

Article

Characteristics Analysis of Commercial Gentrification in Seoul Focusing on the Vitalization of Streets in Residential Areas

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Abstract: This study examines commercial gentrification, focusing on areas where commercial gentrification occurred or was expected to occur in Seoul, Korea. To identify the general phases of commercial gentrification, we used data collected from January 2015 to January 2019 by cluster analysis. Cluster analysis was conducted with a ratio of terms including “birth”, “replacement”, and “vacancy”, and characteristics including the “homogenization index”, “chain stores”, “vitalization”, and the “front width of stores” were applied. The contributions of this study are as follows. Three clusters were formed and supplemented according to differing types of industry change. Cluster 1 represents a stage where commerce has begun to penetrate residential areas, and it can be seen that gentrification has just started. Cluster 2 is more commercialized than Cluster 1, but characteristics remain in the vicinity of neighborhood commercial facilities. Cluster 3 describes a phase of full vitalization, characterized by franchise stores. The implications of this study are as follows. Commercial gentrification is proven to have distinctly different stages of commercial characterization that can be interpreted and observed sequentially, thereby requiring a differentiated approach to commercial gentrification by phase.

Keywords: commercial gentrification; Seoul; Korea; cluster; vitalization; retail diversity

1. Introduction

Recently, a number of commercial gentrification phenomena have occurred in residential areas of Seoul City in Korea, which have replaced neighborhood commercial facilities with cafes and restaurants with unique atmospheres, and in some instances, with large-scale commercialized shops. This is because residential areas have gained attention in terms of the human scale—meaning urban design that is optimized for human use—and have been identified as new areas of opportunity as consumer culture has shifted beyond the simple purchasing of goods to consumption of locations formed in proximity to streets [1,2]. These commercial gentrification processes have previously occurred mainly in the West, and definitions and concepts have been established through various studies. Gentrification in the West is mainly a phenomenon in which neighborhood living facilities are refined as commercial spaces, such as creative stores, and is further characterized by the evolution of these unique shops into franchise stores, forming unique urban landscapes [3]. Commercial gentrification is a natural change in land use due to ground gaps according to urban ecology theory [4], but it causes involuntary extrusion.

Commercial gentrification has both positive and negative effects. (Table 1) Its negative effects are mainly evident in Korea, where commercial gentrification is occurring mostly in residential areas. One feature of Korea’s Land Use Zoning System is that urban plans generally include residential spaces and commercial spaces, which are subsidized by residential areas. This has led to social

issues beyond the urban planning sector, mainly due to the negative effects of excessive vitalization in residential applications where housing and small-scale neighborhood stores have coexisted. In addition, commercial gentrification speeds up regional changes [5], making it difficult to predict changes in the location of residential areas and making it difficult to respond to them. On the residents' side, neighborhood commercial facilities, which used to be the infrastructure of residents, are being driven out and increasingly replaced with shops with large-scale capital to meet the needs of external customers. These changes have led residents to suffer inconveniences such as noise in their residential areas, privacy exposure, congestion, and the general destruction of neighborhood [5,6]. On the local side, a negative factor is that excessive vitalization due to commercial gentrification can ultimately change the sense of place to either place-loss or placelessness [7]. Franchise shops, or large capitalists, mass-produce products and standardize space according to popular preferences, thereby destroying the "placefulness" of existing unique cultures [8–10]. In addition, the following vacancies occur in Korea. By tenants and leases, the negative effects of commercial gentrification are the involuntary migration of tenants due to soaring rents, the resulting displacement, and the increase in the vacancy rate of stores where even large companies cannot afford rent due to excessive increases in rents [11].

Table 1. Effects of gentrification.

Positive Effects	Negative Effects
-	Involuntary extrusion due to rising rent
Stabilization of declining region	Causing community anger and conflict
Increase in property value	Affordable Housing Reduction, Speculative real estate price rise
Promote regional development	Involuntary migration of commerce/industry
Revitalization of real estate through government assistance	Increased vacancy rates and reduced population and stores due to higher rents
Promotion of social mixing	Loss of local diversity

In November 2015, the Seoul Metropolitan Government announced a comprehensive measure for commercial gentrification in Seoul in order to address the negative effects that cannot be solved under market initiatives. Since then, local governments have also announced various series of measures to cope with commercial gentrification. The Seoul Metropolitan Government sought a win-win alternative for tenants and residents alike, fearing that commercial gentrification could ultimately undermine the city's sustainability and diversity, thus weakening the city overall. Accordingly, the government intended to select the areas prescribed as the study site (designated by experts and the media as the Gentrified area) to review and account for residents' opinions in regional countermeasures by way of a regional win-win agreement. Ultimately, however, the study site was not identified through objective data in extracting the Gentrified area. Thus it was difficult to grasp the objective status of the targets, and it was difficult to come up with a differentiated response plan accordingly. Following this policy, many studies in Korean academia have been conducted on commercial gentrification. Data that can analyze commercial gentrification is also increasing in many ways. Therefore, it is necessary to prepare differentiated response measures by objectifying the progress of commercial gentrification in each region and by rapid diagnosis.

From this standpoint, this study aims to divide the progress of commercial gentrification in Korea into stages based on data obtained across five years from January 2015 to January 2019 in areas where commercial gentrification occurred or was expected to occur in Seoul. This type of analysis stands to provide step-by-step policy implications of commercial gentrification and explores the potential of the data to diagnose future commercial gentrification.

2. Gentrification

2.1. Definition of Gentrification

Gentrification is the first term used by Glass [12] to describe housing advancement by the middle class as they moved into residential areas of the workforce, together with the involuntary migration of indigenous workers. During periods of industrialization, the term gentrification was used among poor natives who did not own land as a concept similar to the phenomenon of extrapolation [13,14]. Generally, gentrification refers to a phenomenon of influx of upper-middle classes into existing underdeveloped areas, resulting in depression of the working class poor [15–17]. The term has been slightly redefined depending on the direction of research by country, scholars, and experts over time. Looking at differing definitions of gentrification by major scholars, the term commonly involves involuntary exclusion phenomena [3,14,18–20]. Among existing research, the works of Lees et al. [14] and Zukin et al. [3] look at gentrification from various aspects of land-use change, extending the issue to residential areas. All of these scholars also define gentrification as an involuntary expropriation of existing working-class residents or residents in underdeveloped areas by the middle class. The work of Zukin et al. [3] focuses on commercial gentrification, one phenomenon of gentrification, which results in small shops, boutiques with unique appeal, and chain stores forming “layers” of retail according to the size of capital. Alberto Rodríguez Barcón et al. [21] said that new businesses replace traditional local businesses in the city of Olzan, Spain. In the process, dilapidated and abandoned houses and traditional stores became fashionable pubs, hipster coffee shops, and creative workshops. In Shanghai, under the initiative of the government, historical dwellings were turned into upscale shopping, dining and culture areas, seeking economic revitalization through gentrification. However, the commercialization also caused involuntary extrusion of residents living in the area [22]. As in gentrification in general, commercial gentrification involves the “involuntary migration” phenomenon of small stores making way for upper-class franchises.

2.2. Retail/Commercial Gentrification in Seoul

Commercial gentrification in Seoul, Korea, has brought artists and self-employed people to commercial streets in residential areas—mostly areas where rents are low—and thus the food and beverage sector has been taking the place of residential buildings and living space [23]. This trend has and will result in a surge in the number of floating people and an increase in large-franchise restaurants and coffee shops as the regions’ original cultures are reformed. The phenomenon has the side effects of undermining regional identity and unifying big industry. Thus, prior studies in commercial gentrification in Korea have been conducted regarding the order of factors, processes of progress, and the results of commercial gentrification.

The main factors for commercial gentrification have been shown to be physical, economic, and human factors [24,25]. Kim [24] observed past and present features of the Samcheongdong-gil and Garosul regions in Sinsadong, revealing that local factors and early cheap land prices were keys to revitalizing the area. Lee, Shin, and Yang [25] judged that vitality is perceived through an area’s location and atmosphere by way of large floating populations.

Some of the characteristics that occur during commercial gentrification include the processes of changes in functionality, the increasing presence of chain stores, and the homogenization of industry [2,23,26–28]. Lee and Bae [2] divided the development of Garosu-gil into six stages including the residential formation period, the neighborhood commercial area development stage, the neighborhood merchant area stabilization stage, the cultural street image formation stage, the cultural street development stage, and the commercial zone expansion period. Park and Jeong [26] said that the merging of small lands along Samcheong-dong-gil impacts the presence of franchises. Such development activities change the identity of existing streets consisting of small buildings and stores to commercial streets with large-scale franchise stores. The work of Benediktsson et al. [27] includes ten-year business transformation data in Brooklyn and other areas of New York City.

Based on this, the concentration of franchises and the homogenization of particular industries are observed, thus defining the main characteristic of commercial gentrification. Through this process, commercial gentrification has been shown to have a positive effect in terms of economic revitalization of urban residential streets, mixed also with certain negative effects on rent prices or residents' wellbeing. Heo [23] analyzed the causes of gentrification on Gyeongridan-gil in terms of suppliers, finding the expectation that a rise in store premiums would affect suppliers' willingness to keep their businesses running despite high rents. (In addition to the rent paid to the borrower, the borrower usually refers to the customary money that the borrower pays to the person who borrows the shop, etc., which is common in stores and other stores, and is paid in anticipation of a successful business.) That research argues that the formation of commercial districts is rapid and that brisk changes caused by economic attraction have the potential to result in the inflow of speculative capital. Choi and Yang [29] surveyed Seochon residents in research that suggests that various measures should be taken to deal with the negative and positive effects of the economic, physical, and social aspects of commercial gentrification.

These commercial gentrification studies have shown that a set of processes exists. In particular, the work of Zukin et al. [3] analyzes the gentrification phase in New York City. Research shows that commercial gentrification processes are divided into the emergence of local stores, new entrepreneurship shops, and chain stores. Local stores refer to businesses long used by indigenous people, such as grocery stores and laundry shops. In commercial gentrification, these local stores are replaced by new and unique entrepreneurship shops. This process changes population characteristics and stimulates economic revitalization, thereby capturing economic opportunities. The resulting rise in rents to the infamous prices of consumer space leads to the establishment of companies with large capital to cover these rents. This aspect of the trend further replaces small and unique shops that had been the mainstay of early gentrification. Kim and Choi [30] tried to verify the three steps mentioned in the work of Zukin for the Samcheong-dong and Sinsa-dong areas. Based on road-view data covering up to five years, the processes of progress in gentrification and analysis of place changes were conducted according to changes in building usage, official land prices, and current population. As a result, it was verified that the steps of gentrification identified by Zukin were occurring very similarly in Samcheong-dong and Sinsa-dong. Yoon and Park [5] observed Seoul in terms of physical and commercial changes across a number of years from 2014. As a result of two-step cluster analysis, commercial streets were divided into three clusters, which were arranged in chronological order based on timing defined by the media. This exercise showed that the ratio of Western restaurants and cafes increased in the second stage of commercial gentrification. In the third stage, retail in clothing, cosmetics, watches, and jewelry increased significantly, while the presence of Western restaurants and cafes decreased rapidly. Analysis also revealed increasing franchise rates in the first, second, and third phases of progress. This previous study shows that there is a series of step-by-step processes that change the characteristics of streets through use changes and the homogenization and franchising of particular industries.

Many recent studies in Korea cite the results of gentrification as industry changes with dimensions of the presence of chain stores and industry homogeneity. Although sufficient research in commercial gentrification uses various variables in previous studies, there is a shortage of studies that observe changes by quantifying commercial variables. Second, the studies that separate the stages of commercial gentrification use physical and commercial characteristics but have failed to provide generalized steps and implications insofar as these studies are limited to specific areas, such as Samcheong-dong and Garosu-gil, or are limited to specific times. In addition, physical variables are an element that cannot be changed in a short period of time, so there have been limits to observed patterns of change. Accordingly, the current study analyzes 13 target streets based on data deployed across five years. We quantify commercial characteristics by dividing them into the replacement of non-commercial industries, substitution between commercial industries, vacancy, diversity, vitalization rates, and the full width of stores.

3. Research Methodology

3.1. Analytic Frame

Based on previous research, an analysis framework was constructed as shown in Figure 1 in order to empirically verify the stages of commercial gentrification. The framework is based on the stages of progress in commercial gentrification verified by Kim, H.; Choi, M. and Lee, I.; and Bae, J., which are qualitatively demonstrated [2,30]. In addition, the phase of commercial gentrification in New York, Spain, and Australia has been added [3,21,31]. In this study, Figure 1 is assumed to depict the commercial gentrification phase in Korea and can be quantitatively demonstrated through commercial characteristics.



Figure 1. Analytic frame.

The traditional stores phase, stage 1, refers to the initial stage in which commercial gentrification begins to occur. The characteristics of stage 1 include low vitalization rates, and mainly consist of independent shops because of the mix of residential and residential-commercial facilities that originally define an area. In addition, as vitalization occurs gradually, the ratio of non-commercial use to commercial use tends to be high, but as vitalization progresses, the ratio of non-commercial use to commercial use will decrease. The second stage, the creative stores phase, is when commercial gentrification begins in earnest. In this stage, independent shops (mainly small-capitalized) begin to create a unique atmosphere and lead the revitalization of proximate streets. In addition, with the entry of various industries, frequent changes between industries tend to occur. Gradually, the entrance of chain stores begins. In the third stage of the predominance of chain stores, excessive vitalization occurs. Competition among industries leads to the survival of relatively high unit prices, which are increasingly homogenized. In addition, physical enlargement together with capital expansion results in an increase in the number of chain stores with the front widths of buildings.

3.2. Study Site

The selected areas of this study are commercial streets in residential areas where commercial gentrification took place in Seoul. Zukin et al. [3] stated that local changes can be seen through media such as magazines, newspapers, and alternative media including websites and blogs. Therefore, to prescribe the study site, this study used search keywords, including craft workrooms, alleys, small-scale, cultural, cafes, and franchising, which were frequently mentioned in the media during the Korean commercial gentrification process. The main dimension of commercial gentrification in urban residential Seoul has been the emergence of boutiques. Because these boutiques are spread around streets due to continuous pedestrian traffic, street-shaped commercial districts were extracted for analysis [23]. As a result, 18 streets were drawn, and 13 commercial roads were finally selected, excluding those used as residential areas (that is, the study site excluded industrial areas and commercial areas only). Details are shown in Table 2 and Figure A1. The 13 Study sites were photographed five times across the five years from January 2015 to January 2019. The total number of photos taken by six researchers in January 2015, five researchers in January 2016, seven researchers in January 2017, six researchers in January 2018, and eight researchers in January 2019 were taken on both sides of buildings within the site, and the scope is shown in Figure 2. While taking photos, types of industries and vacancies by store were identified. Subsequently, commercial characteristics were examined in detail on this basis. Herein, analysis of only the first floors of buildings, which are sensitive to street

changes, was limited to 5523 houses and shops in 13 areas across five years of study. Class I general residential areas, Class II general residential areas, and Quasi-residential areas are part of Korea's Zoning system. Class I general residential area refers to a place where four or fewer low-rise houses are built. Class II general residential area is where the middle-story building is located. A variety of facilities can be built below the 18th floor. Quasi-residential areas add a commercial element to housing. They serve as a buffer between residential and commercial spaces.

Table 2. Study site.

	Area	Street	Land Use
1	A	Garosu-gil	Class II general residential area
2	B	Bangbae-ro 42-gil	Class II general residential area
3	C	Samcheong-ro	Class I general residential area
4	D	Seoulsup 2-gil	Class I & II general residential area
5		Seoulsup 4-gil	Class II general residential area
6	E	Seongmisan-ro	Class II general residential area
7	F	Sinheung-ro	Class I general residential area
8	G	Yeonhui-ro 1-gil	Class II general residential area
9	H	Ogin-gil	Class II general residential area
10		Jahamun-ro 7-gil	Class II general residential area
11	I	Hoenam-ro gil	Class II general residential area
12	J	Wausan-ro 3-gil	Class II general residential area
13	K	Itaewon-ro 42-gil	Quasi-residential area and Class II general residential area

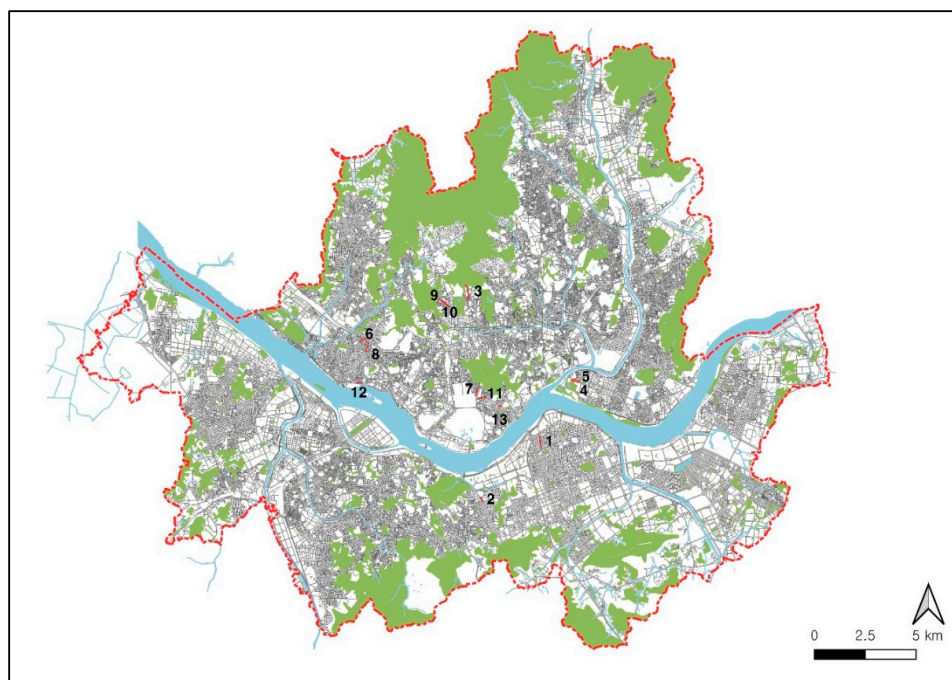


Figure 2. Key map.

3.3. Cluster Analysis

This study conducts cluster analysis to analyze and verify the progress of commercial gentrification occurring in Seoul. Although progress in commercial gentrification in each area of the study site can be determined by looking at area changes, it is necessary to classify commercial gentrification with general, step-by-step characteristics in order to manage simultaneous commercial gentrification phenomena. Cluster analysis is largely divided into hierarchical clustering and non-hierarchical clustering, both of which are performed stepwise to improve the accuracy of findings. Based on the number of clusters obtained as a result of hierarchical clustering, this study also utilizes non-hierarchical clustering and the K-means method.

4. Variables

For analysis, we subdivided industry change characteristics, which are characteristics of commercial gentrification based on prior research, into “birth”, “replacement”, and “vacancy”, and we applied “homogenization index”, “chain store”, “vitalization” and “front width of stores” as variables [3,27,28,32,33]. The work of Meltzer and Capperis [33] uses variables of stay, entry, exit, birth, and death to show industry changes. In this study, three variables—namely, birth, replacement, and vacancy—were reconstructed to suit the Korean situation, and involuntary displacement can be shown. These variables will illustrate the most characteristic of gentrification, involuntary extrusion. Vacancy is not typically mentioned as a feature of commercial gentrification, but in the course of commercial gentrification, the short-term phenomenon of current shops evolving into other industries or changing due to building construction commonly occurs together with the related vacancy phenomenon of rising rents due to progress in gentrification. Thus this study includes vacancy as one very important commercial variable to identify gentrification. Of the seven variables, the numbers of birth, replacement, vacancy, and chain stores were analyzed by switching stores per 100 M due to differing lengths of study areas.

4.1. Birth

First, commercial use conversion from non-commercial use is termed birth. To measure birth, the lengths of study areas were obtained through a quantum geographic information system (QGIS) and were then divided into the number of commercial use conversions from non-commercial use in streets. Thus, birth is measured per 100 M in streets. Birth mainly describes the vitalization of houses.

4.2. Replacement

Changes between stores are defined as replacement. To measure replacement, the number of store replacements per 100 M was measured. A store change literally means that a given store for commercial use is turned into a different store for other commercial uses.

4.3. Vacancy

Empty stores define vacancy. To measure this variable, the number of vacancies per 100 M was measured. Based on photographic data used in this study, clearly empty stores and stores displaying the words “Lease Inquiry” were classified as vacancies.

4.4. Homogenization Index

The homogenization index is a variable that identifies the degree of homogeneity in types of industries within the study area. The Herfindahl–Hirschman index (HHI) was used in this study to measure homogenization in a class of industries by changing the classifications of industries under the 9th Korea Standard Industrial Classification for transparency. The Herfindahl–Hirschman index (HHI) is used primarily in economics to identify market concentration, and also in urban studies to measure homogeneity in industries by location or within specific areas [27,34]. A Herfindahl–Hirschman index

value of 1800 and above describes an area as being “highly concentrated”, while values of 1000 to 1800 classify an area as being “moderately concentrated” and values of less than 1000 classify an area as “unconcentrated” in terms of homogeneity in industry. In other words, the larger the value of the index, the more unified an industry is. Our homogenization index using the Herfindahl–Hirschman index is as follows.

$$H_t = \sum_{t=1}^n S_t^2$$

S_t : Percentage of industry classifications in streets at t year

H_t : Degree of homogenization at t year

4.5. Chain Stores

To measure franchising, this study uses the number of chain stores per 100 M across streets. The definition of a chain store herein involves the way in which a franchise head office uses its brand name and trademarks to provide image parity to merchants and thereby to sell goods based on brand recognition.

4.6. Vitalization

To measure vitalization, this study multiplies by 100 the number of stores divided by the number of all dwellings and shops on a street. This shows how commercialized a street has become.

4.7. Front Width of Stores

In this study, the full widths of all stores in the study area were obtained in order to identify the large physical scale. The average front width of stores was obtained for the study area streets.

5. Analysis

5.1. Basic Statistics

Table 3 (below) shows variables in the study areas herein. Areas A, B, C, and K had no Share of birth and showed very high vitalization. On the other hand, Areas D and G have relatively high share of birth and relatively low vitalization. This can be observed that the higher the vitalization figure, the greater the change in the area from residential to commercial.

In Area A, there were 11.17 chain stores per 100m, while D, G, and J were mostly private stores.

K showed very frequent changing about Share of replacement and Share of vacancy. On the other hand, D had the fewest Share of replacement, while H, J, and F had the fewest Share of vacancy.

A, B, and D were relatively wide in front of stores, while K, H, and F were relatively small. The wider the full width, the more likely it is to be an area where franchising has progressed or where the change from residential use to commercial use has just begun.

Based on the HHI index, the number of businesses in A is 2297, which shows that the industries are very homogeneous, and in the case of B, J, and I, the industries are very diverse.

5.2. Cluster Statistics

The aforementioned year-by-year figures for birth, replacement, vacancy, the homogenization index, chain stores, vitalization, and the front widths of stores were averaged for side-by-side comparison. These figures were re-standardized to sequentially perform hierarchical and non-hierarchical clustering. Based on hierarchical cluster analysis, it was deemed appropriate to classify results into three types. One of the non-hierarchical clustering analyses, K-means, was re-typed by study site. Results were derived as shown in Table 4. Cluster 1 includes D and G, and Cluster 2 includes B, F, H, J, K, I, and E. Cluster 3 includes A and C.

Table 3. Basic statistics.

Category	Share of Birth	Share of Replacement	Share of Vacancy	Retail Diversity (HHI)	Share of Chain Stores	Vitalization	Front Width of Stores
	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
A(Garosu-gil)	0.00	2.38	1.19	2298.0	11.17	1.00	8.44
B(Bangbae-ro 42-gil)	0.00	3.30	0.44	384.9	1.47	0.95	6.25
C(Samcheong-ro)	0.00	1.87	0.69	603.9	5.17	0.96	7.61
D(Seoulso 2, 4-gil)	0.76	1.61	0.36	1670.4	0.32	0.62	8.62
E(Seongmisan-ro)	0.27	2.29	0.76	663.2	1.25	0.82	6.10
F(Sinheung-ro)	0.09	2.69	0.18	830.7	1.28	0.89	5.83
G(Yeonhui-ro 1-gil)	0.65	2.02	1.01	1395.4	0.64	0.69	6.74
H(Ogin-gil, Jahamun-ro 7-gil)	0.03	2.58	0.21	939.2	1.58	0.97	5.33
I(Wausan-ro 3-gil)	0.19	2.07	0.19	435.6	0.53	0.85	6.82
J(Itaewon-ro 42-gil)	0.00	6.74	1.23	790.0	1.51	0.98	4.33
K(Hoenamu-ro gil)	0.00	2.33	0.54	465.4	3.01	0.98	6.35

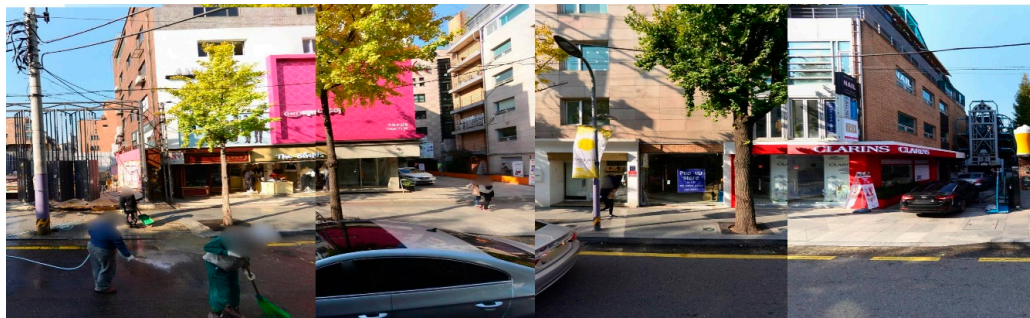
Table 4. Cluster characteristic analysis.

Category	Cluster		
	1 (n = 2)	2 (n = 7)	3 (n = 2)
Birth	0.707	0.072	0.000
Replacement	1.817	2.947	2.129
Vacancy	0.687	0.479	0.942
HHI	1532.903	627.803	1450.918
Share of chain stores	0.479	1.530	8.171
Vitalization rate	0.656	0.930	0.980
Front width of stores	7.677	5.704	8.027
Streets	D G	B F H J K I E	A C
Types of use (2015)	Residential (46.85%) Cafes (5.59%) Korean food and hair salons (3.5%)	Housing (8.88%) Cafes, Real estate advisories and brokerages (5.92%) Shirt and blouse retail (5.76%)	Shirts and blouse retail (27.78%) Cosmetics (11.54%) Cafes (8.12%)
Types of use (2019)	Residential (28.57%) Cafes (12.24%) Western-style establishments (5.42%)	Cafes (8.26%) Residential (6.94%) Western-style establishments (6.61%)	Shirts and blouse retail (22.78%) Cosmetics (12.17%) Rental free (11.3%)

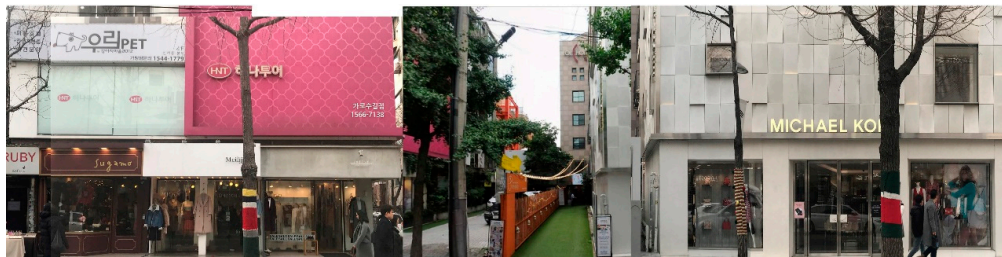
Based on the analysis results of clusters and the ratio of industries in 2015 and 2019 by cluster, this study analyzes the characteristics of each type of industry and observes the step-by-step comparison. Industry composition extracts the top three sectors of each cluster based on the tax classification of the 10th Korea Standard Industrial Classification. Table 4 shows that cluster 1 has the highest share of birth at 0.707 in comparison to other clusters. The share of replacements is 1.817, which is slightly smaller than other clusters. Vacancies are observed at 0.687 and the homogenization index is 1532.903, indicating that cluster 1 industry is moderately homogeneous. Franchise figures and vitalization rates are 0.479 and 0.656, respectively, which are the lowest in comparison to other clusters. The average front width of stores is 7.677 m.

Cluster 2 has a very small share of birth at 0.072, while replacements are high at 2.947 and there is active transition between commercial uses of existing commercial space. Vacancies represent a small number at 0.479 and are observed slightly less in cluster 2 than in other clusters. The homogenization index is 627.803, which shows a wide variety of industries. The chain store figures and vitalization rates are 1.530 and 0.930, respectively, showing an increase in chain stores and vitalization in comparison to cluster 1. The average front width of stores is 5.704 m, lower than in cluster 1, which is consistent with the increase in the number of small stores.

Cluster 3 has the lowest share of birth at 0.000. From this, it can be inferred that there is little residential use in cluster 3. The share of replacement depicts moderate transition between commercial uses of existing commercial space at 2.129. Vacancy, at 0.942, indicates a rather high vacancy rate. This trend is also evident in field surveys, and the increase in vacancies is one of the problems caused by commercial gentrification in Seoul. The index for homogenization stands at 1450.918, indicating that cluster 3 industry is somewhat homogenous in comparison to industry in cluster 2. Franchise figures and vitalization rates are 8.171 and 0.980, respectively, showing that streets in cluster 3 have been mostly franchised and transformed into commercialized spaces. The average front width of stores is 8.027 m, and it can be seen that large-scale physical change has occurred with commercial gentrification. Figure 3 shows the scale of buildings expanding entrances to franchise stores with large capital.



2015 Garosugil



2019 Garosugil

Figure 3. The change from small shops to large capital shop.

5.3. Cluster Characteristic Analysis

Changes in the use of building spaces in cluster 1 in 2015 and 2019 show higher percentages of residence, with 46.85% and 28.57%, respectively. Gradually the rate of dwellings decreases, with the number of cafes (12.4%) and Western-style restaurants (6.61%) increasing (see Table 4). Area D was first mentioned in the media in July 2014 and is relatively new commercial compared to Cluster 2 and 3. Based on analysis results and our theoretical framework, cluster 1 shows an active shift in the commercial use of housing, even though the housing ratio remains high in comparison to commercial space. This example is shown in Figure 4, showing that approximately 18 percent of residential space has changed to commercial space. Vacancy rate is somewhat high, which can be seen in photographs as a temporary vacancy resulting from the transformation of the street into a commercial space. Moreover, the reason why Front width of stores is high is that residential buildings exist more than other clusters. The franchise ratio and the conversion ratio between commercial sectors in cluster 1 are the lowest in comparison to these metrics in other clusters. These findings demonstrate that cluster 1 is at a stage where commerce is beginning to penetrate some of the residential-oriented streets, which is the beginning of gentrification.

Changes in the use of building spaces in cluster 2 in 2015 and 2019 show a sharp decline from percentages in cluster 1 to 8.8% and 6.94%, respectively. In addition, it can be seen that residential use in cluster 2 decreases while the numbers of cafes, Western-style restaurants, and clothing businesses increase slightly. In sum, it can be interpreted that cluster 2 is gradually becoming more diverse and commercialized as the number of franchises increases, while the number of spaces with residential functions decreases in comparison to cluster 1. An example of this is shown in Figure 4, where the area F has changed from a café (independent store) to a conglomerate-based supermarket. Cluster 2 shows a relatively high number of commercial use transitions in comparison to the other clusters, which can be seen as a step toward greater change. Given that Cluster 2 has the lowest vacancy rate and very high vitalization rate, it can be seen that cluster 2 is at a stage where commercial gentrification is in full swing—while housing still exists, it accounts for a smaller proportion and vitalization is more advanced.



Cluster 1(Seoulsup2gil,2016) Residential



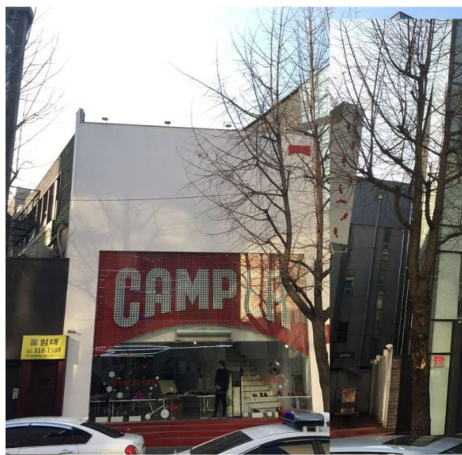
Cluster 1(Seoulsup2gil,2019) Cafe



Cluster 2(Sinheungro, 2017) Café(Creative store)



Cluster 2(Sinheungro, 2019) Franchise market



Cluster 3(Garosugil, 2017) Franchise Shoes store



Cluster 3(Garosugil, 2019) Vacancy

Figure 4. Changes in the use of building.

Changes in the use of building spaces in cluster 3 in 2015 and 2019 show that clothing and cosmetics industries are the top industries across the time sample. However, it can be seen that vacancies in the area are increasing over time, as vacancy rates rise to 11.3% in 2019. In sum, cluster 3 represents an area of completely commercialized streets. In addition, of all the clusters, cluster 3 has the highest percentage of franchises, as well as the highest percentages of replacement, vacancy, and front widths of stores. This is an area comprised largely of corporate franchises, not individual independents store, which fill the streets with industries with high turnover and high guest unit prices, such as retail space in clothing and cosmetics [35]. In other words, cluster 3 features commercialized streets dominated by franchise stores with significant commercial gentrification. Since food and beverage industries have a ceiling on sales due to the limited turnover, cafes and Western restaurants tend to

decline in the long-running commercial districts of gentrification [35]. The target area of Figure 4 is area A, corresponding to cluster 3, which was first mentioned in the media in August 2006 [28]. Area A, which has been commonly referred to as a hip business district since 2006, is a street where the vacancy rate is steadily increasing due to the increasing rent. Moreover, Camper, a global company, was pulled out in 2017 because of high rental cost. Since then, there have been no stores that can pay the rent, so the vacancy continues until 2019. At the same time, other independent stores are changing into chains or entering short-term lease, pop-up store. That's why vacancies repeat every short period of time. Area A is the most luxurious and popular commercial district in Seoul, where vacancies are occurring simultaneously. Therefore, it is important to note the decline of commercial districts due to increased vacancies.

6. Conclusions

This study divides the process of commercial gentrification into stages through quantitative analysis, and the validity of commercial gentrification indicators are revealed by the use of photographic data, which were constructed directly for five years. Types of industry are identified using cluster analysis and are used to show differing stages of commercial gentrification. Unlike the fact that preceding research has examined commercial gentrification locally and that physical variables have been considered rather than commercial characteristics when trying to verify stages, this study shows the most volatile commercial characteristics of the city of Seoul quantitatively. The main results of this study are as follows.

First, three types of industry are derived using cluster analysis based on seven variables of birth, replacement, vacancy, homogenization index, franchise stores, vitalization, and the average front width of stores.

Second, the characteristics of each type derived from cluster analysis results are analyzed and investigated with changes in industry structure for more detailed analysis. Cluster 1 is seen to be a first step where residential proportions are high, and vitalization and franchise figures are low, suggesting that commercial gentrification is just beginning. Cluster 2 has been commercialized more than cluster 1, but data confirms that residential uses still exist in the sample area. Cluster 3 is a fully commercialized landscape, which can be seen as the third stage of commercial gentrification—comprised mainly of franchise stores. These findings validate the theoretical analysis framework and result in commercial characteristics being useful in explaining the stages of commercial gentrification in residential areas. As a result, this study makes it possible to verify that recognizable steps of commercial gentrification were carried out sequentially in clusters 1, 2, and 3.

Through analysis results, this study identifies the following implications. Commercial gentrification may be interpreted as a process of sequential steps, demonstrating that the commercial characteristics of each stage are distinctly different. Therefore, different policies are needed for different stages of commercial gentrification. Up to the first stage, residential functions are the main focus, and the diversity of industries remains high due to a mix of residential space, residential facilities, and commerce.

This is a positive step in commercial gentrification, where residential vitality can be increased. Our findings show that preemptive management measures are needed to prevent the expected growth of franchises and the homogenization of industries while maintaining the current commercial characteristics of diverse street environments. For example, the District Unit Plan suggests that diversity in streets and housing functions should be protected with measures such as restrictions on entry into franchised industry and restrictions on the entry of new businesses into identical industries. Later, in the second stage of commercial gentrification, our findings reveal more advanced vitalization. In the second stage, we see that policies are no longer needed to maintain the characteristics of residential areas but rather that policies are needed to maintain the status quo of unique commercial streets. Subsequently, in the high vitalization of the third stage, it can be seen that the government

needs revitalization policies for areas to serve as representative tourist destinations rather than points of regionality.

One limitation is that this study does not cover an entire commercial area within the massive sphere of influence of gentrification because our analysis was conducted through direct-captured photographic data. However, it is meaningful that previous step-by-step classification of gentrification in the work of existing research demonstrates that the framework can be applied in many extended locations in Korea as well. Moreover, since the data used in this study are photographic data, there is a limit to the status of changes in vacancies and stores.

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Appendix A



Figure A1. Cont.

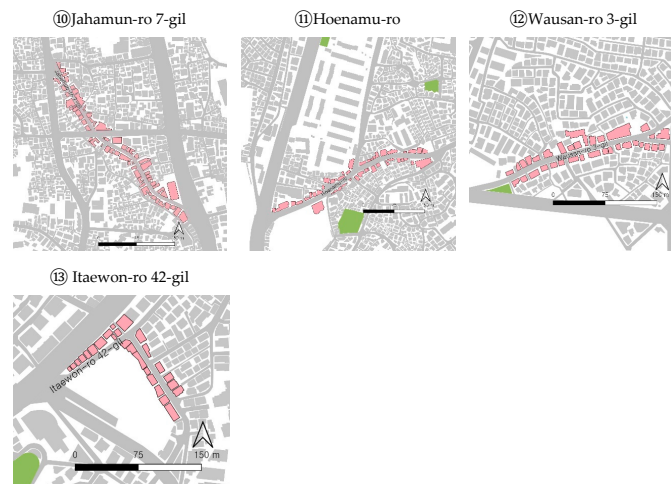


Figure A1. Map of the study sites.

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