Identifying the effect of tenant mix on rental price

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Abstract. This study reviews the literature about the correlation between the rental price and tenant mix in the shopping center. Our research aims at determining which variables can describe the model of tenant mix impact on the rental cost. One of the aspects that influence the architectural experience for shopping center visitors is the tenant mix aspect. Shopping centers with an optimum tenant mix may enhance its shopping experience and its rental price. Previous studies on rental cost and tenant mix have only been carried out in the first world countries and western countries. Indonesia has never conducted this study, so there is yet a method to quantify rental prices based on the tenant mix level for Indonesian shopping centers. Results of this literature study found that tenant mix variables include the number of units, size of the shopping center, average unit area, number of categories, and number of brands. Thus the shopping center in Indonesia would have a quantification standard of rental prices in the tenant mix level. Shopping center manager and retail observer in Indonesia can apply this quantification method. In the future, researchers may develop this study; they may examine the regression calculation on the correlation between shopping center rental prices and tenant mix.

1. Introduction

The shopping experience is one of the significant aspects of a shopping center. A proper application of the tenant mix becomes a way to optimize its performance. The tenant mix is one of the determining factors of rental pricing [1, 2, 8, 9, 12, 13]. The tenant mix influences the quality of the shopping experience, and that experience is necessary for rental pricing. Thus, the tenant mix is vital in setting the rental price of a shopping center.

The current issue is the lack of a mechanism in calculating the magnitude of the impact of tenant mix on the rental price. Rental pricing in Indonesia is still done based on competitor study and negotiation. The pricing does not align with the quality of its tenant mix. The shopping center in Indonesia is yet to have a calculation method of rental price based on the tenant mix.

This article aims at identifying the variables of the calculation model of the impact of tenant mix upon the rental price of a shopping center in the Indonesian context. The study's purpose is for learning the definition and variables of the tenant mix. We also learn about the other variables which are affecting the rental price.

The tenant mix variables we observed in this study are macro variables that determine the rental price. The reason for this is because the tenant mix is part of the macro variables. The tenant mix is the identity of a shopping center that determines the price among shopping centers. Our study does not review the micro variables, which are the identity of a unit in a shopping center like the study of Joko and Gamal [7].
2. Method
Our research employs a qualitative study with a literature investigation. The literature covers the definition and benefit of tenant mix, tenant mix variables affecting the rental price, as well as the variables that determine the rental price of other shopping centers. The literature study will produce a final result in the form of a research niche.

3. Literature Review

3.1. Tenant Mix
The tenant mix is a combination of a homogenous tenant group and a heterogeneous tenant group [4, 5, 13]. The types of tenant in a shopping center consists of retailers and services tenants. The tenant mix is also a combination of tenants of various categories [1, 11].

3.2. Variables of the Tenant Mix Heterogeneity Level
The level of heterogeneity affects the level of the tenant mix [1, 12, 13]. The heterogeneity level will indicate the level of tenants types heterogeneity. The higher the heterogeneity, the higher the tenant mix level, and the rental price in a shopping center.

Dawson [1], Yim Yiu and Xu [12], and Yuo et al. [13] explains that one of the variables of tenant mix is the number of units. The number of units positively affects the level of variety. A higher number of units may increase the brands or categories variation. The study of Yuo et al. [13] has proved that the number of units and the number of brands has a strong correlation. The correlation coefficient is 0.92 between these two variables. This high result is indicating a strong correlation.

The size of the shopping center is the second tenant mix variables [12, 13]. A shopping center will try to obtain the highest profit. The management would maximize the space used to gain maximum income. A more spacious shopping center will increase the possibility to have more varied tenants compared to a smaller shopping center. The bigger the shopping center, the higher its variation level. These studies [12, 13] have a different unit of a shopping center with Indonesia. The research of Yuo et al. [13] from the United Kingdom and Yim Yiu and Xu [12] from Hong Kong are uses square feet. Besides that, Indonesia is using the square meter unit.

Another variable of tenant mix is the average unit size [1, 13]. The study of Dawson [1] and Yuo et al. [13] which are from England use square feet. The average unit size is the division between the total unit size and the sum of total available units in the shopping center. The higher the number of units in a shopping center, the smaller the size of each tenant. Larger shopping center might not experience the same thing; the high number of units might not cause its average unit size becomes smaller.

The number of categories is the next tenant mix variable [1, 13]. It is the grouping of retail types. The retail meaning in this study is the tenant. Yuo et al. [13] uses 28 types of the group for measuring the value of this variable. The number of categories for each country will vary according to its respective retail regulations.

The fifth variable for the tenant mix is the number of brands [13]. One brand may have a unit more than one in a shopping center, the identical tenant is the term for it. If a shopping center has many
similar tenants, then its variation decreases and competition among tenants will increase. In the calculation of the number of brands, researchers will calculate the repeating brands as one brand.

The first study that addresses the determining variables for the heterogeneity of tenant mix against rental price is the study of Yuo et al. [13]. All five variables are included in the regression model of Yuo et al. [13] research. Every equation has the repeating categorical variable, which is the unit size category (grouping). This categorical variable indicates the dominant unit size in the shopping center. The option in this variable is the unit size/main unit/big standard/small standard/small tenant.

\[ \log P = f (US, S) \] (1)
\[ \log P = f (US, NU) \] (2)
\[ \log P = f (US, AUS) \] (3)
\[ \log P = f (US, NC) \] (4)
\[ \log P = f (US, NB) \] (5)

Equation 1-5. Regression Model of Tenant Mix
Source: Yuo et al. (2004)

\[ \log (NU) = \log (c) + z \log (S) \] (6)

Equation 6. Correlation between Size of Shopping Center and Number of Units.
Source: Yim Yiu and Xu (2012)
The equation six (6) explains that the logarithm of the number of units is affected by the logarithm of the size of the shopping center with certain constants. Size of shopping center variable using constant because there are non-saleable areas in shopping centers, for example, voids and corridors. Yim Yiu and Xu’s [12] research found a strong correlation between the size of the shopping center and the variables of the number of units.

3.3. Variables of the Tenant Mix Concentration Level
The tenant mix correlates to the concentration level because it concerns the relationship among tenants. The study that assesses the variables of tenant mix concentration level is the study of Yuo et al. [13]. This research wrote about the concentrate level of brands and categories using the Herfindahl index.

\[
IB = \sum_{s=1}^{n} \left( \frac{NU_s}{NU} \right)^2
\]

Equation 7. Concentration Level of Brands
Source: Yuo et al. (2004)

\[
IB : \text{Herfindahl Index for Brands}
\]
\[
NU : \text{Number of Units}
\]
\[
NU_s : \text{Number of Units in Brand } s
\]
\[
n : \text{Number of Brands}
\]

\[
IC = \sum_{r=1}^{n} \left( \frac{NU_r}{NU} \right)^2
\]

Equation 8. Concentration Level of Categories
Source: Yuo et al. (2004)

\[
IC : \text{Herfindahl Index for Categories}
\]
\[
NU : \text{Number of Units}
\]
\[
NU_r : \text{Number of Units in Category } r
\]
\[
n : \text{Number of Categories}
\]

Equation seven (7) is useful for calculating the concentration of brands. Whereas equation eight (8) is the model for the concentration of categories in a shopping center. By calculating the ratio we may be measuring the concentration of brands. The ratio is the division between the number of units for certain brands (brand S) with the number of available units in a shopping center.

This division goes to the category as well. For example, the calculation for brand concentration. The division of 3 units of brand X with 600 units in total in the shopping center. The result showed that the concentration of brand X is 0.5%. The example for the category is by dividing 60 units in the food and beverage category with a total of 300 units in the shopping center. So, the concentration for this category is 20%.

The measurement of the Herfindahl index is by summing all of the division's results of brands or categories concentrations, which are squared respectively. Furthermore, Yuo et al. [13] calculated the shopping center rental price based on tenant mix homogeneous variables, namely the brand concentration and category concentration.

\[
\log P = f \left( PR, Ag, T, IB, LT, CS, CT \right)
\]

Equation 9. Rental Prices using Brand
Source: Yuo et al. (2004)

\[ \log P = f(PR, Ag, T, IC, LT, CS, CT) \]  
**Equation 10. Rental Prices**
Source: Yuo et al. (2004)

- **P**: Shopping Center Rent Price (per square feet)
- **PR**: Region Shopping Center Rent Price (per square feet)
- **Ag**: Age of Shopping Center (year)
- **T**: Traffic in Shopping Center (weekly)
- **IB**: Herfindahl Index for Brands
- **IC**: Herfindahl Index for Categories
- **LT**: Large Unit (dummy)
- **CS**: Category of Unit Size (categorical)
- **CT**: Category of Unit Type (categorical)

Equation nine (9) is a calculation of rental prices using brand concentration. While equation ten (10) for category concentration. The equation contains seven (7) variables, including the brand and category concentration. The other variables are region shopping center rental prices, age, traffic, large units (anchor units), unit size, and unit type categories. The anchor unit in this study is a well-known unit (top retailer) in the United Kingdom, based on the Freeman Retail Guide book. If a unit is an anchor unit, so the value is 1. Otherwise, it will be zero (0) given if it is not. This study used two (2) categorical variables, namely unit size category and unit type category. Unit type category has options which are strong/medium/weak/independent unit.

The study of tenant mix concentration impact on rental prices found that brand concentration has a negative effect on shopping centers rental prices. The higher the concentration level of the brand, the lower the rental cost would be in the United Kingdom. However, the concentration category does have a positive impact on the rental price. The higher the concentration, the higher the rental price of the shopping center would be in the United Kingdom.

### 3.4. Control Variable: Size of Shopping Center

Our literature study then attempts to review macro variables other than tenant mix variables that determine the rental cost. The first macro variable is the size of the shopping centers [2, 8, 10]. The first impression of the wider shopping center will be better than the smaller shopping center. The size of the shopping centers represents the number of available tenant units, so the larger size probably has more kinds of tenant units. A good image will create a powerful attraction for the shopping center. The unit's diversity also becomes an appealing factor for visitors to visit a shopping center.

In the studies of Sirmans and Guidry [10] and Des Rosiers et al. [2], the size variable is part of the attraction category. This variable may attract consumers, thus affecting the income and rental price of a shopping center. The size of the shopping center positively and significantly affects the shopping center rental prices, with a beta coefficient of 0.006 [10]. Every increase of 10,000 square feet of the shopping center size will increase the rental price by 5 cents.

Ke and Wang study [8] included the size variations of the shopping center into a physical category. According to Ke and Wang [8], size is one of the physical characteristics of the shopping center. The regression results of this study obtained a coefficient of 0.00. This study output means that the size variable has a positive and significant influence on rental prices.

| Author     | Location       | Effect on Rental Price | Coef. | Unit |
|------------|----------------|------------------------|-------|------|
| 2 Canada   | Quebec City    | Positive               | 0.00  | -    |
3.5. **Control Variable: Size of Unit**

According to Des Rosiers et al. [3] and Jeong and Kim [6], unit size is one of the determining factors for the rental price. The unit size of these two studies uses square meters, which align with the research context that located in the eastern country, Seoul, Korea. Different from the category name in the previous study [8], who use physical category name. Jeong and Kim [6] included the unit size variable in the building category. Unit size is the characteristic of a building. The influence of unit size on rental price is positive and significant with a p-value of 0.00. In Jeong and Kim’s [6] study, the primary factor in determining the rental price is the unit size variable.

4. **Results and Discussions**

Researchers emphasize the size of the shopping center more than on the number of units variable because it is easier to retrieve the data, thus enabling the researchers to make a more accurate analysis compared to focusing on other variables. The size of the shopping center is the sum of the entire floor area. If each floor has the same size, we multiply the area of a shopping center with the total floors. But if the size is different, we calculate each floor area and add them all. Considering the strong correlation between the number of units and the size of the shopping center, the calculation model only requires one (1) variable from both of them. This study uses the size of the shopping center variable.

The average unit size and number of unit variables are the second substantial variable for tenant mix study. The formula for calculating the average unit size is by dividing the size of the shopping center with the number of units. This research only uses one variable from both of them. Therefore, this study only uses the average unit size variable because the average unit size formula already uses the number of units value. The number of categories and the number of brand variables have the hardest calculation techniques among the five tenant mix variables. Researchers need to list all the brands in the shopping center to calculate the number of brands. In calculating the number of categories, researchers must categorize the brands that are renting a space in shopping centers.

Table 2 illustrates where the previous studies had discussed the tenant mix variables. The literature of tenant mix variables and the literature of other determinant variables for shopping center rental prices are two groups of literature that are reviewing the tenant mix variables.

| Variable                  | TMV | ODV | Author |
|---------------------------|-----|-----|--------|
| Number of Units           | √   |     | 1, 12, 13 |
| Size of the shopping center | √   | √   | 2, 8, 10, 12, 13 |
| Average Unit Size         | √   | √   | 1, 6, 13 |
| Number of Categories      | √   |     | 1, 13 |
| Number of Brands          | √   |     | 13 |

**Notes.**

TMV = Tenant Mix Variable. ODV = Other Determinant Variable for Shopping Center Rental Price. 
1 = Dawson, 1983. 2 = Des Rosiers et al., 2005. 6 = Jeong and Kim, 2012. 8 = Ke and Wang, 2015. 10 = Sirmans and Guidry, 1992. 12 = Yim Yiu and Xu, 2012. 13 = Yuo et al., 2004.

Our study found that there are overlaps between tenant mix variables and other determining variables of rental prices. Table 2 shows that there are two (2) variables that intersect. Those variables are the size of the shopping center and the average unit size. Research on shopping center rental prices mostly discusses the variable size of the shopping center and average unit size. Both of the literature on tenant mix variables and the literature on other determinant variables for shopping center rental prices mostly use these two variables. These two variables influence the average rental price among
shopping centers including the tenant mix variables. A more in-depth discussion of variables in the research indicates that the variable is a substantial variable for shopping center rental prices issue.

This study found five (5) findings, i.e:
1. The size of the shopping center and average unit size variables are the most significant variables in the rental price calculation model based on the tenant mix.
2. The size of the shopping center is the most frequently occurring variable because it is the easiest variable to calculate.
3. The ease of obtaining data causes the average unit size and number of units to be the second most frequently occurring variables in previous studies.
4. It is difficult to calculate and obtain data for variable numbers of categories and the number of brands, so the authors rarely discuss these two variables.
5. There is a strong correlation between the variable size of the shopping center and the number of units.

Conclusions
The tenant mix affects the shopping experience of a shopping center. There are six (6) tenant mix variables. The most important aspects that affect the shopping experience and tenant mix are the sizes of the shopping center variable and the average unit size variable. This study shows that the sizes of a shopping center and the average unit size are the key variables to use in the calculation model of tenant mix upon the rental price of the shopping center. Besides that, there are also the number of units, the number of categories, and the number of brands variable for the calculation model.

Currently, only researches in the Western countries have discussed the determinant variables of rental prices based on the tenant mix. There has yet no studies on the effects of tenant mix on shopping centers in Indonesia. Therefore, researchers in Indonesia need to examine their effects using empirical studies. Our study is still limited to a literature study to identify what variables of tenant mix that may determine the rental price of shopping centers. The theoretical gap in this study is an empirical study of how much the variable influences quantitatively. We expect that there will be future studies that can calculate the regression equation of the tenant mix to the rental cost. Future studies also need to know about how much the coefficient of each tenant mix variable.

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