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The Degree of Association between Traditional Markets and Related Major Factors in Korea

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Abstract

Purpose – This paper studies if types of markets have an association with several variables such as occupation, district, sales, employee, administrative district by a lessor, area in rental building and so on. Three attributes of markets can be general commercial zones, central commercial zones and traditional markets. Furthermore, we can investigate the degree of association by calculating the numerical strength and visualizing their distances on two-dimensional plane, once the association exists between them.
Research design, data, and methodology – This work is performed by the 2013 report presented with Small Businessmen Promotion Institute in Korea and used by a chi-squared test and correspondence analysis by using IBM SPSS 23.0.
Results - The results show that types of markets, including traditional markets, have an association with variables considered in this paper, and we can obtain the detailed associations between attributes of corresponding variables by inspecting two-dimensional plane.
Conclusions - This study suggests that government authority and local autonomy can make strategies to vitalize traditional markets and to get win-win relationships among several types of markets by looking over our findings.

Keywords: Association, Chi-squared Test, Correspondence Analysis, Traditional Markets.

JEL Classifications: C12, M10, M30, N75, Q12.

1. Introduction

Since the opening of distribution markets and backing for traditional markets in 2002, legislations and policies of the government authority have been reformed to invigorate the slumped traditional markets many times. However, The Korean traditional markets have promptly aggravated due to expansion of the new types of distributors such as department stores, super markets (SSM), home shopping on TV, internet shopping mall. In spite of diminishment of the traditional markets, the government authority enacted 'The special law on the nurture of the traditional markets' on October, 2004 and, at last, built up the foundation for the revitalization of the traditional markets by setting up 'Special act on cultivation of traditional markets and shopping district' on April, 2006.

Traditional markets, in essence, are a charming place for the common to purchase goods. Collaborating with traditional culture event, life and health lessons and seminars, the traditional markets can be added to modern culture as a shopping, meeting place, relaxing and playing place. Furthermore, traditional markets can be provided with local tourist route, along with introducing a variety of culture programs such as music, mime, performances, exhibition and so forth.

Lee (2016) analyzed the empirical study on consumption behaviors with respect to traditional markets and proposed improvement plan of the traditional retail markets. Also, he drew a conclusion that convenience, products and facilities have a significant influence both on consumer satisfaction and on revisit intension in traditional markets.

Song (2015) examined modern architecture which has

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evolved various forms of marts such as public mart-type, arcade-type and so on and analyzed the characteristics of architectural variation.

Su et al. (2015) tested the three hypotheses of ethical management and drew a conclusion that ethical management has an effect on both corporate impression and buying intent.

Kim & Youn (2015) proved that self-employment by administrative district and/or schooling year to decide the self-employment causes and measures.

Kim (2014a) studied the contentment extent of physical surroundings and choice attribute of the visitors of traditional markets for the purpose of providing consumers with better quality services.

Song (2014) treated the financial management capacity of owner-operators of traditional markets which has hardly been noticed by the government in vitalizing traditional markets.

Kim (2014b) investigated policies of the government driven for activating traditional markets, responses from consumers and merchants and factors which have an effect on sales with focusing on Mokpo Free market.

In this work, several associations between three types of markets and several major topics are investigated by calculating the numerical strength and visualizing their distances on the two dimensional plane. Three types of markets mentioned above can be general commercial zones, central commercial zones and traditional markets and also these topics can be types of occupations, types of districts, sizes of sales, sizes of employees, administrative districts by a lessor, areas in rental building and so on.

In section 2, definitions and concepts of statistical analyses such as a chi-squared test and correspondence analysis. In section 3, data collection is comprehensively described. Nine variables in association with types of markets will be summarized as a boxplot and their associations are visualized on two dimensional plane in section 4 by using multivariate methods. Based on these analyses, both strength and direction of their association will be proposed. Finally, the result and conclusion of this research will be stated.

2. Theoretical Review

For discovering details of this association, two main statistical analysis given below will be utilized.

2.1. Chi-squared test

The main goal of utilizing two-way contingency table is to explore the existence of association between two categorical variables which shows column and row, using a chi-squared test. Once the coordinates are defined, at the same time, for the categories of two variables, the chi square value can be calculated for every cell (i, j) as follows:

$$\chi_{ij}^2 = \frac{\left(f_{ij} - f_{ij}^*\right)^2}{f_{ij}^*}$$

where $f_{ij}^* = \frac{\left(n_{i0} - n_{0j}\right)}{n}$ such that f_{ij} is the relative frequencies, n is the sample size and n_{i0} and n_{0j} are the row i marginal total and the column j marginal total, respectively. Thus, χ^2 determine and measure if there exist a significant associations between two categorical variables.

Not that the chi-square distance can be exploited to examine the association between categories of the same variables but not between variables of different categories.

2.2. Correspondence analysis

Once there exists an association between two categorical variables, correspondence analysis can be utilized for visualizing the association among categorical variables. Correspondence analysis, namely, is a useful tool to uncover the relationship among variables and a descriptive or exploratory method devised to assay cross tabulations with assessment of correspondence between categorical variables (Yang, 2013; Steven, 2009).

Because there is an association between two variables, the correspondence plot reduced to the s dimension can be explained by, what is called, 'principal inertia' to investigate the geometric relationships. If the reduced dimension is 1 and 2, the two dimensional reduction is optimal associated with two principal inertia.

The main goal of this technique is to convert association of cross tabulations into a visual representation, in which every row and every column is shown as a point. We propose a scaling of this display, called a biplot, which incorporates diagnostic directly into visual representation, showing the important contributors and thus simplifying the graphical display considerably (Greenacre, 1984; Greenacre, 2007).

Given a contingency table N, and associated correspondence table $P=(1/n)N$ of relative frequencies, where n is the grand total of N, let r and c be the row and column marginal totals in associated correspondence table, and let D_r and D_c be the diagonal matrices of r and c. Corresponding analysis can be defined as approximating the target matrix of standardized residuals based on the relative frequencies in P:

$$T = D_r^{-1/2}\left(D_r^{-1}P - 1c^{'}\right)D_c^{-1/2}$$

After decomposing T by the singular value decomposition, the rows and columns are plotted according to the $F = D_r^{-1/2}U\Gamma$ and $Y = D_c^{-1/2}V$. Note that $T = U\Gamma U'$ where $UU' = V'V = I, \Gamma = diag(\gamma_1 \geq \gamma_2 \geq \cdots \geq \gamma_K > 0)$. The joint display of F and Y is a biplot of the target matrix $(D_r^{-1}P - 1c^{'}) = FY'$ (Benzercri, 1992; Brigitte, 2009; Clausen, 1988; Boey & Kurta, 2011; Hair et al., 2007; Hoffman & Franke, 1986).

3. Data Collection

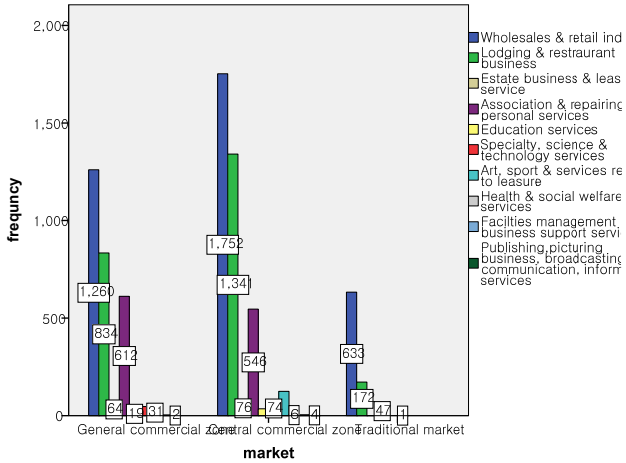
Small and Medium Business Adminstration investigated 8,427 small businesses samples in 2013 (May/2013~August/2013) which were classified into three groups – general commercial zones, central commercial zones and traditional markets. Samples taken from general commercial zones are obtained by administrative districts and occupations, which represent the feature of population, whereas samples from central commercial zones are located at the heart of commercial areas in Seoul and metropolitan cities, which belong to the top hundred commercial powers. Samples from traditional markets are businesses which are registrated with traditional markets.

The survey shows that samples consist of 7,700 hirers and 727 lessors by categorizing both 15 cities and provinces and the average of sales in month 14,830,000 won. The survey is conducted from May to August in 2013, supervised by Small Businessmen Promotion Institute. Of the surveyed hirers, in addition, monthly rent with a guarantee holds 95%, the lease of a house on a deposit basis accounts for 2.8%, and monthly rent without a guarantee occupies 1.7%. The average of the term of a lease contract is 30 months and two-year contract accounts for 67.2% and three-year contract holds 10.8%.

4. Research Results

4.1. Types of occupations versus types of markets

<Figure 1> shows that wholesale & retail industry, along with lodging & restaurant business, is more than 70% of total values for all types of markets. In particular, wholesale & retail industry accounts for about 74% of the total values. For all types of markets, wholesale & retail industry, lodging & restaurant business and association & repairing personal services are most selected occupations in numerical order.



<Figure 1> Occupation by market

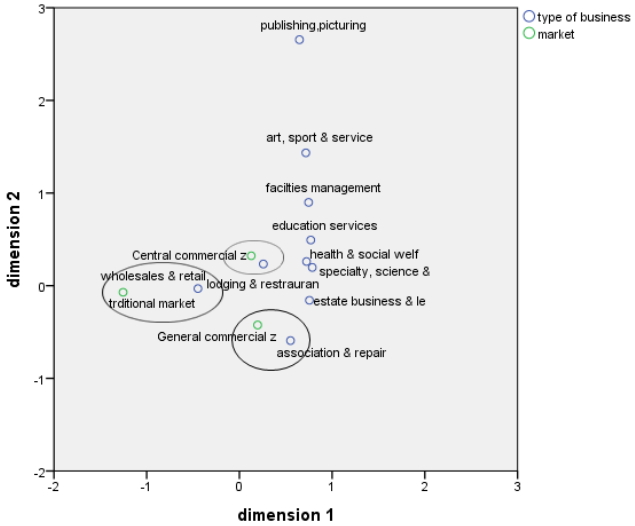
From <Table 1> given below, the Inertia column provides the total variance interpreted by all dimensions in the considered model and the total inertia is 5.4%, which indicates that knowing something about type of occupation explains 5.4% of something type of market and vice versa. This association is frail, but still very significant as shown by the value of chi square statistic (p-value<0.001).

<Table 1> Summary on types of occupations

dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Accounted	Cum	Std. dev.	Corr. 2
1	.198	.039			.725	.725	.009	.042
2	.122	.015			.275	1.00	.011	
Total		.054	414.08	0.000	1.000	1.00		

Dimension 1 does 3.9% while dimension 2 explains 1.5% of the total 5.4% of variance accounted for. Dimension 1 explains 72.5% of the total 5.4% of variance explained in the model and also dimension 2 explains 27.5% of the total 5.4% of variance explained in the model from the Proportion of inertia column.

A biplot from <Figure 2> shows a visual display of each value in the dataset plotted with their axes and provides a global view of the trends with the data. While utilizing a biplot, the chi-square statistic measures the strength of tendencies within the considered data, which is focused on the point distances of variables.



<Figure 2> Row and column points with symmetric normalization

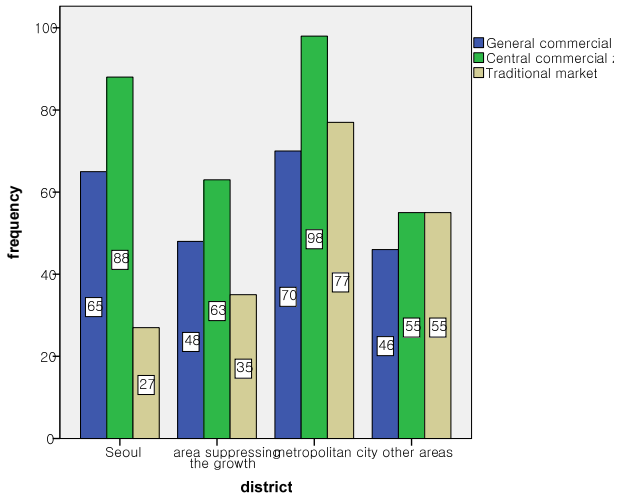
The distance between any points on a biplot provides a measure of their similarity (or dissimilarity). Points mapped close to one another have similar traits, while points

mapped remote from one another have different traits. We can find out traditional markets among three types of markets are, in particular, related to wholesales & retail industry among types of occupations. Similarly, central commercial zone and general commercial zones are closely related to lodging restaurant business and association & repairing personal services, respectively. On the other hand, publishing, picturing business, broadcasting & communication, information services is far away from all types of markets.

4.2. Types of districts versus types of markets

Whereas central commercial zones are bigger than any other types of districts regardless of types of markets, Traditional markets are a little bigger than general commercial zones for Metropolitan cities and other areas. Traditional markets in Seoul have a far more smaller size comparing to the other districts (see <Figure 3>).

The chi-squared test suggests the strong and significant association between types of districts and types of markets. The first dimension explains 98.6% and the first two do 100% of total inertia (see <Table 2>).

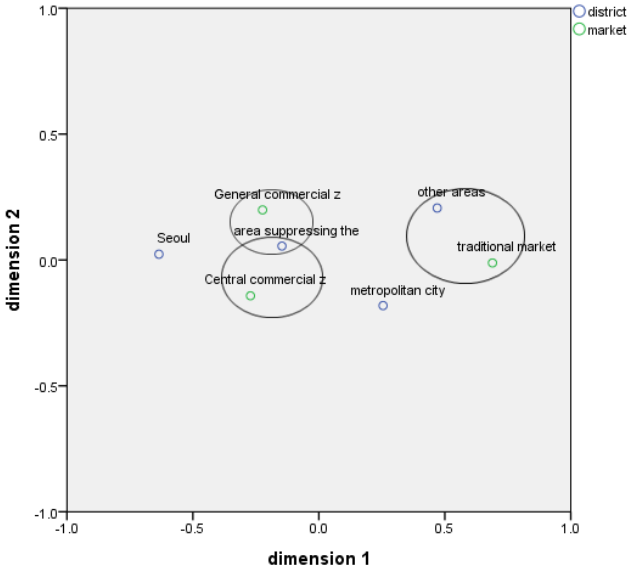


<Figure 3> District by market

<Table 2> Summary on types of districts

dimension	Singular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Accounted	Cum	Std. dev.	Corr. 2
1	.173	.030			.986	.986	.034	-.019
2	.021	.000			.014	1.00	.036	
Total		.030	22.16	0.001	1.000	1.00		

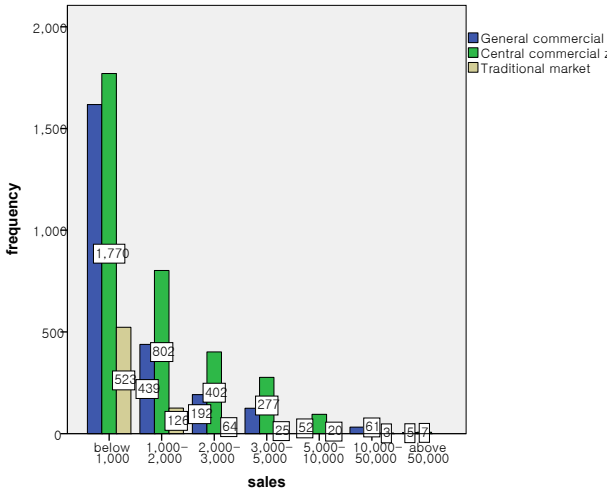
We can see that traditional markets among three types of markets are related to 'other areas', whereas both general commercial zones and central commercial zones are closely linked with areas suppressing the growth. However, traditional markets do not have to do with as much for Seoul. Metropolitan cities among types of markets seem to have a marginal connection with both general commercial zones and central commercial zones (see <Figure 4>).



<Figure 4> Row and column points with symmetric normalization

4.3. Sales versus types of markets

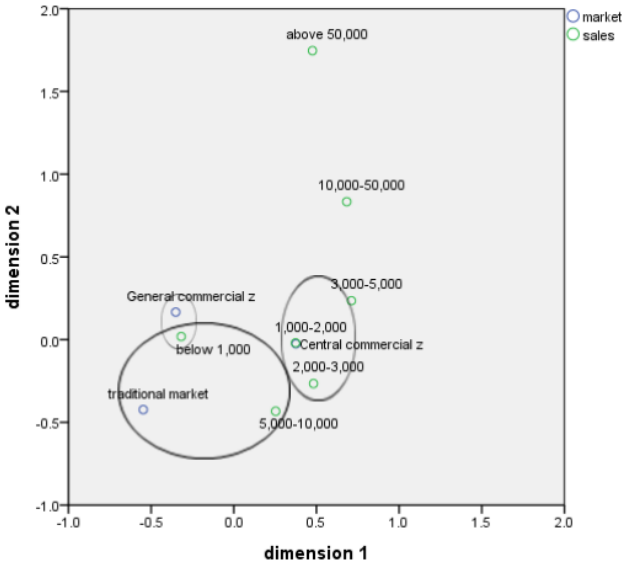
For all sales, central commercial zones, general commercial zones and traditional market are most chosen markets in numerical order. We can find the fact that both central commercial zones, general commercial zones in sale 'below 1,000' account for about 51% of the total values, and also traditional markets have the largest number in the lowest sale 'below 1,000' (see <Figure 5>).



<Figure 5> Sales by market

<Table 3> Summary on sales

dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Acco unted	Cum	Std. dev.	Corr. 2
1	.153	.023			.960	.960	.012	-.099
2	.031	.001			.040	1.00	.010	
Total		.024	161.39	0.000	1.000	1.00		



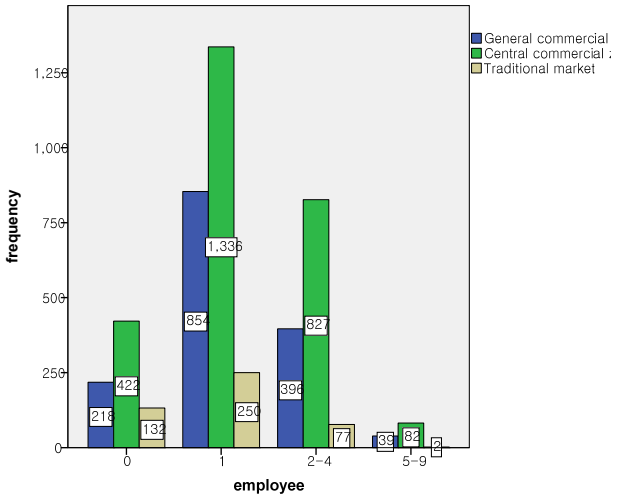
<Figure 6> Row and column points with symmetric normalization

Examining the value of chi square statistic (p-value<0.001), from <Table 3> given above, suggests that it is significant, justifying the assumption that the two variables (or sizes of sales and types of markets) are apparently related to each other. We can see that the first dimension explains 96% of the 2.4% of the variance explained by the given model.

Note that, from <Figure 6>, the close association of pairs of categories can be summarized as follows: (general commercial zones, below 1,000), (central commercial zones, 1000 to 2000). Traditional markets appear to have a marginal association with 'below 1,000'. However, 'above 50,000' among sizes of sales is far away from all types of markets.

4.4. Sizes of employees versus types of markets

Central commercial zones have the largest count in all types of markets regardless of sizes of employees, and also they account for about 64% in sizes of employees '2 to 4'. Additionally, we can see that all types of markets are the biggest in '1' comparing to other size of employees (see <Figure 7>).

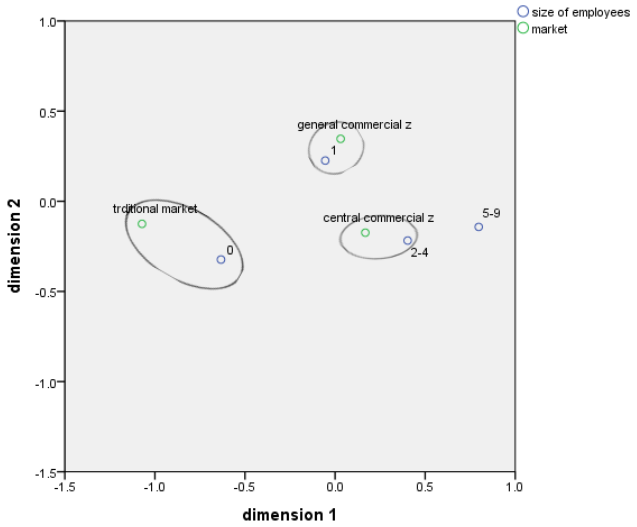


<Figure 7> Sizes of employees by market

The value of total inertia, from <Table 4> below, indicates that knowing something about size of employee explains 2.0% of something type of market and vice versa. This connection is not strong, but very significant as shown by the value of chi square statistic (p-value<0.001).

<Table 4> Summary on sizes of employees

dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Acco unted	Cum	Std. dev.	Corr. 2
1	.131	.017			.835	.835	.015	.069
2	.058	.003			.165	1.00	.015	
Total		.020	94.851	0.000	1.000	1.00		



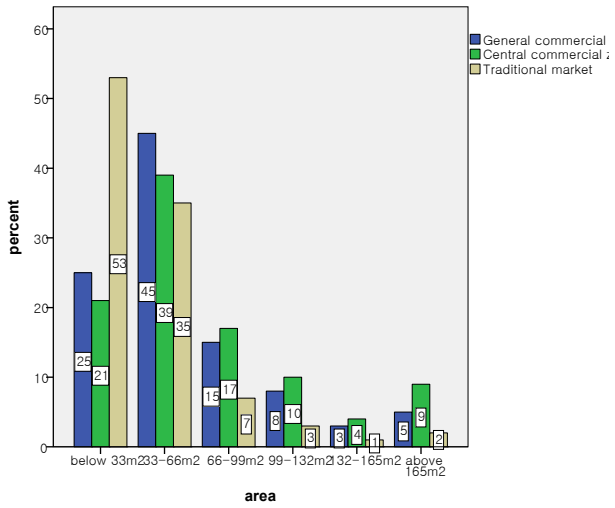
<Figure 8> Row and column points with symmetric normalization

We can discover the following: traditional markets among three types of markets are tied to '0' amongst sizes of employees, general commercial zones are '1', and central commercial zones are '2-4'. Note that traditional markets are far from '5-9' comparing to other markets (see <Figure 8>).

4.5. Areas in rental building versus types of markets

We can find the fact that as the sizes of rental building are getting bigger, the percent of traditional markets are smaller. In case of 'below 33m^2' among three kinds of markets, traditional markets, in particular, account for about 54%, which are the largest scale in all combination of types of markets and sizes of rental housing (see <Figure 9>).

The sum of 'below 33m^2' and '33m^2 to 66m^2' takes up approximately 72% of all markets while 'above 165m^2' takes up only 5.3%, which shows a part of the present market situation.



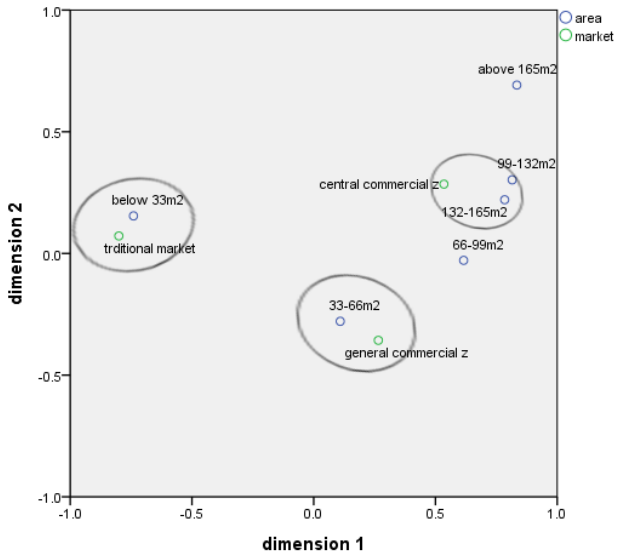
<Figure 9> Areas in rental building by market

The chi-squared test shows the highly significant association between areas in rental building and types of markets. The first dimension explains 95.6% and the second does 4.4% of total inertia (see <Table 5>).

<Table 5> Summary on areas in rental building

dimension	Singular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Accounted	Cum	Std. dev.	Corr. 2
1	.332	.110			.956	.956	.053	.110
2	.071	.005			.044	1.00	.060	
Total		.116	34.656	0.000	1.000	1.00		

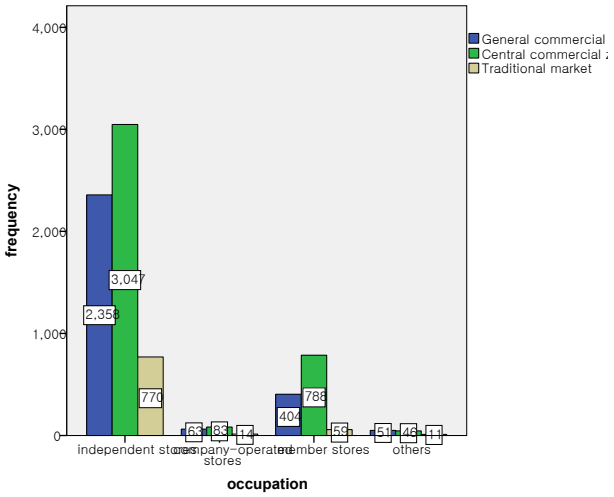
We can obtain findings, from <Figure 10>, that traditional markets are likely to have to do with much 'below 32m^2', and general commercial zones are '33m^2 to 66m^2' among areas in rental building. General commercial zones have a marginal association with '66m^2 to 99m^2' and '99m^2 to 165 m^2'. In addition, there exists an indication that the larger areas in rental building, the more remote traditional markets.



<Figure 10> Row and column points with symmetric normalization

4.6. Types of business versus types of markets

Independent stores and traditional markets cover about 80%, 11%, respectively, for all combinations of types of business and types of markets and also traditional markets of types of business, in addition, account for approximately 90% of all three markets (see <Figure 11>).



<Figure 11> Business by market

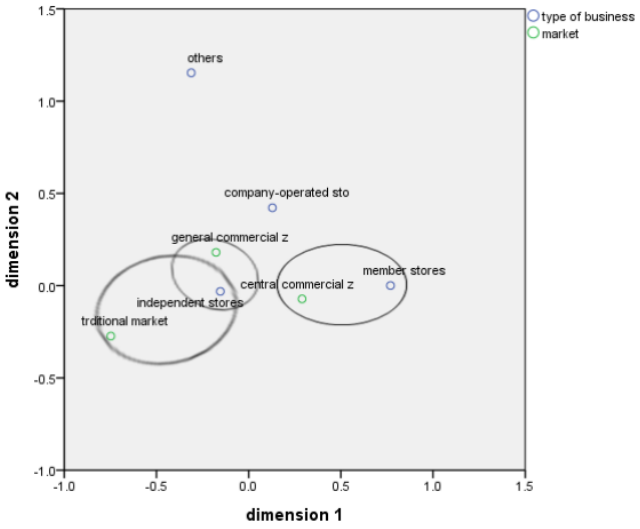
Central commercial zones and general commercial zones in Independent stores dominantly take up about 40%, 31%, respectively for all combination of types of business and types of markets.

The value of chi-square statistic indicates that there exists a strong association between types of business and markets (p-value<0.001). The first dimension explains 96.2% and the first two do 100% of total inertia (see <Table 6>).

<Table 6> Summary on types of business

dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Acco unted	Cum	Std. dev.	Corr. 2
1	.117	.114			.962	.962	.010	.004
2	.023	.001			.038	1.00	.012	
Total		.014	109.24	0.000	1.000	1.00		

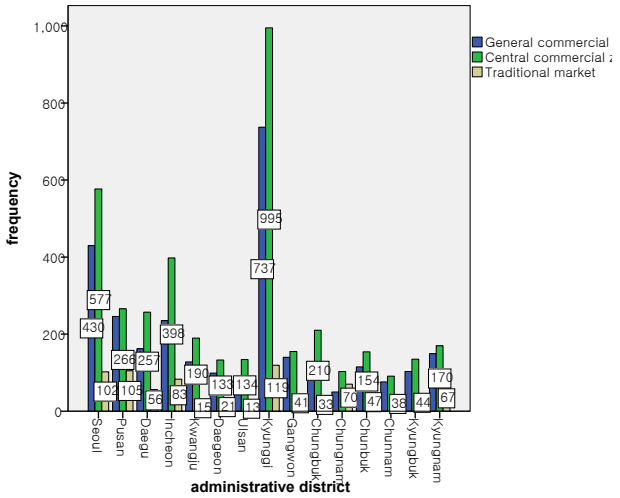
We can see, from <Figure 10>, that traditional markets and general commercial zones appear to have to do with independent stores, whereas central commercial zones seem to have a marginal association with member stores and independent stores. In particular, all types of markets have nothing to do with others amongst types of business.



<Figure 12> Row and column points with symmetric normalization

4.7. Administrative districts by a hirer versus types of markets

Central commercial zones are most activated at most of administrative districts from the standpoint of the hirer and have the largest number in 'Gyunggi', whereas traditional markets do not any traits, with keeping up inferiority in numbers in three types of markets (see <Figure 13>).

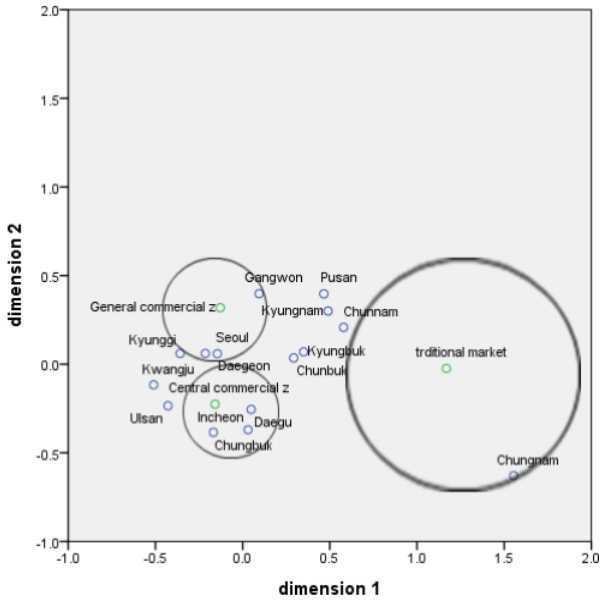


<Figure 13> Administrative district by a hirer by market

We can conclude that there exists a significant connection between administrative districts by a hirer and types of markets (p-value<0.001). The first dimension explains 87.5% and the second does 12.5% of total inertia (see <Table 7>).

<Table 7> Summary on administrative districts by a hirer

dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Acco unted	Cum	Std. dev.	Corr. 2
1	.170	.029			.875	.875	.013	-.023
2	.064	.004			.125	1.00	.011	
Total		.033	255.59	0.000	1.000	1.00		

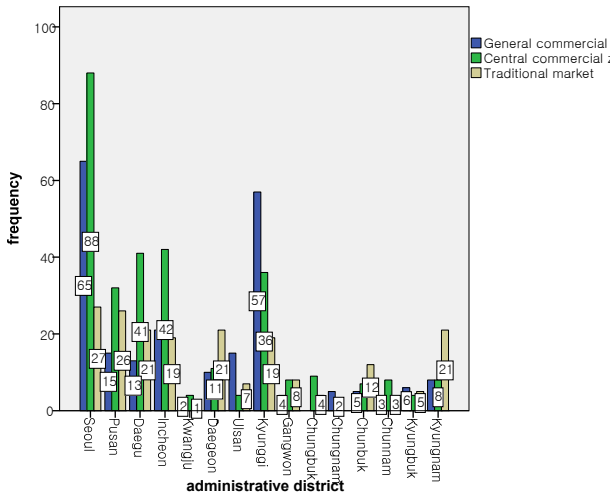


<Figure 14> Row and column points with symmetric normalization

The result can be found, from <Figure 14>, that traditional markets among three types of markets are marginally related to 'Chungnam' and 'Chunnam', but far from 'Gyunggi', 'Gwangju' and 'Ulsan'. Additionally, Central commercial zones are deeply tied to 'Incheon' and 'Daegu', whereas general commercial zones are marginally holding on 'Seou', 'Daejeon' and 'Gangwon'.

4.8. Administrative districts by a lessor versus types of markets

Traditional markets are, in particular, revitalized at 'Chunbuk', 'Deajeon' and 'Gyungnam' compared to others, while central commercial zones are activated at big cities such as Seoul, Pusan, Daegu and Incheon. We can see the unique characteristic that Gyunggi has the highest frequency at general commercial zones, unlike most of administrative districts from the standpoint of the lessor (see <Figure 15>).



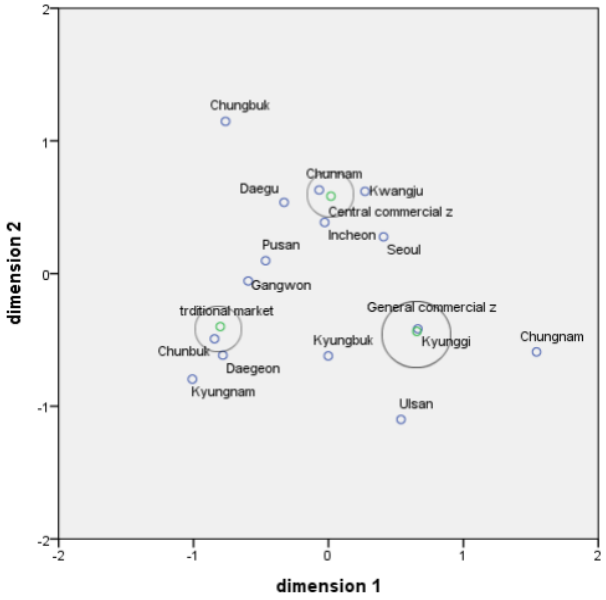
<Figure 15> Administrative district by a lessor by market

The chi-squared test represents the significant association between administrative districts by a lessor and types of markets (p-value<0.001). The first dimension explains 61.1% and the second does 38.9% of total inertia (see <Table 8>).

<Table 8> Summary on administrative district by a lessor

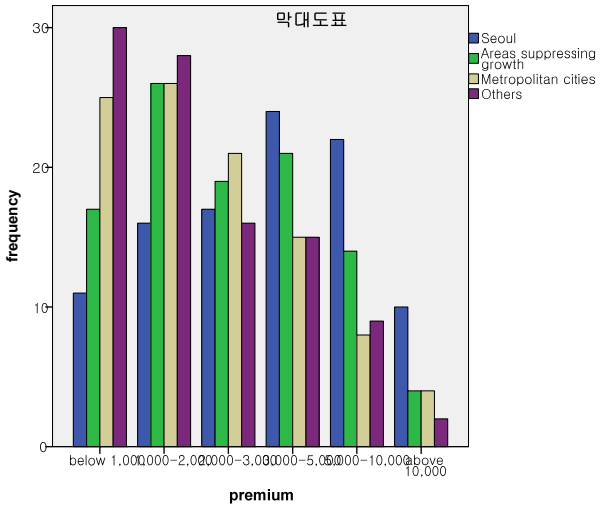
dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Acco unted	Cum	Std. dev.	Corr. 2
1	.307	.094			.611	.611	.036	.091
2		.060			.389	1.00	.034	
Total	.245	.154	112.05	0.000	1.000	1.00		

We can find out traditional markets among three types of markets are closely linked to 'Chunbuk', but not as much for 'Chungnam'. Also, central commercial zones are deeply tied to 'Chunnam', whereas general commercial zones are very closely connected with 'Gyunggi' (see <Figure 16>).



<Figure 16> Row and column points with symmetric normalization

4.9. Amount of premium versus types of districts



<Figure 17> Premium by market

We can find out, from <Figure 17>, that as the amount of premium is getting larger, both 'metropolitan cities' and 'others' tend to be smaller, whereas 'Seoul' is inclined to be bigger with maintaining the highest count.

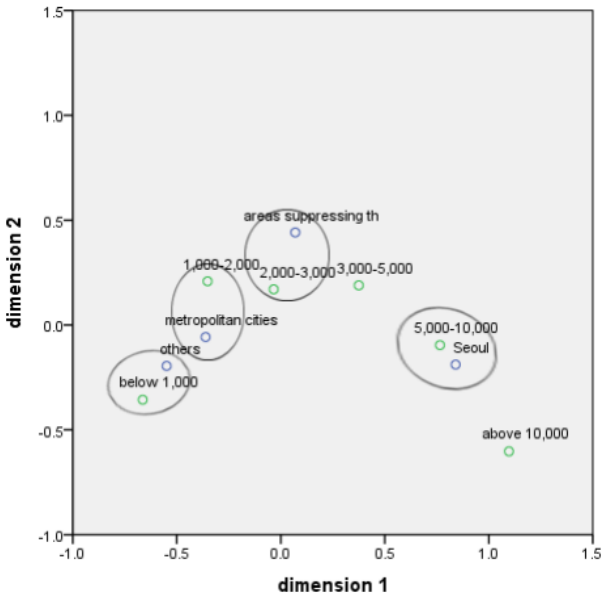
The p-value for chi-square statistic indicates that there exists a strong association between types of business and types of markets (p-value=0.002). The first dimension

explains 91.6% and the first three do 100% of total inertia (see <Table 9>).

<Table 9> Summary on amount of premium

dimen-sion	Sin-gular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Conf. Singular Value	
					Acco unted	Cum	Std. dev.	Corr. 2
1	.286	.082			.916	.916	.048	.158
2	.068	.005			.052	.968	.048	
3	.054	.003			.032	1.00		
Total		.089	35.678	0.002	1.000	1.00		

The following can be obtained: 'Seoul' among administrative districts is closely related to '5,000 to 10,000' amongst amount of premium, 'areas suppressing the growth' is '2,000 to 3,000', 'metropolitan cities' is '1,000 to 2,000', and 'others' is 'below 1,000. Note that most of administrative districts are remote from 'above 10,000' except 'Seoul' (see <Figure 18>).



<Figure 18> Row and column points with symmetric normalization

5. Concluding Remarks

Correspondence analysis, the main tool exploited in this research and one of the popular multivariate statistical analyses, decomposes the chi-square statistic associated with the two-way table into orthogonal factors that maximize the separation between row and column scores (i.e., the frequencies computed from the table of profiles).

In summary, traditional markets have to do with much wholesale & retail industry among types of occupations, with other areas among types of districts, with below 1,000. among sizes of sales, with 0 among sizes of employees, with below $32m^2$ among areas in rental building, with independent stores among types of business, with marginally Chungnam and Chunnam among administrative districts by a hirer and with Chunbuk by a lessor.

In this paper, we considered only three types of markets such as general commercial zones, central commercial zones and traditional markets in order to explore associations between traditional markets and other factors. Considering more detailed and specialized markets unlike large-scaled types of markets given above, the segmented version of association between traditional markets and others can be investigated in the future. Furthermore, it will be very interesting to categorize and segment a variety of traditional markets into homogeneous groups based on similarities or dissimilarities.

The government and local autonomy should enact a special law to reform the timeworn infrastructure, establishment and environment of traditional markets and enforced diverse policies with the sole object of changing consumers' business mindset, with maintaining the balance among other markets.

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