A Study on the Rent Characteristics of Small Shopping Malls

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Abstract

Purpose: The purpose of this study is to analyze the rental determinants of a small shopping mall located in Seoul, Korea, and the characteristics of four commercial districts (CBD, GBD, YSD, etc.). **Research design, data, and methodology:** For the characteristics of the data, descriptive statistics and frequency analysis were used. Artificial Neural Networks (ANNs) have been used as rental determinants for small shopping malls. The characteristics of 4 commercial districts were analyzed using Analysis of variance (ANOVA) and post-hoc analysis. **Results:** 1) CBD 14.8%, GBD 16.7%, YSD 13.0%, others 55.6%. 2) The order of important variables affecting rent: CBD=1> GBD=1> vacancy rate> rental index> number of buildings> YBD=1> average gross floor area> conversion rate> average floor. 3) Characteristics of commercial district: Rents in CBD and GBD are high. The conversion rate is high in the GBD commercial area. The number of buildings is high in the CBD. The average area of GBD is larger than that of other commercial districts. **Conclusions:** 1) Several factors should be considered when investing in or renting a small shopping mall. 2) Depending on the investment and business purpose, factors such as rent, conversion rate, building, and area average should be considered.

Keywords: Small Shopping Mall, Commercial Districts, Rent, Artificial Neural Networks, Analysis of variance, Post-Hoc

JEL Classification Code: A14, A19, R11, R15, R41

1. Introduction

Small-scale shopping malls in Seoul, the capital of South Korea, play an important role as business places for small business owners. As for the rental demand for small shopping malls, the demand for businesses close to the lives of small business owners and the demand for start-up businesses of retirees due to the aging population is concentrated.

In the rural areas of Korea, the population has begun to disappear, and the population is concentrated in metropolitan areas. Accordingly, those considering self-employment tend to focus on small-scale shopping malls in densely populated metropolitan areas, especially Seoul.

Small shopping malls are the type of shopping malls that people starting a business can easily access for the first time. This is because small-scale shopping malls are mainly located in close-to-life industries. According to the National Tax Service, the number of small-scale shopping malls was in the order of restaurants > private institutes > real estate brokerages. Convenience stores were located on the first floor, private institutes on the second floor and above, and karaoke rooms in the basement.

The aging rate in Korea is accelerating. However, preparation for old age is insufficient. Consequently, the percentage of retirees choosing self-employment for retirement income was the highest (Van Solinge, 2014).

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In January 2021, the Seoul 50 Plus Foundation surveyed new career choices after retirement among the 50+ generations (people between the ages of 50 and 64) residing in Seoul. As a result of the survey analysis, the new job types after retirement were found a job-seeking type (64.3%), a livelihood type (24.7%), and an activity-seeking type (11%).

For those who plan to become self-employed, the rent of the shopping mall is an important factor. On the other hand, there was a limit to the data that were not disclosed about the rent of a shopping mall. Most studies have been conducted to obtain and analyze shopping malls' rental rates and characteristics using personal channels, but these studies are also insufficient. Additionally, research on the rental rates of office buildings that are relatively open to the public is the main focus.

Therefore, this study analyzed the rental characteristics of small shopping malls in Seoul. Using official data published in the Real Estate Statistical Information System (R-ONE) of the Korea Real Estate Board, we analyzed the characteristics of rents for small-scale shopping malls in Seoul. Based on the analysis results, we intend to provide information on the rent characteristics for each commercial district in Seoul for those who want to start a business in small shopping malls. Through this, we aim to help small shopping mall operators in their decision-making in shopping mall selection.

2. Literature Review

2.1. Small Shopping Mall Definition

Among the commercial facilities in Korea, shopping malls are divided into office buildings, medium and large shopping malls, small shopping malls, and collective shopping malls.

An office building is a general building with more than six floors and is mainly used as an office in a general building book.

Medium-to-large shopping malls are primarily used for general building ledgers. It is a general building with three or more floors, or a total floor area of more than $330\,\text{m}^2$. The targets were type 1 and 2 neighborhood living, sales, sports, and amusement facilities.

Small-scale shopping malls are mainly used for building ledgers. These are Type 1 and 2 neighborhood living facilities, sales facilities, sports facilities, and entertainment facilities. It is a general building with two or fewer stories and a total floor area of $330\,\text{m}^2$ or less. The main use of the collective shopping mall is that of the shopping mall. It is a collective building that is a type 1 and 2 neighborhood living facility, sales facility, sports facility, and entertainment facility.

2.2. Research Differentiation

Sirmans and Krisandra (1993) analyzed the effect of the characteristics of 55 shopping center stores on rent formation. The + factor is the size of the shopping center, and the - factor is the number of years elapsed and the vacancy area. In addition, the design form of the shopping center and region had an influence. A limitation of this study was its small sample size. However, it is meaningful in that it presents the factors that determine the rent of retail facilities and provides further research directions.

Hardin et al. (2002) analyzed an empirical analysis of the factors determining the rent of a community center was conducted using a two-step model. The first stage model of this study estimated the community center vacancy. The two-level model is a demand model that examines the endogenous and exogenous determinants of community center rental rates. The first-stage model, vacancy, was included in the second-stage model. Data for this study were from 118 community centers in Atlanta, Georgia. The results of the study showed that maximum community center rentals were highly correlated with the center's expected vacancy rate and location within the Atlanta area. In addition, the maximum and minimum level of rent was less influenced by the purchasing power of the trading area, the age of the building and proximity to the local shopping mall, and the design of the center and nearby factors.

Benjamin et al. (1990) divided rent into base and excess rent. The results of the analysis show that the basic rent decreases as the rent ratio increases as the sales threshold level increases.

Accurate visibility quantification can affect rent negotiations between the mall management and potential tenants. Jain et al. (2021) identified the major determinants of shopping mall rentals and, second, checked whether there was a statistically significant deviation in shopping mall rentals. The relative importance index and survey data collected from 11 shopping malls in Lusaka were analyzed. As a result of the analysis, high rental insurance premiums suffered damage.

Wheaton (2000) studied the basic and excess rent of retail tenants. It has been shown that the revenue ratio is highly variable and positively dependent on fixed rents (sales externalities).

Adair et al. (1997) analyzed retail store rental factors using artificial intelligence technology. Pure inductive, inductive (Q-model), inductive (prototype), and inductive (Q-model and prototype) approaches were used as case-based reasoning approaches for the retail real estate domain.

Raslanas and Lukošienė (2013) analyzed US experience and data available for rent determination, implemented the

necessary adjustments, and applied them to the Lithuanian market.

Yu et al. (2018) investigated the impact of Austin MetroRail on commercial real estate values using the Spatial Durbin model (SDM). Geo-weighted regression analysis showed that the premium was significantly higher in the Central Business District (CBD) and TOD regions. Awareness of these disparate price effects is useful for project financing and TOD strategy design.

The retailer's rent is an important factor in the number of customers in the store and the number of pedestrians passing. Jeong et al. (2013) analyzed the effect of pedestrian characteristics on retail rent. Ninety-six retail stores in Korea were targeted.

Through multiple regression analysis, Jeong (2015) analyzed rents, locations, and facilities for 4,990 retail real estates in Seoul, Korea. The important variables were the number of floors above ground, number of basement floors, number of elevators, subway line distance, building age, ratio of the rental area, number of owners in 1999, and security deposit.

Most of the prior studies on the determinants of rent in shopping malls are those in which researchers obtain and analyze data individually. In Korea, public data and indices have been established for residential real estate, especially apartment rentals.

However, it is challenging to obtain rent from shopping malls. However, since 2002, the Korea Real Estate Agency has provided market information by measuring commercial real estate investment performance and identifying market trends through asset value calculation and rental information surveys of commercial real estate (office, shopping mall) across the country.

Therefore, in this study, it is differentiated in analyzing the rent characteristics of small shopping malls in Seoul using reliable rental data.

3. Data and Research Methods

3.1. Data

This study used data from 54 small shopping malls from the Real Estate Statistical Information System (R-ONE) of the Korea Real Estate Agency.

The analysis variables include rent (KRW 1,000/㎡) of small shopping malls, location characteristics of small shopping malls (commercial district), individual characteristics of shopping malls (rental index, vacancy rate, conversion rate), and physical characteristics of small shopping malls buildings (buildings, average floors, area average).

3.2. Composition of Variables

The rent is the market rent per square meter. The market rent is not the actual contracted amount between the lessee and the lessor but the tradable price at that time. Because the first floor is mainly used most efficiently in the shopping mall, the rent based on the first floor is calculated (R-ONE). The calculation method converts the rent/leaseable area (exclusive area + common area), and after converting the deposit and monthly rent paid by the lessee into the full monthly rent amount using the conversion rate, divided by the total rental area per unit area (㎡), calculate the level (R-ONE). Management fees are not included in the rent.

The commercial districts of Seoul, which have geographical characteristics, are the central business district (CBD), Gangnam business district (GBD), Yeongdeungpo Sinchon District (YSD), and others. The CBD is a central business district covering the Jung-gu and Jongno-gu areas. The GBD is located in Gangnam-gu, Teheran-ro, and Gangnam-daero in Seocho-gu. YSD is the business district of Yeongdeungpo University and the university district of Sinchon. The other is the commercial district of Seoul.

The rental index, vacancy rate, and conversion rate, which are individual characteristics of a shopping mall, are as follows: The rental index was calculated using the market rent of the base floor of the sample building compared to the base time (4/4 quarter of 2021) to estimate the change between the two points in the total cost paid by the lessee to occupy a certain space (R-ONE). The calculation method (R-ONE) is as follows: The business district index of the sub-region is as follows:

$$I_{D,t} = \frac{\frac{1}{n}\sum_{i=1}^{n} p_i^t}{\frac{1}{n}\sum_{i=1}^{n} p_i^0} \times 100$$

$$= \sum_{i=1}^{n} \frac{p_i^0}{\sum_{j=1}^{n} p_j^0} \frac{p_i^t}{p_i^0} \times 100$$

$$= \sum_{i=1}^{n} w_i^0 \frac{p_i^t}{p_i^0} \times 100$$

$$w_i^0 = \frac{p_i^0}{\sum_{j=1}^{n} p_j^0}$$

$I_{D,t}$: *D subregion index at time t*
p_i^t: *The total rent of the base floor at the ith time t*
p_i^0: *The total rent of the base floor at the i-th base point*
w_i^0: *The weight of the i-th survey target*

The top regional index was calculated by applying the total gross floor area of the population for each commercial

district as weight.

$$I_{M,t} = \sum_{D \in M} w_D I_{D,t} \qquad w_D = \frac{y_D}{\sum_{D \in M} y_k}$$

$I_{M,t}$: M upper region index at time t
w_d: D Sub-region weights
$I_{D,t}$: Index of time t in sub-region D
y_d: Total population gross floor area for sub-region D

The vacancy rate (%) refers to the empty space in an office/commercial building that has not been leased or used for private or sale. The vacancy rate was calculated by dividing the sum of the vacancy areas in the area by the total gross floor area of the area.

The conversion rate (%) is the deposit conversion rate of Cheonsei or monthly rent with the guarantee used when calculating the rent of a shopping mall (based on the first floor).

The conversion rate is the required rate of return of the lessor and is used to convert a portion of the Jeonse money into monthly rent or convert monthly rent to a deposit or cheonsei, as follows:

$$\text{Vacancy Rate} = \frac{\sum_{j=1}^{n_i} V_{ij}}{\sum_{j=1}^{n_i} A_{ij}}$$

n_i: ith total number of buildings
V_{ij}: Vacancy area of the i-th building
A_{ij}: Total floor area of ith and jth buildings.

The physical properties of the buildings are buildings, average floors, and average area. Buildings refer to the number of buildings in a small shopping mall.

The average number of floors is the average number of floors. The average area is the average total floor area of the shopping mall.

3.3. Research Hypothesis

This study focused on the fact that the rent of a small shopping mall in Seoul varies according to the characteristics of the shopping mall.

H1: The rent of a small shopping mall is affected by the physical, location, and individual characteristics of the shopping mall.
H2: The rents and characteristics of small-scale shopping malls differ depending on the commercial district.

H1 analyzes the size that affects rent using a neural network analysis method.
H2 was analyzed using ANOVA.

3.4. Analysis Methods

Artificial neural networks (ANNs) and analysis of variance (ANOVA) were used in this study.

ANNs(An artificial neural network function) is a combination of several functions. A frequently used type of synthesis is the nonlinear weighted sum. A predefined function, such as a hyperbolic function, is also known as an activation function (Bede et al., 2022).

The artificial neural network function is as follows.

$$f(x) = k \left[\sum_i w_i g_i(x) \right]$$

$f(x)$: ANNs function
w: weight
g: other function

Methods for analyzing the research questions are frequency analysis, ANOVA analysis and post-mortem analysis, and cross-analysis. The ANOVA and Levene's tests for choosing the post-analysis methods to verify the research hypothesis are as follows: Levene's test statistic for equal variances (Kim, 2021).

$$P_O = \frac{(N-k) \sum_{i=1}^{k} n_i (\bar{z_i} - \bar{z})^2}{(k-1) \sum_{i=1}^{k} \sum_{j=1}^{n_j} (z_{ij} - \bar{z_i})^2}$$

k: Number of groups
n_i: number of ith level samples
N: Total number of samples

ANOVA verified significant differences between the groups within a 10 percent significance probability. The post-hoc analysis methods (Scheffe & Dunnett T3) were selected according to Levene's test results (Kim, 2021).

When equal variance was assumed, the Scheffe test was used, and concurrent pairwise comparisons were performed for all possible pairwise average combinations using the F-sampling distribution (Kim, 2021).

It can be used to investigate all possible linear combinations of group means and pairwise comparisons. Dunnett's T3 test was appropriate when the variances were unequal. This is a pairwise comparison test based on the studentized maximum coefficients (Kim, 2021).

4. Results and Discussion

4.1. Basic Analysis

This is the basic statistic of the rents of small shopping malls and the factors that affect them. The maximum,

minimum, mean, and variance were calculated for the continuous variables. The average rent is 50,000 KRW/㎡. The average rental index was 100. The average vacancy rate is 5.8. The average conversion rate was 7.2. The average number of small commercial buildings was 15 dongs. The average number of floors in a small shopping mall is 1.6. The average floor area of small shopping malls was 133㎡.

Table 1: Descriptive Statistics

Variable		Min	Max	Ave	SD
Dependent	Rent (KRW,1000/㎡)	26	138	50	20
Individuality Characteristics	Rental Index	99	102	100	0
	Vacancy Rate(%)	0.0	36.9	5.8	7
	Conversion rate(%)	5.7	8.2	7.2	1
Physical Characteristics	Buildings (dong)	5	57	15	11
	Average of floors (floors)	1.0	2.0	1.6	0
	Area average (㎡)	47	248	133	52

The frequency analysis results of the categorical variables are as follows: CBD is 14.8%, GBD is 16.7%, YSD is 13.0%, and the others are 55.6%. The regional division of the raw data in terms of ratio was not equal. The other regions have the highest percentages.

Table 2: Frequency Analysis

Variable	Frequency	%
CBD	8	14.8
GBD	9	16.7
YSD	7	13.0
The others	30	55.6
Total	54	100

4.2. Artificial Neural Networks

Artificial neural networks were used to analyze the effect on the rent of a small shopping mall. The dependent variable was rent, and the independent variables were the commercial area, rental index, vacancy rate, conversion rate, buildings, the average number of floors, and area average (Jain et al., 1996).

Figure 1 shows the calculation process for neural network analysis.

ANNs use the error between the predicted and actual values by training multiple times. A learning model was created by varying the weight of the synapse. Through deep learning, ANNs have multiple hidden layers between the input and output layers (Argatov, 2019). Figure 1 shows the calculation process using a multilayer perceptron.

ANNs have nine levels. It includes package loading, data preparation, exploratory data analysis, regularization, data separation, learning model construction, training, prediction, and learning model performance evaluation (Krogh, 2008).
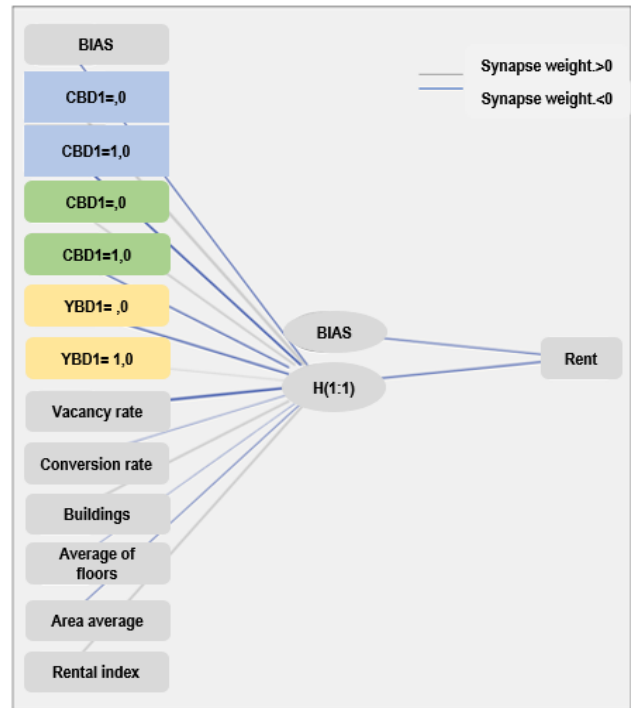

Figure 1: Neural Network Analysis Process

The importance of the normalized variables as a result of the ANNs analysis is presented in Table 3.

The important variables affecting rent are CBD=1, GBD=1, vacancy rate, rental index, buildings, YBD=1, area average, conversion rate, and floor average. CBD was found to be an important factor (100%) compared with other regions in terms of normalized importance.

According to the ANN analysis, the order of important variables affecting rent is shown in Figure 2.

The area average, conversion rate, and floor average had insignificant effects on small shopping malls' rent.

Table 3: Normalization Importance

Variable	Importance	Normalization Importance
CBD=1	.373	100.0%
GBD=1	.197	52.8%
YBD=1	.085	22.8%
Vacancy Rate	.136	36.4%
Conversion rate	.003	.8%
Buildings	.099	26.7%
Rental Index	.103	27.7%
Average of floors	5.693E-05	.0%
Area average	.003	.9%

Thus, research hypothesis 1 was verified using ANNs. The results are as follows. The rent of a small shopping mall is affected by the physical, location, and individual characteristics.
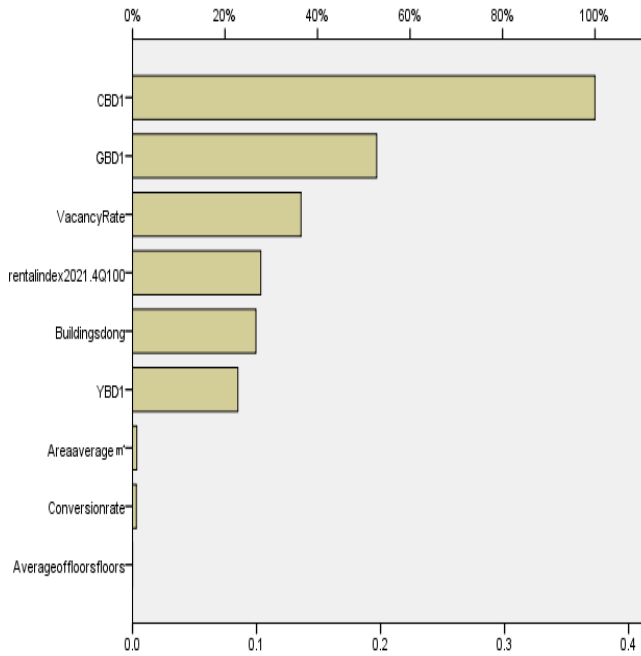

Figure 2: Normalization Importance

4.3. ANOVA

An ANOVA analysis was performed to validate hypothesis 2, that there is a difference by business district.

First, Levene's test, which is a test of equal variance, was performed. Table 4 presents the results.

After the analysis of variance, post-hoc analysis was performed to identify the differences between the groups. The Scheffe and Dunnett T3 tests were performed as a post-hoc analysis method.

The Scheffe post-hoc analysis method was used when the variance between the populations was the same as that in the Levene test ($p \geq 0.05$).

Dunnett's T3 post-hoc analysis method was used when the Levene test was $p<0.05$, and the variances between the populations were not the same (Cuevas et al., 2004; Connelly, 2021; Sohal, & Jain, 2018).

The variables corresponding to the Scheffe test were the vacancy rate, average per floor, average area, and rental index. The variables corresponding to Dunnett's T3 are rent, conversion rate, and building.

Among these variables, significant variables in the ANOVA are analyzed post-hoc.

Table 4: Test for Homogeneity of Variance

Variable	Levene	S.L	Significance Level
Vacancy Rate	1.896	.142	Scheffe
Rent	3.516	.022	Dunnett T3
Conversion rate	12.028	.000	Dunnett T3
Buildings	3.803	.016	Dunnett T3
Average of floors	1.649	.190	Scheffe
Average of Area	2.012	.124	Scheffe
Rental Index	0.456	.714	Scheffe 3

The ANOVA results are shown in Table 5. The significant variables were rent, conversion rate, buildings, and average area. Significant differences between groups were verified with a significance probability of 5%.

Table 5: ANOVA

Division		Mean Square	F	Significance Level
Vacancy Rate	Between	56.069	1.22	.313
	Within	46.022		
Rent	Between	2506.7	9.40	.000
	Within	266.63		
Conversion rate	Between	2.230	5.31	.003
	Within	.420		
Buildings	Between	680.69	7.85	.000
	Within	86.719		
Average of floors	Between	.187	2.73	.054
	Within	.069		
Average of Area	Between	22650	15.2	.000
	Within	1494.5		
Rental Index	Between	.142	.788	.508
	Within	.180		

Between: Between groups, Within: within a group

Combining the results of ANOVA and Levene's test, the subjects of the post-hoc analysis were as follows. The Dunnett T3 variables were rent, conversion rate, and buildings. Those corresponding to the Scheffe test are the averages of the area variables. Dunnett's T3 post-hoc test results are presented in Table 6.

Table 6: Dunnett T3 Post-hoc Test

Division			Mean Difference	Signi. level
Rent	CBD	GBD	14.9710	0.32
		YSD	27.0267*	0.02
		ETC.	32.3951*	0.00
	GBD	CBD	-14.9710	0.32
		YSD	12.0557	0.55
		ETC.	17.4240*	0.06
	YSD	CBD	-27.0267*	0.02
		GBD	-12.0557	0.55
		ETC.	5.3683	0.89
	ETC.	CBD	-32.3951*	0.00
		GBD	-17.4240*	0.06
		YSD	-5.3683	0.89

			Mean Difference	Signi. Level
Conversion Rate	CBD	GBD	-.4992	0.48
		YSD	.1201	0.99
		ETC.	.4542	0.39
	GBD	CBD	.4992	0.48
		YSD	.6193	0.32
		ETC.	.9533*	0.00
	YSD	CBD	-.1201	0.99
		GBD	-.6193	0.32
		ETC.	.3340	0.68
	ETC.	CBD	-.4542	0.39
		GBD	-.9533*	0.00
		YSD	-.3340	0.68
Buildings	CBD	GBD	19.806*	0.00
		YSD	6.393	0.63
		ETC.	14.017*	0.01
	GBD	CBD	-19.806*	0.00
		YSD	-13.413*	0.05
		ETC.	-5.789	0.45
	YSD	CBD	-6.393	0.63
		GBD	13.413*	0.05
		ETC.	7.624	0.30
	ETC.	CBD	-14.017*	0.01
		GBD	5.789	0.45

First, Rent's post-test results showed differences in CBD, YSD, CBD, and other commercial districts and in GBD and other commercial districts. The rent in the CBD commercial area is 27 times higher than in the YSD commercial area. The rent in the CBD commercial district is 32 times higher than in other commercial districts. The rents in the GBD commercial districts were 17 times higher than those in other commercial districts.

The following is the post-test result of the conversion rate; there was a difference between the GBD and other commercial areas. The conversion rate of GBD commercial districts was 0.95 times higher than other commercial districts.

Finally, the post-test results for the number of buildings in small shopping malls showed differences in CBD, GBD, CBD, and other commercial districts, and GBD and YSD commercial districts.

The number of buildings in the CBD commercial district was 19.8 times higher than in the GBD commercial district. The number of buildings in the CBD commercial district was 14 times higher than in other commercial districts. The number of buildings in the GBD commercial district was 13.4 times smaller than the number of buildings in the YSD commercial district.

In conclusion, the rents in the CBD and GBD were high. The number of buildings in the CBD is high. The conversion rate was high in commercial GBD areas.

The results of Scheffe's post-hoc test on the average area of small shopping malls is shown in Table 7.

Table 7: Scheffe Post-hoc Test

Division			Mean Difference	Signi. Level
Area	CBD	GBD	-118.7357*	0.00
		YSD	-25.9608	0.59
		ETC.	-41.5243*	0.00
	GBD	CBD	118.7357*	0.00
		YSD	92.7749*	0.00
		ETC.	77.2114*	0.00
	YSD	CBD	25.9608	0.59
		GBD	-92.7749*	0.00
		ETC.	-15.5635	0.93
	ETC.	CBD	41.5243*	0.00
		GBD	-77.2114*	0.00
		YSD	15.5635	0.93

In the commercial districts where the difference occurred, there were differences in the CBD, GBD, CBD, and other commercial districts; GBD and YSD commercial districts; and GBD and other commercial districts. The average area of GBD is approximately 119 times larger than that of CBD. The average area of GBD was approximately 93 times larger than that of YSD. The average area of GBD is approximately 77 times larger than that of other commercial districts. The average area of the other commercial districts was approximately 42 times larger than the average area of the CBD.

In conclusion, the average area of GBD was larger than that of other commercial districts.

5. Conclusions

This study analyzed the rental determinants of small shopping malls in Seoul, Korea, and the characteristics of four commercial districts (CBD, GBD, YSD, and others). The methods used were frequency analysis, artificial neural network, ANOVA, and post-hoc analysis. Descriptive statistics and frequency analyses were used to analyze the characteristics of the data. ANNs were used as determinants of rent for small shopping malls. The characteristics of the four commercial districts were analyzed using ANOVA and post-hoc analysis.

The analysis results are as follows.

First, the characteristics of the data were analyzed. The average rent index was 50,000 won/m^2, the average vacancy index was 100, the average conversion rate was 5.8, the average conversion rate was 7.2, the average conversion rate was 7.2, the average number of floors was 1.6 floors, and the average total floor area was 133 m^2. 14.8% for CBD, 16.7% for GBD, 13.0% for YSD, and 55.6% for the others.

Second, the order of the important variables affects the rent. CBD=1> GBD=1> vacancy rate> rental index> number of buildings> YBD=1> average gross floor area>

conversion rate> average number of floors.

Third, we examined the characteristics of each business district. Combining the results of ANOVA and Levene's test, the subjects of the post-mortem analysis were rent, conversion rate, building, and average area. Dunnett's T3 post-test results. The difference in rent is as follows: Rents in the CBD were 27 times higher than those in the YSD. The rent in the CBD was 32 times higher than that in other commercial districts. Rents in the GBD were 17 times higher than those in the other commercial areas. The differences in the conversion rates are as follows. The conversion rate of GBD was 0.95 times higher than that of other commercial districts. The difference in the number of buildings is as follows: The number of buildings in the CBD is 19.8 times higher than that in the GBD. The number of buildings in the CBD was 14 times higher than that in other commercial districts. The number of buildings in the GBD was 13.4 times less than that in the YSD.

Consequently, rents in the CBD and GBD are high. The conversion rate was high in commercial GBD areas. The CBD has several buildings. The results of Scheffe's post-hoc test are as follows: The average area of the GBD is approximately 119 times that of the CBD. The average area of the GBD was approximately 93 times that of the YSD. The average area of GBD is approximately 77 times that of the other commercial areas. The average area of the other commercial districts was approximately 42 times the average area of the CBD. In conclusion, the average area of GBD was larger than that of other commercial districts.

The implications of the study are as follows.

First, rent is determined by several factors; therefore, several factors must be considered when investing in a small shopping mall or entering a lease. Second, there are differences in rent, conversion rate, number of buildings, and average area by commercial district. A commercial district should be selected considering these factors depending on the investment and business purposes. Third, a limitation of the data is that the ratio of commercial districts is not constant. Compared to CBD, GBD, and YSD, other regions (55.6%) showed a higher rate. The regional partitioning of raw data in terms of proportions was not the same. It is necessary to equalize the sample of the commercial district during the sampling process of the commercial district data. Alternatively, it is necessary to divide commercial areas into other regions.

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