mass media pays attention to the area. In the fourth stage, as competition among the middle class who migrated to the area and the surge in property investment occur, those who initiated the change relocate to other areas [5]. Similarly, Berry [6] categorized gentrification into three stages. As a first stage, single or married-couple households move to houses in low-income residential areas and improve the environment. In the next step, the media and real estate agents become increasingly interested in the area, and the displacement problems of the indigenous people begin to be highlighted. In the third stage, the interest of not only the media, but also the government increases, the physical environment greatly improves, the land price surges, and large investments are made. Lees [7] also used the concept of super-gentrification to illustrate the steps of gentrification. Super-gentrification refers to the process through which the upper gentry enters an area that has already undergone gentrification.

The meaning of gentrification has expanded over time from the traditional conception proposed by Ruth Glass to a variety of meanings such as rural gentrification and new-build gentrification [8]. Zukin et al. [9] described the change in small stores to upscale restaurants and boutiques in the New York City neighborhoods of Williamsburg and Harlem. This type of commercial gentrification has become an issue in many cities worldwide and is now comparable to the issue of traditional gentrification in residential areas. In addition to New York City, commercial gentrification has been taking place as a new form of gentrification in major cities around the world: Edinburgh [10]; Prague [11]; Amsterdam [12]; and Berlin, Shanghai, and Tokyo [13].

Such commercial gentrification has positive effects, such as new retail stores and store diversity, improved neighborhood images, enhanced local economies, and new job offerings, but there are also negative effects, such as increased commodity prices, a change in the style of goods, and changes in the composition of residents.

Commercial gentrification has also occurred in Seoul. However, gentrification in Seoul is different from the commercial gentrification in the West in that houses as well as local stores in Seoul's residential areas are being converted into high-end stores (see Figure 1).

Figure 1. The change from residences (2013) to cafes (2015).

Commercial gentrification in residential zones is observed in various areas of Seoul. Garosu-gil, an emerging shopping street of Gangnam in Seoul, whose popularity recently surged among international tourists, initially comprised a mix of houses and local shops. However, as gentrification continued and the area became overrun by clothing chain stores and cafés, the area lost its neighborhood nature. Samcheongdong-gil, a concentration of Korean traditional houses, is another prime example of commercial gentrification in Korea. The area initially experienced an influx of poor artists due to relatively low rent; however, art galleries began to move in as building codes were deregulated in the 1990s.

Since then, wine bars, cafés, and fashion shops have increased in number due to the growing number of tourists. Accordingly, most residences were converted for commercial use, and the original sense of place of the Korean traditional residences has changed significantly. In recent years, the numbers of large-scale coffee shop chains and clothing chain stores have rapidly increased (see Figure 2).

Figure 2. Samcheongdong-gil (**top**) and Garosu-gil (**bottom**) in 2015.

As the gentrification process progressed in Garosu-gil, the residence ratio greatly decreased. Moreover, business uses simplified and business diversity decreased due to the infiltration of large

fashion clothing chains, as seen in the conversion of a low-level café into a multi-level clothing store [14]. In addition, in Samcheongdong-gil, the presence of cafes and western restaurants increased at the beginning of gentrification [15]. As gentrification intensified, an expensive change from independently owned stores to chain stores was observed [16].

This study analyzed gentrification in terms of commercial activity based on the discussion of previous studies. Commercial gentrification is defined as the physical, social, economic, and cultural changes of a region due to the increased displacement of houses and neighborhood stores in residential areas and the increase of cafes, Western restaurants, and chain stores.

3. Research on Gentrification in Seoul

Early research on gentrification in Korea was largely based on theory and issues of gentrification in a traditional sense [17–19]. From this point of view, the redevelopment of old housing and the resistance of low-income tenants in Seoul are interpreted as gentrification [20,21].

On the other hand, more recently, a lot of research has been conducted on the commercial gentrification process including physical characteristics, content, and involved parties of conflicts, and the problems caused by commercialization observed in so-called cultural commercial streets, such as in Samcheongdong-gil [16,22–24], Hongdae [25], and Garosu-gil [14,26].

In this study, the side effects of gentrification include population change [25], excessive commercialization [27], and the influx of speculative capital [28], as well as the loss of cultural and art facilities due to their inability to cope with rising rent [22]. Also, small buildings that formed the street landscape change to large chain stores, which changes the identity of the shopping street [24].

Focusing on the commercial identity of previously active commercial streets of Samcheongdong-gil caused by franchises and large stores, Park and Jung [24] conducted a study to identify causes of the change. The study results suggested that creating large buildings by combining small parcels of lands influenced franchises coming in to the area, and this development activity changed the identity of the existing commercial street.

Explaining the commercialization and gentrification of Hongdae, Jin [25] demonstrated that cultural factors drove gentrification and stressed the need for the preservation of culture at Hongdae for its ongoing viability. The study results showed a surge in the number of businesses, which was accompanied by an increased land price and a shrinking resident population in the last decade. In addition, Hwang [27] investigated gentrification in Hongdae and Yeonnam-dong, Garosugil and Serosugil, and Itaewon and Gyeongnidan-gil. The study suggested that excessive commercialization had a negative impact on visitors and residents, and that gentrification was expanding to neighboring areas.

Recently, many studies on commercial gentrification have been conducted in Seoul, but most of them have focused on specific target areas. There is also a lack of research on generalized features of gentrification. This study defines the stages of gentrification by selecting multiple sites and analyzing the changes of diversity and vitality.

4. Physical Environment and Diversity

The emergence of chain stores and changes in the physical environment that occur during the gentrification process may influence the diversity and identity of neighborhoods.

Talen [29] argued that certain physical environments help diversity thrive and sustain, and Mumford [30] maintained that healthy diversity requires limits in size, density, and scale. In addition, Nyden et al. [31] argued that the diversity of physical elements contributes to the formation of various neighborhoods and identified diversity of land use and housing price as key factors.

In addition, Jacobs [32] explained the change of an area, focusing on the diversity of use, and argued that a combination of various uses, small blocks, and some older buildings can increase the diversity and vitality of an area, while the presence of only one or two dominating uses can decrease the diversity and vitality of an area. Considering that the commercial gentrification occurring in Seoul, as in Garosu-gil and Samcheongdong-gil, involves a decrease in diversity resulting from the change of

residential to commercial use and an increase in a small number of commercial uses, the phenomenon can be interpreted from Jacobs' perspective of the destruction of diversity.

In addition, the city of Paris identified the decline of local stores and the concentration of single types of businesses from large commercial facilities as the cause of a worsening living environment. Paris implemented a policy to regain the vitality of "living space" by combining various uses in spaces with the Vital'Quartier project as a means for planning and executing urban management to maintain commercial diversity designed for urban regeneration [33].

5. Study Area Selection

An internet search was conducted to obtain information on gentrified areas in Seoul. Zukin et al. [34] argued that areas of gentrification gain popularity from mentions in newspapers, websites, and blogs before they are gentrified. This was also seen in Seoul, in which areas such as Seochon began to change around the time they were introduced in mass media. Therefore, an internet search was conducted to select the study areas using keywords such as alley, art, culture, craft workshop, café, small store, gallery, artist, and influx, and 21 such areas were identified.

Prior to gentrification, 16 of 21 areas were general residential zones with low-rise housing buildings and local stores that were changed to commercial zones during gentrification. Each of the other five areas was classified as either a semi-industrial zone, a general commercial zone, or a Class 1 dedicated residential area, which have different legal restrictions for physical size and use of buildings; therefore, it was difficult to classify them as commercial gentrification areas of Seoul. Accordingly, the present study used 16 of 21 areas as study areas.

The selected areas were the following 16 neighborhoods: Garosu-gil (1), Bangbae-ro 42-gil (2), Bukchon-ro 5-gil (3), Samcheong-ro (4), Seoulsup 2-gil (5), Seoulsup 4-gil (6), Seongmisan-ro (7), Yeonhui-ro 1-gil (8), Sinheung-ro (9), Usadan-ro 10-gil (10), Itaewon-ro 42-gil (11), Hoenamu-ro (12), Ogin-gil (13), Jahamun-ro 7-gil (14), Wausan-ro 3-gil (15), and Changgyeonggung-ro 35-gil (16). In these areas, 1093 residences and stores on the ground floor, not including parking lots and empty properties, were replaced (see Figure 3).
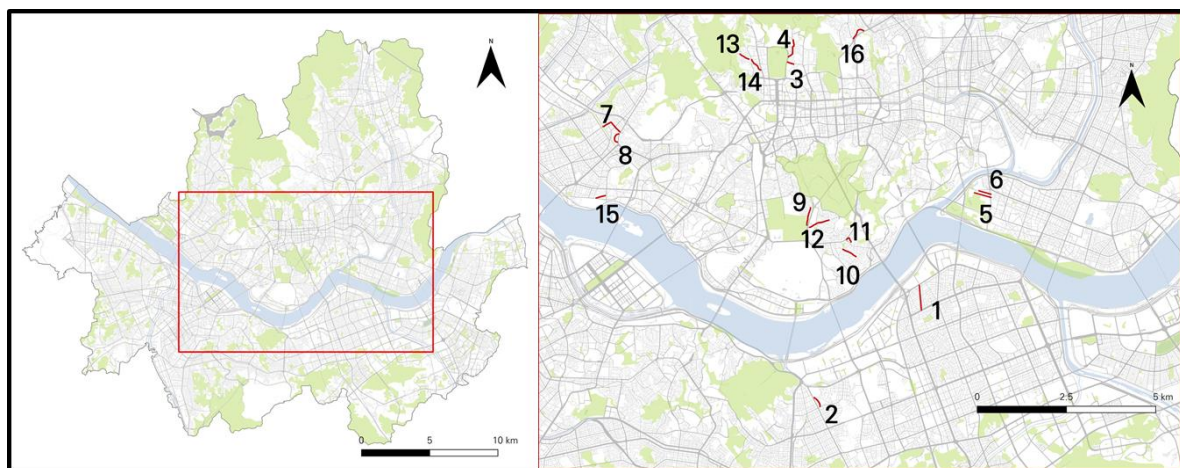

Figure 3. Map of the study areas in Seoul.

All study areas were general residential zones, with similar levels of restrictions for the size and use of buildings. These areas also used to be quiet with low-rise housing buildings and local stores that had recently undergone gentrification.

6. Methods of Study

Data were collected focusing on stores on the ground floor, which respond most sensitively to commercial gentrification. For physical analysis, three investigators surveyed the study areas three times in December 2014, during which they collected photographic records of the stores on the first floor and classified the commercial use of stores into 112 types using the 9th Korea Standard Industrial Classification. In addition, building ledgers and a 2012 digital map of Seoul were used.

The study was conducted in three steps. First, 1093 stores and housing buildings in the 16 study areas were clustered using a two-step cluster analysis focusing on use and physical size. Second, the streets with the same cluster characteristics were grouped together. Characteristics of each group of streets were determined using analysis of variance (ANOVA). Finally, under the assumption that the time at which newspapers and magazines start to pay attention to a study area corresponds to the start of the area's commercial gentrification, the study analyzed the changes in physical environment caused by gentrification over time.

7. Variables

The present study aims to explain the general stages of change during gentrification in Seoul using physical environment variables and to analyze the problem of the decrease in diversity that occurs during gentrification in Seoul.

Previous studies have explained commercial gentrification in a variety of areas around the world using features such as use [9,11,35], chain stores [9], diversity of business use [36,37], construction years [36], physical size [36,37], and density [37].

Building use and the mix of uses are important indicators of commercial gentrification. Studies have shown that the disappearance of houses and mom-and-pop stores such as laundromats and grocery stores and the opening of chain stores, pubs, and boutiques accompany commercial gentrification [9,11,13,35–38]. The opening of pubs and restaurants increases rent values and homogenizes the areas, ultimately influencing the diversity of business types [36,37].

Therefore, this study utilized the use, residential density, chain store ratio, and diversity of business types as study variables. Regarding use, a variable was created to determine the distribution of different uses in the study areas and specified the characteristics of business types of each study area using 53 categories, 71 subcategories, and 112 sub-subcategories based on the 9th Korea Standard Industrial Classification. Regarding the proportion of chain stores, a variable was created based on the determination that chain stores inhibit the shaping of a unique image of an area and consequently interfere with secondary diversity because they provide identical products using identical services. In addition, the present study aimed to understand the diversity of business types in the studied areas. An entropy index was used to assess the diversity of business types. The entropy index values range from 0 to 1, with values closer to 1 indicating more complexity in use. The entropy index is calculated as follows, where p_u denotes the area ratio per use, u, and n denotes the number of uses.

$$\text{entropy index} = -\frac{\sum_{u=1}^{n} p_u \ln p_u}{\ln n}$$

Also, studies have demonstrated the presence of a relationship between new building construction and large chain stores as a result of gentrification. As 2004 downtown Brooklyn was rezoned, redevelopment was active and the buildings were larger. Small shops have rapidly changed to international chains such as Sephora, H & M, and Gap [36,37]. As in Brooklyn, Seoul's Samcheong-dong was also enlarged and newly constructed through gentrification [24]. Therefore, in this study, the construction year, lot area, store area, building area, and commercial density (i.e., number of stores per building) were used to examine gentrification and physical scale change.

The areas of this study are residential zones. In general, neighborhoods are rarely mentioned in the media. However, commerce-related media coverage of the neighborhoods indicates that gentrification

is currently underway. Therefore, the time of the first mention in the media was considered as the beginning stage of commercial gentrification (see Table 1).

Table 1. Description of variables.

Classification	Variables	Description
Mixed uses	Uses Proportion of chain stores Diversity of business type	Residence or business type Proportion of chain stores Entropy index
Aged buildings	Year of construction	From building ledger
Concentration	Lot area (m^2) Store area (m^2) Building area (m^2) Number of stores per building Residential density	Lot area of buildings containing stores or residences Each store or residence area Building area containing stores or residences Commercial density (Number of houses/Street length) $\times$ 100
Beginning stage of commercial gentrification	Time period of first media mention	The time period when each area was first mentioned in the media

8. Analysis

8.1. Basic Statistics

The results of the basic statistics analysis showed similarities among some study areas. The study areas that have been gentrified for relatively long times, indicated by their relatively early first mentions in the media, showed high proportions of chain stores, clothing retailers, and western restaurants, along with relatively large lot areas, building areas, and store areas. Conversely, the study areas that were considered latecomers among gentrified areas, indicated by relatively recent first mentions in media, showed lower proportions of chain stores and high proportions of residences, small lot areas, building areas, and store areas (see Table A1 and Figure A1).

Shirt and other clothing retail stores accounted for the largest proportion of uses in Garosu-gil and Itaewon-ro 42-gil, while nonalcoholic beverage stores accounted for the largest proportion in Bukchon-ro 5-gil, Samcheong-ro, and Ogin-gil. Residences accounted for the largest proportion in Seoulsup 2-gil, Seoulsup 4-gil, Seongmisan-ro, Sinheung-ro, Yeonhui-ro 1-gil, Wausan-ro 3-gil, and Changgyeonggung-ro 35-gil. On the other hand, there was no residential use in Garosu-gil and Gyeongnidan-gil, but a high proportion of residences in Seoulsup 2-gil and Yeonhui-ro 1-gil.

In Garosu-gil, 72.82% of stores were chain stores. In Bukchon-ro 5-gil and Samcheong-ro, a relatively high proportion of stores were chain stores. However, nearly no chain stores existed in Seoulsup 2-gil, Seoulsup 4-gil, Seongmisan-ro, Yeonhui-ro 1-gil, Wausan-ro 3-gil, Usadan-ro 10-gil, and Changgyeonggung-ro 35-gil.

Garosu-gil, Yeonhi-ro 1-gil, and Jahamun-ro 7-gil had many newly built buildings, while Itaewon-ro 42-gil and Gyeongnidan-gil had older buildings than those in other study areas. On the other hand, Samcheong-ro and Bukchon-ro 5-gil showed the largest standard deviation in building construction year. Variation in construction year was low in Seoulsup 2-gil, Seoulsup 4-gil, Usadan-ro 10-gil, and Itaewon-ro 42-gil.

Ogin-gil, Usadan-ro 10-gil, and Jahamun-ro 7-gil showed small lot areas, building areas, and store areas, suggesting higher densities and higher values of business type diversity than other study areas. In contrast, Garosu-gil had large lot areas, building areas, and store areas, with a lower level of business type diversity.

Regarding the time period of first mention in the media, Changgyeonggung-ro 35-gil, Seongmisan-ro, and Seoulsup 4-gil were mentioned most recently in June 2014, while Gyeongnidan-gil and Garosu-gil were mentioned earlier in November 2005 and August 2006, respectively, than other study areas. This suggests that the commercial gentrification of Changgyeonggung-ro 35-gil and the two other areas began relatively recently, while the commercial gentrification of Gyeongnidan-gil and Garosu-gil began earlier.

8.2. Two-Step Cluster Analysis

To examine the common characteristics among the gentrification areas in Seoul using quantitative analyses, cluster analyses and one-way analysis of variance (ANOVA) tests were performed.

Using cluster analysis, store characteristics in areas of gentrification were clustered. As the sample size was over 1000 and categorical variables such as use, hierarchical cluster analysis, and K-means cluster analysis were not suitable, a two-step cluster analysis was performed. Such an analysis is useful for a cluster analysis of large data and can be used for both categorical and continuous variables.

The analyses included 971 of the 1093 stores and houses, excluding outliers. Variables used in the cluster analysis were use, chain store status, year of construction, lot area, store area, building area, and number of stores per building. The results of the cluster analyses showed that 223 stores and houses were included in Cluster 1, 592 in Cluster 2, and 147 in Cluster 3 (see Table 2 and Figure A2).

Table 2. Street classification and characteristics by clustering analysis.

Cluster	Street	Uses	Residential Density (Mean)	Proportion of Chain Stores	Diversity of Business Type	Time Period of First Media Mention (Mean)
1	Seoulsup 2-gil Seoulsup 4-gil Yeonhui-ro 1-gil Changgyeonggung-ro 35-gil	Residences (43.47%) Non-Alcoholic Beverage Places (6.83%) Korean Style Restaurants (4.34%) Hair Salons (3.1%) Western Style Restaurants (3.72%)	4.61	0.62%	0.66	July 2014
2	Bangbae-ro 42-gil Sinheung-ro Ogin-gil Wausan-ro 3-gil Usadan-ro 10-gil Itaewon-ro 42-gil Jahamun-ro 7-gil Hoenamu-ro	Western Style Restaurants (7.96%) Non-Alcoholic Beverage Places (6.72%) Real Estate Consultancy and Brokerages (6.54%) Retail Clothing Stores (6.01%) Hair Salons (6.37%)	1.10	9.03%	0.87	March 2012
3	Garosu-gil	Retail Clothing stores (46.6%) Retail Sale of Cosmetics and Perfumery (20.38%) Retail Sale of Watches and Jewelry (5.82%) Retail Sale of Other Threads, Textiles, Clothing Accessories (3.88%) Retail Sale of Luggage and Other Leather Products (4.85%)	0	72.82%	0.58	August 2006

In Cluster 1, residences accounted for 43.47% of building uses. Non-alcoholic beverage shops such as cafés accounted for 6.83%, followed by Korean style restaurants, hair salons, and western style restaurants. Therefore, streets classified as Cluster 1 showed characteristics of use observable in general residential areas, such as residences, Korean style restaurants, and hair salons, with a small portion of non-alcoholic beverage places and western style restaurants. Chain stores as a commercial use accounted for 0.62%.

Next, in Cluster 2, western style restaurants were most common at 7.96%, followed by non-alcoholic beverage places, real estate consultancy and brokerages, retail clothing stores, and hair salons. Chain stores accounted for 9.03% of the businesses. The diversity of business types was highest among the clusters at 0.094, suggesting the highest level of mixed use.

Finally, in Cluster 3, the top five uses were all associated with clothing and cosmetics, and the proportion of chain stores accounted for 72.82% of the businesses. Diversity of business types was lowest among the three clusters at 0.023.

Next, regarding the average time period of first mention in the media, Cluster 1 was July 2014, Cluster 2 was March 2012, and Cluster 3 was August 2006. Therefore, it was concluded that commercial gentrification began relatively recently in Cluster 1 and earliest in Cluster 3.

According to Lee and Bae's (2013) research on the commercial gentrification process, Garosu-gil in Cluster 3 showed a change from initial increases in restaurants in residential areas to the current domination of clothing stores [14]. This suggests that Garosu-gil initially showed the characteristics of Cluster 1, followed by a period of showing the characteristics of Cluster 2 due to reasons such as

increased visitors, and finally showing the characteristics of Cluster 3. The addition of clothing stores as characteristics of Cluster 3 was discussed by Kim and Kim (2013) and Zukin et al. (2009) [9,39]. Both studies found an increase in clothing stores in the final stage of gentrification. In addition, media coverage of Jahamun-ro 7-gil and Ogin-gil in Cluster 2 showed that residences were being transformed into restaurants and cafés, which suggests that the areas that once showed Cluster 1 characteristics changed to Cluster 2.

Based on these results, this study determined that Cluster 1 streets change to Cluster 2 streets as commercial gentrification progresses, and Cluster 2 streets change to Cluster 3 as the progress continues. In other words, as commercial gentrification progresses, streets progress from Cluster 1 to Cluster 3.

Applying these change processes to cluster-specific use, proportion of chain stores, and diversity of business types, uses in residential areas such as residences and Korean style restaurants in Cluster 1 mostly disappeared as the streets changed to Cluster 2, showing the change to western style restaurants or retail clothing stores. The decrease in residences and increased commercial value of local stores suggest changes in demographics and the sense of place in the areas. Therefore, it was determined that the first commercial gentrification occurs when Cluster 1 changed to Cluster 2. Moreover, real estate consultancy and brokerages also increased, which suggests an increase in demand for lease and sales on the respective streets.

Next, as Cluster 2 progressed to Cluster 3, western style restaurants and non-alcoholic beverage places changed to clothing and fashion stores such as retail sale of clothing or cosmetics and perfumery. The proportion of chain stores significantly increased from 9.03% in Cluster 2 to 72.82% in Cluster 3. These changes in use and increases in chain stores suggest a change in urban landscape and sense of place. Therefore, it was determined that the second commercial gentrification occurs as Cluster 2 changes to Cluster 3.

In addition, the diversity of business types increased from 0.657 to 0.867 when gentrification advanced from Cluster 1 to Cluster 2, but decreased to 0.579 when gentrification advanced to Cluster 3. This suggests that the diversity of business types tends to decrease in the second commercial gentrification after an initial increase during the first commercial gentrification. Moreover, the results showed an ongoing decrease in residential density and a steady increase in chain stores during the gentrification progression. In particular, chain stores were found to greatly increase during the second commercial gentrification.

8.3. Mean Comparison among Clusters

Differences in physical environments among clusters were examined using one-way ANOVA. As the test of homogeneity of variance yielded *p*-values greater than 0.05 for year of construction and lot area, the null hypothesis on homogeneity of variances, "H0 = Variances of groups are the same," was accepted. Consequently, the results of the Sheffe test under the assumption of equal variance were interpreted for the variables. For the number of stores per building, building area, and store area, the assumption of equal variance was violated as the null hypotheses were rejected; therefore, results of the Dunnett T3 test were interpreted.

The detailed results of the one-way ANOVA are shown in Table 3 and Figure A2. First, regarding characteristics at the store level in Cluster 2, the store area was 46.27 m^2 on average, lower than Cluster 1 (88.42 m^2) and Cluster 3 (93.83 m^2), and the average number of stores per building was 2.19, which was the highest among the three clusters. This suggests that, as local stores and residences in Cluster 1, which accounted for a large area at relatively low rent, changed into commercial facilities in Cluster 2 due to commercial gentrification caused by factors such as an influx of outsiders, store size decreases and the number of stores per building increases. In addition, store areas in Cluster 3 were larger than in Cluster 2, and while not statistically significant, the number of stores per building decreased. This suggests that store size increased as originally existing small restaurants and cafés in the neighborhood changed to large clothing and cosmetics businesses and chain stores.

Second, the lot area and building area, which indicate the characteristics at the building level, showed no significant mean differences between Cluster 1 and Cluster 2. Year of construction, lot area, and building area increased as Cluster 2 changed to Cluster 3. It is suggested that Cluster 3 has more new buildings, with an average year of construction of 1989.96, than the other clusters. Increases in lot area and building area suggest that gentrified physical environments are larger than those of older buildings. Moreover, the standard deviation of construction year was highest in Cluster 1 (11.68), followed by Cluster 2 (11.34) and Cluster 3 (10.00), suggesting that diversity in construction year decreased as commercial gentrification progressed (see Table 3).

Table 3. Results of one-way ANOVA.

Variables	Cluster	Mean	SD	F/Sig	Scheffe	Dunnett T3
Store area	1	83.42	55.06	60.24/0.000 **	-	1, 3 > 2
	2	46.27	45.7			
	3	93.83	65.68			
Commercial density (Number of stores per building)	1	0.68	0.97	62.24/0.000 **	-	2, 3 > 1
	2	2.19	1.72			
	3	2.09	1.04			
Year of construction	1	1987.04	11.68	19.18/0.000 **	1, 3 > 2	-
	2	1983.19	11.34			
	3	1989.96	10			
Lot area	1	231.45	188.37	8.54/0.000 **	3 > 1, 2	-
	2	222.83	364.49			
	3	362.29	153.44			
Building area	1	113.41	78.79	49.72/0.000 **	-	3 > 1, 2
	2	103.57	74.9			
	3	185.83	83.98			

** p-value < 0.01.

9. Conclusions

The characteristics of commercial gentrification were identified based on the results of this study. First, the streets where commercial gentrification occurred were classified into three clusters. The three clusters were classified into stages, and the progression of commercial gentrification was determined by arranging the stages in a time series based on the moment they were first mentioned in the media. This study demonstrated that the stages varied in use and physical size.

Second, as commercial gentrification progressed, the use and the number of franchise stores changed. In Cluster 1, residence and neighborhood commerce such as Korean restaurants, hair salons, and hardware and heating equipment retailers accounted for most uses. However, in Cluster 2, the proportion of western style restaurants and non-alcoholic beverage shops increased, and the proportion of clothing retailers, which had been nearly non-existent in Cluster 1, increased sharply. Moreover, in Cluster 3, fashion-related stores such as clothing retailers, cosmetics and fragrance retailers, and watch and jewelry retailers increased sharply, and western style restaurants and non-alcoholic beverage shops, which accounted for the highest proportion in Cluster 2, decreased sharply. Moreover, franchise stores were also nearly non-existent in Cluster 1, but surged in number with the progression to Cluster 2 and Cluster 3.

Third, physical size changed as commercial gentrification progressed. Regarding stores, the retail area decreased when Cluster 1 changed to Cluster 2. This is likely due to a value increase of neighborhood commerce in the residential area, which operates on a large scale due to originally low rent, or to the increase in the number of small restaurants and cafés. However, when the change from Cluster 2 to Cluster 3 occurred, store area increased, which is likely due to the presence of large franchise stores. Next, regarding the buildings, during the progression of commercial gentrification from Cluster 2 to Cluster 3, new buildings increased and the building area expanded. These changes

are likely to cause an increase in rent and interfere with the diversity of the area as they prevent the existence of stores that have a wider range of uses.

Fourth, these changes in uses and physical size during commercialization could be explained as the first and the second commercial gentrification. The problems of commercial gentrification that have recently been covered in the media are largely classified into two types: the first problem is the destruction of the community of original residents due to an influx of outsiders and capital; the second problem is that artists and the young, creative class who increased the value of commercial facilities as they moved into the residential area seeking low rent, are driven out of the commercial district they created. These two problems can be explained by the stages of commercial gentrification identified in this study. The first problem can be explained as the first commercial gentrification in which original residents are driven out when the commercial street changes from Cluster 1 to Cluster 2. The second problem can be explained as the second commercial gentrification in which the young creative class is driven out and franchise stores increase rapidly when the commercial street changes from Cluster 2 to Cluster 3. Especially, the second commercial gentrification, which refers to the loss of small cafes and restaurants by chain stores, is similar to Lees' super-gentrification concept [7] and the fourth stage of Pattison' s gentrification [5]. This study shows that the basic characteristics of the commercial gentrification system are similar to those of the traditional gentrification system.

Jane Jacobs argued that, when the diversity of street use increases, the vitality of the street can be increased, but when one or two profiting uses have a dominant influence, vitality may decrease. The present study found that the small-scale neighborhood commercial facilities in Stage 1 changed to small scale food and beverage businesses in Stage 2 and then to large scale clothing businesses in Stage 3. In particular, the process of change from Stage 2 to Stage 3 revealed that the diversity of business types decreased and uses changed, and as franchise numbers increased, commercial districts became larger. In other words, although Stage 2 shows the highest level of mixed use and density, indicating the greatest vitality, when commercial gentrification progresses to Stage 3, use, old buildings, and density all decrease, which can be identified as Jacob's stage in which the street loses vitality. Therefore, the result demonstrates the need for commercial district management at the appropriate point in order to maintain the characteristics of commercial streets and prevent decline. To maintain the vitality of streets, it is suggested that commercial district management is necessary as an urban management measure during the transformation from Stage 2 to Stage 3 of commercial gentrification.

Author Contributions: Y.Y. conceived the idea and designed this research. J.P. developed the idea for academic research and reviewed the manuscript as a corresponding author. All authors carried out data collection and analysis and drafted the manuscript.

Appendix A

Table A1. Basic statistics.

Street	Year of Construction		Number of Stores Per Building		Lot Area		Building Area		Diversity of Business Type	Residential Density
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Garosu-gil	1990.83	10.51	1.63	0.90	385.09	171.05	199.17	96.45	0.58	0.00
Bangbae-ro 42-gil	1984.37	11.64	1.96	1.56	530.18	899.23	140.09	73.37	0.84	0.85
Bukchon-ro 5-gil	1988.63	17.71	0.97	0.45	249.95	113.77	128.05	49.44	0.81	0.22
Samcheong-ro	1982.33	21.68	1.16	0.76	201.44	228.03	98.90	99.78	0.81	0.58
Seoulsup 2-gil	1987.09	9.11	0.35	0.64	212.32	142.09	102.82	40.62	0.59	6.07
Seoulsup 4-gil	1984.88	9.87	0.40	0.58	227.80	95.83	103.35	33.62	0.77	3.81
Seongmisan-ro	1984.10	13.90	0.93	1.02	298.13	123.63	165.26	79.29	0.71	3.70
Sinheung-ro	1986.38	12.38	1.24	1.43	354.89	762.97	111.80	80.77	0.83	2.25
Yeonhui-ro 1-gil	1991.11	14.60	0.57	0.80	231.02	267.11	113.26	97.99	0.51	6.11
Ogin-gil	1986.00	14.88	1.41	0.87	117.88	96.12	72.71	61.66	0.90	0.52
Wausan-ro 3-gil	1988.47	13.15	0.88	0.77	203.84	243.73	92.21	67.61	0.85	3.32
Usadan-ro 3-gil	1982.78	5.55	1.44	0.90	113.79	94.36	67.98	36.67	0.91	0.63
Itaewon-ro 42-gil	1977.22	7.21	1.74	1.01	135.27	123.11	79.17	37.22	0.89	0.43
Jahamun-ro 7-gil	1990.94	14.17	1.20	0.80	134.80	86.38	78.44	43.11	0.89	0.76
Changgyeonggung-ro 35-gil	1985.62	14.08	0.60	0.89	252.81	229.97	134.68	127.79	0.76	2.44
Hoenamu-ro	1980.67	12.98	2.42	1.88	217.72	241.18	113.65	90.35	0.83	0.00

| Street	Uses	Proportion of Chain Stores	Store Area		Time Period of First Media Mention
			Mean	SD	
Garosu-gil	Retail Clothing (46.6%) Retail Cosmetics and Perfumery (20.3%)	Chain store (72.82%)	93.83	65.68	April 2006
Bangbae-ro 42-gil	Retail Household Appliances n.e.c. (8.06%) Retail Clothing (8.06%)	Chain store (11.29%)	56.71	61.85	March 2013
Bukchon-ro 5-gil	Non-Alcoholic Beverage Places (24.39%) Other Creative and Art-Related Services n.e.c. (14.63%)	Chain store (26.83%)	81.35	47.02	June 2011
Samcheong-ro	Non-Alcoholic Beverage Places (19.29%) Retail Clothing (14.91%)	Chain store (36.84%)	70.08	52.89	November 2006
Seoulsup 2-gil	Residences (50.9%) Beauty Shops (5.45%)	Chain store (0%)	82.13	45.00	September 2014
Seoulsup 4-gil	Residences (38.46%) Korean Style Restaurants (11.53%)	Chain store (0%)	84.99	36.09	September 2014
Seongmisan-ro	Residences (22.01%) Chinese Style Restaurants (7.33%)	Chain store (2.75%)	78.99	57.14	June 2014
Sinheung-ro	Residences (12.79%) Real Estate Consultancy and Brokerages (10.46%)	Chain store (10.47%)	67.72	68.30	February 2013
Yeonhui-ro 1-gil	Residences (47.72%) Non-Alcoholic Beverage Places (11.36%)	Chain store (2.27%)	71.52	36.03	July 2014
Ogin-gil	Non-Alcoholic Beverage Places (10.41%) Retail Clothing (8.33%)	Chain store (8.33%)	39.65	46.86	January 2013
Wausan-ro 3-gil	Residences (21.42%) Western Style Restaurants (16.66%)	Chain store (2.38%)	60.70	38.64	April 2014
Usadan-ro 3-gil	Korean Style Restaurants (9.18%) Other Building Completion n.e.c. (8.16%)	Chain store (2.04%)	37.66	22.91	December 2013
Itaewon-ro 42-gil	Retail Clothing (23.07%) Non-Alcoholic Beverage Places (7.69%)	Chain store (20.51%)	39.38	18.87	February 2013
Jahamun-ro 7-gil	Other Building Completion n.e.c. (9.63%) Korean Style Restaurants (9.63%)	Chain store (6.02%)	40.75	28.69	July 2010
Changgyeonggung-ro 35-gil	Residences (30.55%) Other Creative and Art-Related Services n.e.c. (8.33%)	Chain store (0%)	98.12	87.82	December 2013
Hoenamu-ro	Western Style Restaurants (15.88%) Real Estate Consultancy and Brokerages (10.28%)	Chain store (14.02%)	35.81	41.33	September 2007
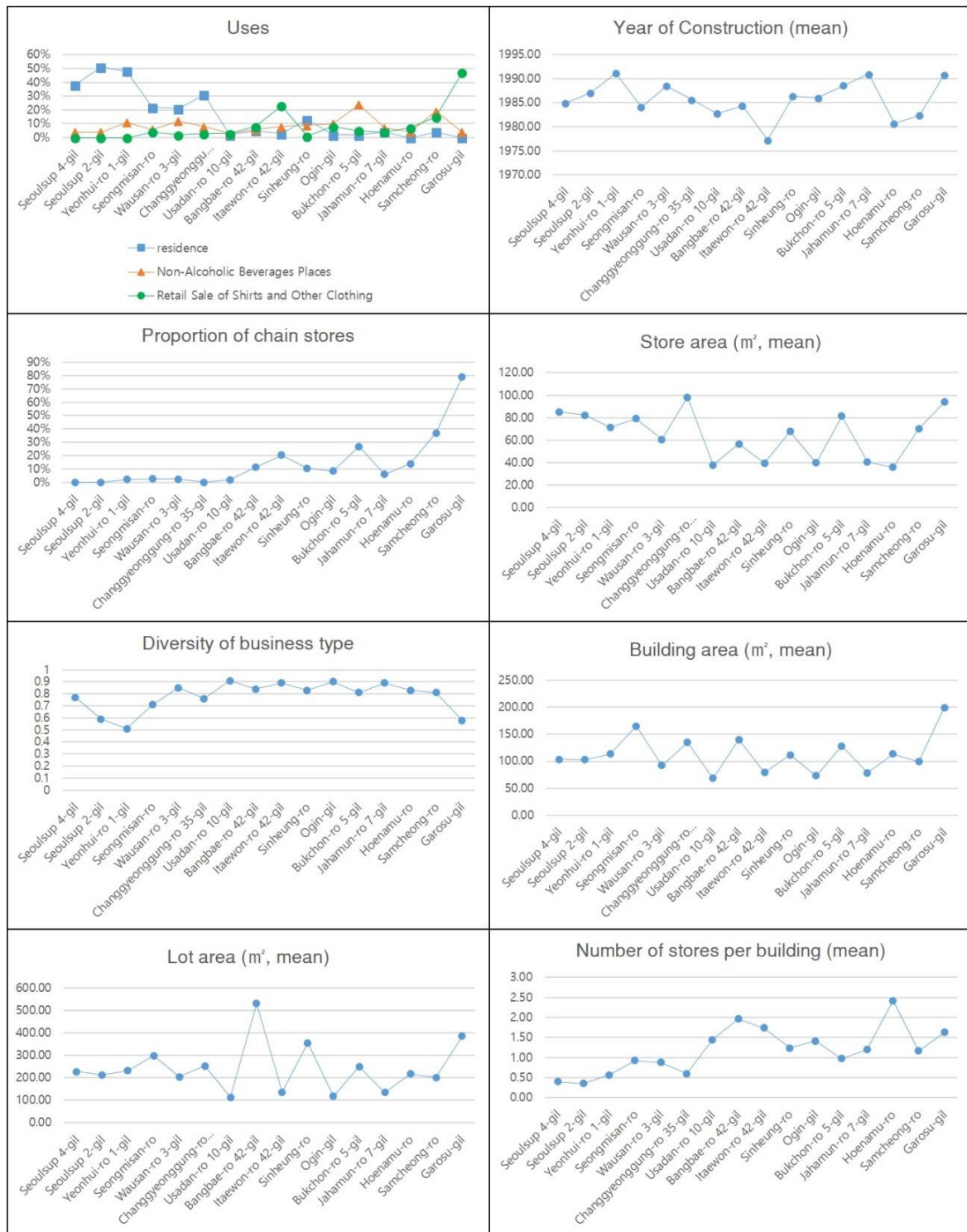
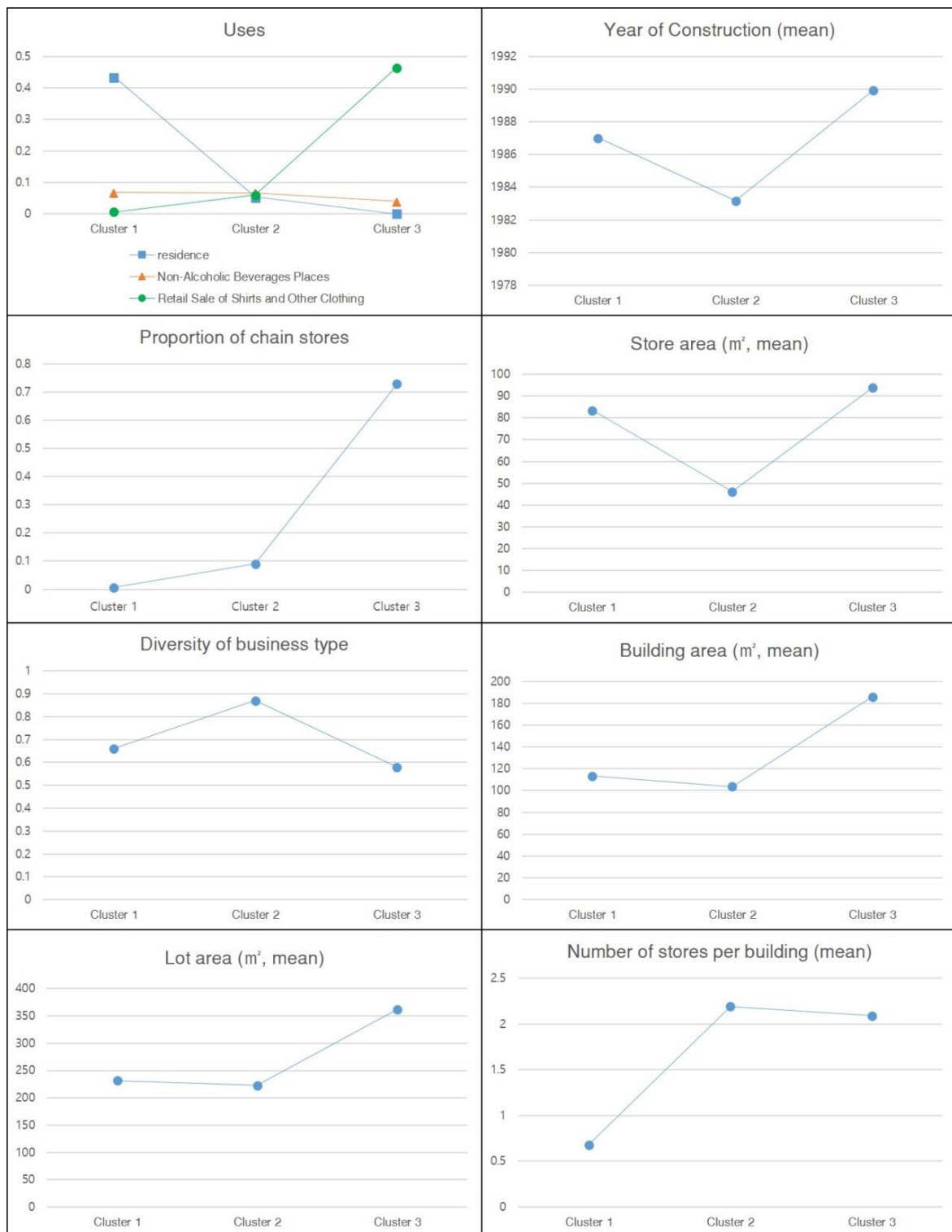**Figure A1.** Basic statistics.

Figure A2. Cluster-specific characteristics.

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