EXAMINATION OF SPATIAL CHARACTERISTICS INFLUENCING SALES BY TENANT TYPES IN SHOPPING MALLS

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Abstract

The purpose of this study is to closely examine the impact of the spatial configuration factors of tenants in a shopping mall on their sales by type of tenant. Two shopping malls in different context were chosen as analysis subject of this study. They had sales data for the same years to compare. To produce the sales decision model that reflects the characteristics of the tenants, this study first examines the blueprints of the subjects to know the spatial configuration, physical specification, business type and sales distribution of the two shopping malls. Second, it uses VGA of Space Syntax to analyze the spatial configurations of the shopping malls and derives the characteristic values of the spatial configurations. Third, precedent studies are reviewed to find the physical factors that determine the sales of commercial facility. Fourth, a model is set of the spatial characteristic factors that affect the sales of the tenants and the factors are examined by type of tenant. The result of the study showed that the sales of the tenants of the same type in two different location are influenced by different sales factors. These empirical result are expected to provide very useful implications for spatial factors and tenant mix in planning a shopping mall. Moreover, this study has significance in that it utilized the sales data of stores of a shopping mall and analyzed the spatial characteristics of each in a quantitative manner.

Keywords: *visibility graph analysis, spatial configuration, shopping mall, sales, tenant*

Theme: *Building Morphology and Performativity*

1. Introduction

1.1 Background and Purpose

A shopping mall is a facility for profit making. Therefore it is very important that it should be activated. However large shopping malls are often suffering from market depression as unsold or unrented units and vacancies increase due to the changes shopping behaviors and the oversupply of facility. To overcame the market depression, it is necessary to make a more efficient plan and thoroughly test the arrangement of sales floor, customer circulation, and tenant mix.

One of the ways to test the activation of shopping mall is sales estimation. However, sales estimation isn't easy because store owners are reluctant to disclose sales data and there are too many factors to influence over sales. Nevertheless, a number of studies have been conducted as sales estimation of shopping mall and the values of commercial facilities are more importantly accepted. For example, some studies looked into the influencing relationship between the factors related in retails and the values of commercial areas (Weisbrod et al.1984; Mejia et al.2002; Lee et al.2010). The studies in this field attempted to forecast the value of commercial quarters in consideration of the various factors of commercial areas. However, they did not place the circulation of customers and the spatial configuration in consideration. The characteristic of spatial configuration is one of the important factors to determine the customer circulation in a store, which is based on accessibility and visibility.

In the field of urban development and architecture, some studies examined the relationship between spatial configuration and sales (Kim et al.2008;Moon et al.2011;Park et al,2011;Kong et al,2013). Those studies used Space Syntax method to quantify the characteristics of the spatial configuration and derive a sales estimation model from it. However, the methodologies they applied to derive spatial configuration characteristics weren't appropriate. And the characteristics were not examined by type of tenant.

Nowadays, more interest is being paid to tenant composition and facilities to attract customers in distribution. Shopping mall should rely on good strategic tenant mix to provide customers 'one-stop' convenience by attracting competitive tenants (LEE et al. 2012). This idea is based on the finding that the sales of stores in the same location can differ depending on product category and brand they handle. As evidenced, the characteristic of a tenant is one of the important sales factors. Nevertheless, most of existing studies on the characteristics of a tenant in a shopping mall are biased to the impact on rents. (Gerbich,1998;LEE et al.2012). Furthermore, those studies set the type of tenant as dummy variable in their models, thus limiting their contributions to the relationship between tenants and rents. They weren't helpful in knowing the characteristics of tenant by business type. However it is highly possible that the spatial characteristics (arrangement) of a tenant can work on sales differently by tenant type. Therefore, it is necessary to examine the impact on sales by type of tenant.

In this respect, this study aims to examine the impact of spatial characteristics[1] on the sales of tenant type. Thus it is expected to contribute to efficiently planning a shopping mall and maximum profit by harmonizing the spatial characteristics with tenant mix, which determine sales.

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[1] The term 'spatial characteristics' used in this study includes the factors of both spatial factors and spatial structural factors. Spatial structural factors are ones that have impact on the change of commercial areas, including space, type of business, population and distance.

1.2 Scope and Method

This study chose two shopping malls that run in different context and have sales data of the same year. A Mall is one of the most well-known giant shopping malls located in Seoul. A number of tenants running various businesses are horizontally located one level floor. B Mall is a shopping mall located in Kyungsang province. A variety of tenants are vertically concentrated on 5 floors. The procedure and method of the study are as follows.

First, the spatial configuration and characteristics of the subjects are examined based on floor plan. And the tenant mix and sales distribution are also captured from it. Second, analyze spatial configuration of the subject by using Space Syntax VGA method and to draw out the spatial configuration value of each store. Third, precedent studies are reviewed to find the spatial factors that determine the sales of commercial facility. Fourth, HEDONIC model is introduced to derive a sales decision model that reflects the characteristics of the tenants in it. Finally a model is set with the spatial characteristics that have impact on the sales of commercial facilities.

2. Review of the Literature

2.1 Definitions of Tenant and Tenant-mix

A tenant can be defined as a member who signs on lease contract for a certain space in commercial facility and opens a store to run, and as a cooperative partner (with the facility) who pursues mutual existence and prosperity with the commercial facility(Lee et al. 2004).

Tenant mix is an important element to determine the success and failure of commercial facility. It is a technique that a facility developer or operator chooses the optimized mix of store type, product category and tenants, and arranges them according to size and location (Kim et al. 2007). The developer selects the best mix of business type, product category and tenants, and arrange them in accordance with planned size, location and concept. The optimal mix of tenants is the important factor to determine the strength of the commercial facility to attract customers and boom up the facility.

Tenants can be categorized by consumption mode. A commercial facility that provides one-stop shopping used to be filled with retailers and dining services. But, at present, they are inviting more entertainment facilities that have a strong power to attract customers. It was said that as a commercial facility is compounded with 3 synergic elements (entertainment, food and beverage, retail facility) in pedestrian environments, tenants come to react independently but complementarily, attracting visitors into the market (Shin,2009). Those three types of tenants are always and necessarily accommodated in a commercial facility in order to induce users to stay longer and to create economic synergy effect (Kim et al. 2007).

2.2 Studies on Spatial Characteristics Deciding Sales of Commercial Facilities

Retail sales are affected by spatial or non-spatial factors. Spatial factors are related to the shopping center's market, building and site while non-spatial factors describe the shopping center's character and usually measured in terms of retail image and mix. (Mejia et al.,2002) Various studies were being conducted concerning the spatial and non-spatial factors that influence the retail sales. First, Gentry and Burns(1977) presented 17 factors that have impact on the choice of a shopping mall. This study examined the importance of these factors by demographic characteristic. It turned out that price was the most important factor in choosing a

shopping mall and followed, in order of importance, by product value for price, product assortment, quality of a store and cleanliness. Regarding preference of retail store as one of the important factors in choosing a retail store, Malhorta (1983) studied the relationship between preference of a retail store and the factors that influence over it, such as product diversification, employees and their service, price term, convenience of location, and store facility. Hise (1983) selected the characteristics of retail manager and retail store, the competitive factors, and location features as retail performance factors and suggested a performance estimation model of retail store by analyzing the impact of those factors on sales. As competition got more heated in retail store environment, Weisbrod et al.(1984) included in Huff model such variables as the location of competitor, population pattern, way, time and cost to access, the characteristics of a store to estimate the attractiveness of market area. Mejia et al.(2002) classified the factors that affect the performance of a retail facility largely into spatial and non-spatial factors. The literature supports the argument that retailers with a similar market, building and site characteristics do not necessarily generate similar sales and that the sales difference can be explained by non-spatial factors, among which the two most cited are retail image and mix.

For Korean commercial buildings where multiple stores are compartmentalized in a building, empirical studies were carried out on the influencing factors on rent, retailer performance and selling price when turning to 2000s. Ha et al.(2007), focusing on the gap in store lot price by the characteristic of location, drew out a price decision model that considered various factors that have impact on the price(value) of store within a billing, such as store type on the same floor and escalator. Lee et al.(2010) attempted to examine the factors that affects the price of a store in the building, using the data of the characteristics and actual transaction of a store in an aggregate building. Their attempt found out that there are clear price gap (per unit area) among the stores, even on the same level, depending on the size of area for exclusive use and contact condition of a store to pedestrian pathway

2.3 Study on the Relationship between Spatial configuration and Sales Using Space Syntax

As spatial configuration is considered as one of the important factors to have impact on the sales of a commercial facility, diverse studies are being conducted using Space Syntax. Kim (2008) took a advantage of Space Syntax method to analyze the topological attributes of individual space. Based on the method, they estimated the sales of a facility, which depends on the topological relation, and used income capitalization approach to the location value of the commercial facility.

As the result, they could estimate the location value of commercial facility by spatial characteristic. Park et al.(2011) used the information of Integration Plan, which uses spatial configuration as accessibility indicator, to analyze the price determinants of the commercial stores within a multiplex building. Reflecting the particularities of a commercial facility, Moon et al.(2011) used VGA to examine the relationship between spatial configurations and sales of duty free shops in an airport and tried to provide a guideline in designing duty free shop in an airport.

This study showed that, in designing product category, there were different indicators of spatial configuration analysis to be considered. However, these studies paid analytical attention only to the perspective of spatial configuration in examining how visibility was reflected on designing space. Kong et al.(2013) conducted a quantitative research on the visual and perceptual attributes of a commercial facility and the space use pattern of users of the facility. And they, based on the analysis, examined the impact of the spatial configuration characteristics on the sales of the commercial facility. In the study, they discovered that sales were higher in the store

that has visually clear accessibility

The review of those precedent studies showed that various factors have impact on the sales of retailers. However, there were no studies that look into the sales determinants of shopping mall and thus the spatial characteristics of a shopping mall. Spatial configuration is being recognized more importantly and studies are paying attention to Space Syntax method for quantitative research of spatial configuration. However, the stores on the same spatial level possess the same topological attributes.

There have been studies on the importance of tenants in a shopping mall. But they set them only as dummy variables in their analyses. No studies have challenged to know how the characteristics of tenants have impact on their sales.

In this respect, this study secured and used the actual sales data of the stores in shopping mall. It also placed the effect of surrounding environment and vertical connectivity in the research model to derive the factors of spatial configuration characteristics. In addition, this study classified the characteristics of tenants and carried out an empirical and quantitative analysis on the factors that determine sales by the type of tenant.

3. Method

3.1 Method of Analysis

Analysis was conducted in 5 steps. First, the spatial characteristics of two target areas were understood based on the floor plan and field study.

Second, sales determinants were examined with the review of literature studies. As a result, the spatial characteristic variables, which can occur in a commercial facility, were derived.

Third, the spatial configuration of the subject areas was analyzed using Space Syntax. For A Mall, this study included only the first basement level of the building, excluding the external space and the inside of the stores in it. But for Mall B, we spread research boundary up to 500 meters from the subject and included the whole space from the first to the fifth floor but excluded the inside of the stores in it.

Fourth, the variables were derived that reflect the characteristics of spatial configuration and space use pattern of shoppers by Space Syntax analysis. The show window of each store was used to derive the variables. The details are shown in 3.3 (3) "Method to Derive Spatial configuration Value".

Fifth, regression model was set using the sales variables of shopping mall, in order to examine the impact of the characteristics of tenants on the sales.

3.2 Summary of Subjects

(1) A Mall
A Mall is located in Seoul. It had been developed as part of the project targeting the construction of the Asia best complex town. Therefore, the project area include business hotel, shopping mall, department store, offices and entertainment facilities. The commercial facilities in the research boundary of the subject include a department store and shopping mall (14% of the entire areas). The shopping mall, which is the main interest of this study, has a multiplex

cinema, a book store, family restaurants, and many retail stores in the underground. About 200 stores run business.(Kim,2006)

(2) B Mall

Located in Kyungsang province, B Mall had been developed as a complex leisure space targeting the lifestyle of 'one-stop for all'. It includes offices, stores, houses, cultural and leisure facilities and resting space. The shopping mall consists of 6 floors (B1 to F5). A bookstore is on the second floor and a multiplex cinema stands on the third floor. A large supermarket opens on the first basement level.

Table 1. Basic Data

			Mall A	Mall B
Completion year			2000	2009
Size (F)			B2F-54F Commercial (B1F)	1F-5F
Plottage(m2)			190,386 m2	59,127.3 m2
Total area(m2)			1,197,224 m2 Commercial: 119,008.3 m2	422,168.6 m2 Commercial: 3,819,933.9 m2
Floor area ratio(%)			350	713
Facility			office/commercial/ terminal/ hotel/culture	office/commercial/ hotel/culture
T E N A N T	Food&Beverage	Size Mean(m2)	7,150.4 m2	5,064.2 m2
		Store	42	37
	Fashion	Size Mean(m2)	3,658.6 m2	6,406.9 m2
		Store	38	44
	Miscellaneous Goods	Size Mean(m2)	1,706.3 m2	638.5 m2
		Store	23	9
	Entertainment	Size Mean(m2)	942.6 m2	1,518.2 m2
		Store	13	11
All Store		Store	116	101

3.3. Analysis of Spatial Configuration and Method of Drawing Spatial Configuration Value

(1) A Mall

Plan shows the result of the spatial configuration analysis of the first basement level. Global Integration is 3.26/mean and Local Integration is 6.8/mean. It turned out that Intelligibility, which indicates the level of convenience of spatial perception and way-finding, is 0.57(R^2). It shows that the space of A Mall is well planned in a way that visitors can easily find and use it conveniently. Figure 1 shows the result of the spatial configuration analysis of Mall A.

First, A space, except to the main entrance, has the best accessibility and visibility among the interior units in A Mall as seen in Figure 1. Global Integration of A space is 4.12/mean and well-recognized brand shops occupy the space. Second, B space is a crossway that connects to other areas. The Global Integration is 4.0/mean. Space 'B' is used as an important space that visitors can easily find. Third, space C is of the lowest accessibility and visibility. The Global Integration is 2.34/mean. A Mall consists of various functional units as well as commercial facilities. Therefore, space C, connected to the facilities of other functions, shows lower accessibility and visibility than the central space where visitors are crowded for the main purpose of visit. (Kong et al.2013).
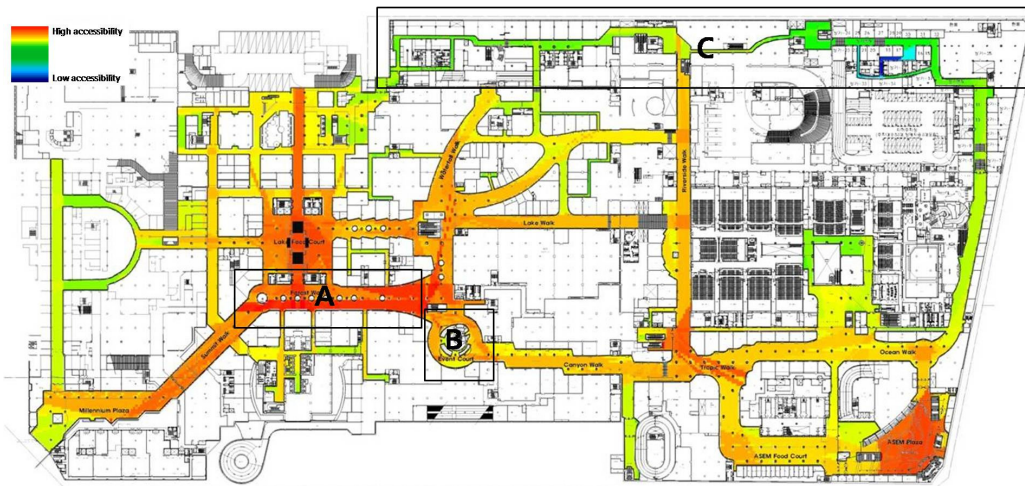
Figure 1. Spatial Configuration Analysis of A Mall

(2) B Mall

The first basement level is the main space of B Mall. The Global Integration is 2.87/mean and LI is 8.55/mean. The intelligibility, which indicates the level of convenience of spatial perception and way-finding, is 0.47(R^2). As the value tells, the spatial configuration of B Mall is also configured in a way that visitors can find it easily as shown in Figure 2.

Figure 2. Spatial Configuration Analysis of B Mall

First, space A is of the highest accessibility and visibility among other units in Mall B. Global Integration of space A is 3.6/mean. It is occupied mostly by fashion stores of high accessibility and visibility. Since adjacent to the main gate where a lot of visitors flow in and out , it has the highest visibility. Second, space B is an area connected to the same axis that space A is located on. Therefore, Space B is more recognized and visited by visitors than other spaces. The Global Integration of space B is 3.1/mean. Third, space C is of relatively lower accessibility and visibility. The Global Integration is 2.37/mean. Since this area is directly connected to the residential block, it has relatively lower accessibility and visibility than other areas in the entire space. However, floating population isn't that low in space C because general restaurants concentrate on the space, attracting visitors.

(3) Method to Derive Spatial configuration Value

Spatial configuration is closely related with the various factors of commercial space. Using Space Syntax allows us to analyze the space, mainly focusing on the visibility of the space, and understand the attributes of spatial configuration in an objective and quantitative manner. The existing studies failed to utilize the method by which the spatial configuration of stores and commercial facility can be examined. Instead, most of the studies regarded the stores arranged on the same axial line as having the same topological values. Or they the Global Integration means of a certain area in front a store as the attribute values of the whole spatial configuration of the store. (Kim et al.2008;Min, 2012).

Figure 3. Drawing method of Spatial Configuration Variable

When shoppers move freely around to select a store to visit, they tend to rely on visual information such as the displays on show window or billboards. Perspective from Visual Merchandising is that window display will promote sales (Bell et al.2002). That is, if the show window of a store is positioned where it is easily recognized, the store can sell more products and have more visitors than otherwise. In the same vein, this study assumes that recognizing the front show window of a store is equal to recognizing the store as a whole. And it uses the values of the spatial configuration of the front show window and derives the attribute values. At first, the front show window of each store is divided in grid and the value of Integration, which is the value of spatial configuration characteristic, is calculated for each grid. Among the values, Total Integration - the sum of each Integration of each grid- was chosen to explain the sales and the value of a store (Kong et al. 2012). Total Integration value is a variable derived from Space Syntax analysis. It is the variable that can differentiate the value of a store depending on the degree of accessibility to the store within where the store is well visually seen and recognized. When a store has a high Total Integration value, it means that the space is positioned high in the hierarchy of the spatial configuration of the entire space, and has a good accessibility and visibility.

4. Establishment of Analysis Indicator

The input factors in a sales decision model were derived through the review of precedent studies (Chapter 2). As a result, the spatial factors that occur in a shopping mall were classified into population, exclusive use area, accessibility and visibility. They were set as independent variables. The dependent variables and independent variables applied in this study are as follows. The sales data (year 2009) of two shopping malls by store were used as dependent variables. They include the sales data of 116 store (A Mall) and 101 stores (B Mall). For independent variables, walking traffic volume, store size, accessibility and visibility.

First, walking traffic volume is defined as number of visitors per hour (P/hour). And the observing point was selected to be at the point where pedestrian paths are separated.

Second, exclusive use area for sales was used as store size.

Third, accessibility and visibility were obtained from the characteristics of the spatial configuration and quantified to be used as a variable. Total Integration values, which were derived from Space Syntax analysis, was used to compute accessibility and visibility. (Kong et al.2011;2013) Existing studies used distance to parameterize accessibility while the visibility of store was parameterized for visibility. This study borrowed the variables used in the existing studies to gain distance from the main entrance to a store variable and quantitatively calculated the characteristic value of the spatial configuration of each store. First, to set distance as a variable, this study assumed that the more closely a store is located from the main and supplementary entrance of the mall, the more easily visitors can have access to the store. Accordingly, the shortest distance on pedestrian pathway between the gate to the store was measured and it was set as an independent variable for this model. Visibility means the extent a store is visually perceived from every direction. Existing studies divided stores into corner shop, walled shop, center shop and so on according to the degree of visibility and treated them as dummy variables. However, as mentioned in 3.2 'Method to Derive Spatial Configuration Value', this study parameterized accessibility and visibility according to the arrangement of a store.

Finally the factors that have impact on the sales of a store consist of walking traffic volume, store size, distance, visibility and accessibility. They are summarized in Table 2. And since the regularity test of those variables turned out that they are irregularly distributed, log conversion was treated on the variables to make them normal distributed.

Table 2. Descriptive Statistics

Variable		Measure	Transformation
Dependent Variable	Sales	₩	Log Sales
Independent Variable	Volume of Pedestrian	person/hour	Volume of Pedestrian
	Exclusive Use Area	m²	Log Area
	Main Entrance Distance	m	Distance
	Visibility	Spatial Configuration : Total Integration	log Total Integration
	Accessibility		

5. Empirical Analysis: Correlation Among Sales Factors by Type of Tenants

The subjects are large scale shopping malls full of stores of various characteristics. The competitiveness and performance of a commercial facility are related to the process of successful development. But after physical factors such as location, size and construction have been decided, they tend to be dependent on the composition of tenants, including anchor tenants, and the operational capability of the facility.(Fanning, 2005;Deborah et al., 2009; Lee et al. 2012) Therefore, the characteristics of a store can influence over consumer behaviors. It supports the need to classify tenants by similarity. The tenants of a commercial facility are very diverse. But, to create synergic effect, it is necessary to understand the factors that affect sales

by type of tenant, mainly by categorizing them into entertainment, F&B (food and beverage) and retail store, which are 3 requirements for the synergic effect of the whole facility. In this respect, the factors are examined.

5.1 F&B

F&B facility includes family restaurants, general diners, and beverage facilities. They are locally arranged throughout the whole space. Therefore, it is considered proper to examine the status, considering tenants. To do so, this study added neighboring stores such as chain stores, key tenants, and anchor tenants in dummy variables and set a model. Table 4 shows the sales decision model of F&B facilities.

Table 4. F&B: Determinants Analysis of Sales

Mall A						Mall B					
Model Summary											
R	R^2	Adj.R^2	Std. Error of Estimate		Durbin-Watson	R	R^2	Adj.R^2	Std. Error of Estimate		Durbin-Watson
.87	.75	.69	0.275		1.584	.81	.66	.58	.265		1.625
ANOVA											
	Sum of Squares	df	Mean Square	F	Sig		Sum of Squares	df	Mean Square	F	Sig
Regression	7.537	8	.942	12.45	.000	Regression	4.110	7	.587	8.38	.00
Residual	2.498	33	.076			Residual	2.101	30	.070		
Total	10.035	41				Total	6.212	37			
	Un standardized Coefficients		Standardized Coefficients				Un standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.		B	Std. Error	Beta	t	Sig.
Constant	7.15	.537		13.32	.00	Constant	2.941	.659		4.46	.00
Exclusive Use Area	.642	.145	.520	4.412	.00	Exclusive Use Area	.963	.193	.711	4.98	.00
Total Integration	.337	.222	.175	1.518	.14	Spatial Configuration	.183	.142	.174	1.29	.21
Volume of Pedestrian	-1.15E-05	.000	-.0.38	-.382	.71	Volume of Pedestrian	.000	.000	.191	1.36	.18
Main Entrance Distance A	-4.60E-07	.000	-.254	-1.4	.17	Main Entrance Distance A	3.383E-07	.000	.036	.205	.84
Main Entrance Distance B	-1.95E-07	.000	-.156	-1.00	.32	Main Entrance Distance B	1.714E-07	.000	.036	.206	.84
Chain Store	.282	.101	.280	2.8	.01	Chain Store	.103	.127	.108	.81	.42
Surrounding retails of Key tenant	.292	.129	.263	2.26	.03	Surrounding retails of Key tenant	.078	.131	.085	.59	.56
Surrounding retails of Anchor tenant	.035	.132	.036	.268	.79						

First, the R^2 of the regression model of F&B facility (A Mall) is 0.69. And the significant level of F-value of the regression model is 0.00 ($p<0.05$), which means it is statically significant. The result of the analysis shows that areas, chain stores, and key tenants are significant ($p<0.05$). All of areas, chain stores, and key tenants appear positively correlated with sales. The result explains that the bigger the size of F&B store is, the bigger the sales of the store is and the more chain store and key tenants F&B store has around, the bigger sales F&B store has.

Second, the R^2 of the regression model of F&B facilities (B Mall) is 0.58. And the significant level of F-value of the regression model is 0.00 ($p<0.05$), which means it is statically significant. The result of the analysis shows that only 'size' is significant ($p<0.05$) and the rest variables are not

statistically significant.

Figure 4. A Mall: Arrangement situation of Food Tenant

The R^2 of the regression model of both shopping malls were high enough and brought out significant statistic results. Results are shown below by factor.

First, it turned out that store size is the most influential factor over the sales of F&B facility. Most of big (in size) stores in F&B facility are family restaurants and well-recognized brand stores. Therefore, it is interpreted that they have high sales due to more customers and higher unit sales.

Second, F&B facility is locally located throughout the whole shopping mall, where necessary. Therefore, it seems that Total Integration, distance and walking traffic volume do not have considerable impact on sales.

Third, although it could be assumed that if chain store and key tenant store are located surrounding F&B store, it will impact its sales, the finding is that it differs depending on shopping mall. F&B facility in A Mall is a place that gathers visitors. Visitors use the facility by their preference. And the facility is arranged according to the characteristics of the stores. As seen in Figure 4, many and diverse dining halls and F&B stores surround the key tenant (multiplex cinema). The arrangement of F&B stores is fit to the walking path and waiting time of users for the key tenant. It is thought that such complementary spatial arrangement between F&B facility and the multiplex cinema maximizes sales. On the other hand, the presence of chain store and key tenant in Mall B don't appears to have impact the sales of F&B facility.
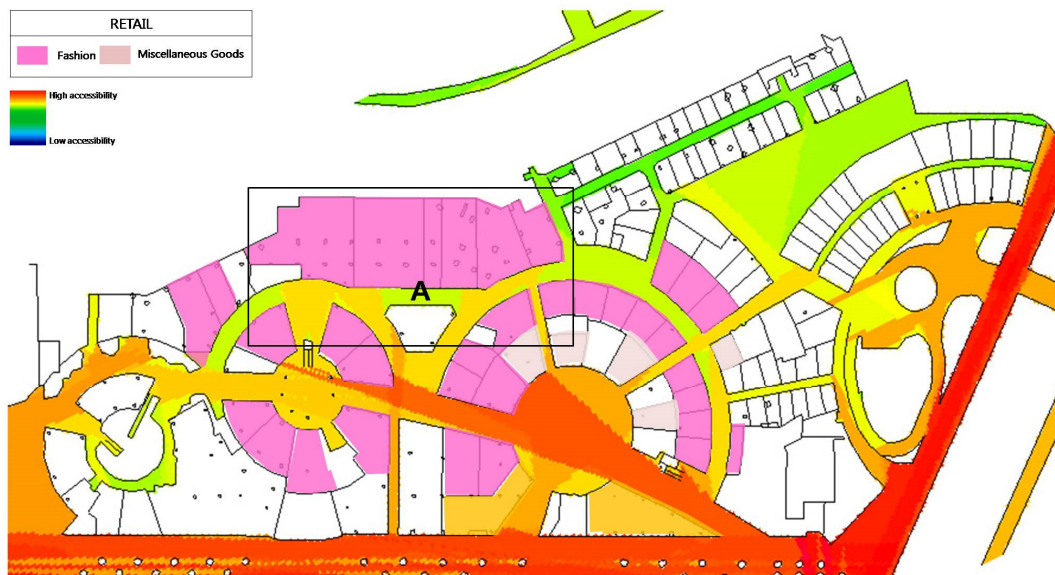
5.2 Retail

Retail stores are tenants that induce consumption on fashion and accessory items, which take high portion of sales. Table 5 shows the sales model. First, the R^2 of the regression model of retail stores (A Mall) is 0.725. And the significant level of F-value of the regression model is 0.00 (p<0.05), which means it is statically significant. The result of the analysis shows that size, Total Integration and walking traffic volume are significant (p<0.05). The result explains that the bigger the size of retail store is, the bigger the sales of the store is. And when it is located in the area of greater walking traffic volume, the retail store has higher sales.

In addition, when a store has higher value of Total Integration, it means the store has better accessibility and visibility. Although the distance between a main gate to a retail store didn't turn out to be statistically significant, it can be assumed that the closer the store is to the entrance, it has higher sales.

Table 5. Retail: Determinants Analysis of Sales

A Mall						B Mall					
Model Summary											
R	R²	Adj.R²	Std. Error of Estimate		Durbin-Watson	R	R²	Adj.R²	Std. Error of Estimate		Durbin-Watson
.865	.748	.725		.249	1.756	.67	.45	.384		.236	2.204
ANOVA											
	Sum of Squares	df	Mean Square	F	Sig		Sum of Squares	df	Mean Square	F	Sig
Regression	10.136	5	2.027	32.691	.000	Regression	2.145	6	.357	6.393	.00
Residual	3.410	55	.062			Residual	2.572	46	.056		
Total	13.546	60				Total	4.716	52			
	Un standardized Coefficients		Standardized Coefficients				Un standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.		B	Std. Error	Beta	t	Sig.
Constant	7.066	.438		16.12	.000	Constant	4.101	.342		11.9	.00
Exclusive Use Area	.659	.155	.441	4.234	.000	Exclusive Use Area	.554	.161	.476	3.44	.00
Total Integration	.373	.189	.198	1.974	.05	Spatial Configuration	.175	.155	.132	1.13	.27
Volume of Pedestrian	6.559E-05	.000	.213	2.210	.031	Volume of Pedestrian	7.319E-05	.000	.053	.419	.68
Main Entrance Distance A	-3.93E-07	.000	-.231	-1.34	.184	Main Entrance Distance A	8.730E-07	.000	.113	.844	.40
Main Entrance Distance B	-2.55E-08	.000	-.012	-.076	.940	Main Entrance Distance B	5.996E-08	.000	.039	.331	.74

Figure 5. B Mall: Arrangement situation of Retail Tenant

The R² of the regression model of retail stores (B Mall) is 0.384. And the significant level (p-value) of F-value of the regression model is 0.00 (p<0.05), which means it is statically significant. The result of the analysis shows that 'size' is significant (p<0.05). As shown in Figure 5, the stores that meet the main street have higher accessibility and visibility than those of

space A. However, space A shows higher sales due to higher unit sales per customer. Therefore, the R^2 of the regression model of B Mall is low. Accordingly, the sales model of 39 stores (located by the main street) has R^2=0.334, which is low. But TI and size are significant (p<0.05). It turned out that the stores by the main street (B Mall) also higher sales, like the case of A Mall, when they are bigger in size and higher value of spatial configuration characteristics. Generally, it is more probably that the bigger space a store has in a shopping mall to have more diverse product assortment, the greater sales it has. Judging from these finding, it can be known that the internal spatial factor in a shopping mall is a main determinant of sales. It was confirmed that the stores located in a space where the value of spatial configuration is high have high sales regardless of brand power or store size. As For B Mall, it has low spatial configuration, so brand outlet are arranged in the space of low accessibility and visibility.

5.3 Entertainment

Entertainment facility is the most representative one of 'experiential consumption'. It provides consumers a chance to consume experience to have pleasure. The facility is an effective tool to promote a shopping mall, persuading consumers to stay longer and making synergic effect with other tenants in diverse ways. (Kim, 2010) Therefore, a shopping mall needs to have such tenants that make consumers enjoy and consume through experience. Table 6 shows the sales decision model of Entertainment facilities.

Table 6.   Entertainment: Determinants Analysis of Sales

Mall A						Mall B					
Model Summary											
R	R^2	Adj.R^2	Std. Error of Estimate		Durbin-Watson	R	R^2	Adj.R^2	Std. Error of Estimate		Durbin-Watson
.970	.941	.859		.1552	1.949	.79	.63	.067		0.455	2.831
ANOVA											
	Sum of Squares	df	Mean Square	F	Sig		Sum of Squares	df	Mean Square	F	Sig
Regression	1.932	7	.276	11.463	.008	Regression	1.391	6	.232	1.12	.48
Residual	.120	5	.024			Residual	.828	4	.207		
Total	2.052	12				Total	2.218	10			
	Un standardized Coefficients		Standardized Coefficients				Un standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.		B	Std. Error	Beta	t	Sig.
Constant	-7.186	3.97		-1.81	.130	Constant	-1.17	2.8		-.42	.69
Exclusive Use Area	-.211	.131	-.230	-1.61	.168	Exclusive Use Area	.951	.480	.833	1.9	.12
Total Integration	1.926	.365	1.241	5.28	.003	Spatial Configuration	.982	.761	.602	1.3	.27
Volume of Pedestrian	.001	.000	2.658	3.15	.025	Volume of Pedestrian	.003	.003	.688	1.2	.29
Main Entrance Distance A	8.269E-06	.000	2.231	4.066	.010	Main Entrance Distance A	7.010E-06	.000	.900	1.3	.27
Main Entrance Distance B	1.099E-05	.000	3.831	3.605	.015	Main Entrance Distance B	1.238E-05	.000	1.289	1.8	.14

First, the R^2 of regression model of Entertainment facility (A Mall) is 0.859, which is high. And the significant level of F-value of the regression model is 0.008 (p<0.05), which means it is statically significant. The result of the analysis shows that Total Integration, walking traffic volume and distance from the main entrance are significant (p<0.05). However, R^2 of the regression model of F&B facilities (B Mall) is 0.067, which is very low and not statistically

significant. This low value can be explained by the fact that the entertainment facility in B Mall was rent without consideration of walking traffic volume or planned spatial arrangement of its stores. Therefore, the variables we put in the model didn't affect sales.

In both shopping mall, the telecommunication and convenience facilities which belong to the category of entertainment are positioned in the space of high traffic volume and spatial configuration. Beauty care facilities of A Mall are located in the space of high traffic volume and spatial configuration but those of B Mall aren't. Sales vary depending on the spatial arrangement. Also, unit sales per customer and consumption behaviors are different by the characteristics of a facility.

Two sales models by type of tenant have been examined. However, the results from the two subjects turned out opposite to each other. The possible explanation of this difference is that the two subjects spatially compose tenants differently (horizontal vs. vertical). Therefore they have different factors that have impact on their sales. Moreover, B Mall has residential area behind it, which may explain different consumer behaviors from those of A Mall. Put it in another way, many factors that can't be parameterized may be applied to the research subjects differently and so this study has limitation to comparison.

A Mall didn't have new tenants from 2009, when is the beginning point of this analysis, and has continuously shown good sales performance. On the contrary, the tenants of B Mall have been frequently changed or switched since 2009 when it was founded. It has had many vacancies. This low performance of B Mall may be explained by the commercial district where it is located. But the spatial composition without deep consideration of spatial characteristics and proper tenant mix are assumed one of the key reasons for it. Therefore, this comparative study evidences that it is necessary to consider the spatial characteristics of internal configuration and tenant mix before planning a shopping mall.

6. Conclusions

This study intended to examine the impact of spatial characteristics of tenants by type on their sales. The findings are summarized as follows.

First, the R^2 of the regression model turned out high and statistically significant except for the entertainment facility of B Mall. It suggests that the spatial factors and configuration characteristics of tenants have impact on the sales of tenants by type (of tenant). In addition, it was revealed that spatial characteristics are valid variables to estimate sales and that the sales decision model has enough statistically significant.

Second, for retail facility, store size and spatial configuration have a great impact on sales. When we look at other tenant type, it can be safe enough to say that the characteristic of spatial configuration is an important variable for the sales of retail facility. For example, the stores located in the space of a high characteristic value of spatial configuration recorded high sales regardless of brand awareness or store size.

Third, store size was turned out to have the greatest impact on the sales of F&B stores. The result can be interpreted that most of F&B facility was occupied by family restaurants and well-known brand shops, so they have many customers and high unit sales. Furthermore, F&B facility is locally located throughout the whole shopping mall to have synergic effect with anchor tenants. Therefore, F&B stores weren't much affected by the characteristics of spatial

configuration and the distance from the main entrance.

Fourth, since entertainment facility consists of too diverse types of stores. Therefore, it was relatively difficult to set a sales model. The difficulty seems to come from that they have different sales factors depending on location and have very diverse unit sales and different purchase behaviors by entertainment type.

The findings of the study can suggest some significance for the study of the impact of spatial characteristics on sales by tenant type, both in terms of theory and methodology.

First, it methodologically derived the characteristics of spatial configuration of a store, differentiated analytical method that reflect shopper's buying behaviors and the variables of spatial configuration characteristics. Existing studies didn't consider shopping patterns and the particularities of subject in deriving the characteristics of spatial configuration. As a result, the stores located on the same location have the same topological properties in those study (Kim et al.2008;Park et al.2011). It evidences the absences of appropriate methodology that can be applied to a complicated spatial configuration such a shopping mall. The methodology used in this study can be employed to the space where purchasing pattern and behaviors can defer by various factors such as space use pattern and visual attributes. In addition, this study utilized Total Integration, which can differentiate the value of a store by the extent of accessibility to the store within where the store is well noticed and recognized. Total Integration can be used as an objective and quantitative variable to estimate sales of a store. And this study classified tenants by type and examined the impact of them, by type, on sales. This attempt can be usefully applied in planning a commercial facility. Gerbich(1998) and LEE et al.(2012) could set the type of tenants as dummy variables in their models and tried to understand only the relationship between the value of a store and the variables. However, this study classified tenants into some types and examined the impact on sales by type of tenant. By doing so, this study had a chance to know how they are spatially arranged in a commercial facility. These challenges can be useful date in harmonizing the spatial characteristics with tenant mix.

Second, this study has following theoretical significances. It views that sales of a store in a shopping mall is determined by the spatial configuration of the store, rather than its size. Huff mentioned that the chance that a consumer selects a certain store among many retailers is decided by the value and utility he or she can gain in the store. He said that effective value utility is greater when a store is closer and bigger (Huff,1963). However, it is naturally probable that since a bigger store in size can have more product categories to sell and accommodate more customers, it has greater sales. Therefore, if the natural determinant is excluded, this study suggest that spatial configuration is an important sales determinant. It is true for a shopping mall that the store with clearer spatial configuration has higher level of sales than stores without it. And the impact varies by type of tenant.

In conclusion, this study established a sales decision model by placing the model the characteristics of spatial configuration of a store as independent variables and the sales of the store by type of tenant as a dependent variable. The model suggested that the factors that have impact on sales were different by tenant type. In addition, the tenant of the same type of business has different sales determinants by subject location. It was because that, in this study, two subjects showed different factors in neighboring environment, spatial plan and purchasing behaviors of consumers. And each factors had different impact on sales. This study expects that following studies will be able to complement and extend this estimation model to planning and activating a shopping mall, and maximizing profit of it if they analyze shopping malls in more diverse spatial and geographical conditions and classy the type of tenants in more detail.

Also, the empirically demonstrated results of this study are expected to provide useful implications and can be used in harmonizing the spatial characteristics with tenant mix. Last, it has significance in that this study has significance in that it utilized the sales data of stores of a shopping mall and analyzed the spatial characteristics of each in a quantitative manner.

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