

Multiplicative Competition Interaction Model to obtained Retail Consumer Choice based on Spatial Analysis

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Abstract. The economic development in Indonesia is strongly supported by the existence of the retail industry. The retail market potential is also quite large, which has grown from traditional to modern retail. Retailers need to improve its strategy to retain customers, both on design, pricing, facilities, or green retailing concepts. This study provides the application of spatial marketing method Multiplicative Competition Interaction (MCI) for retail marketing analysis and strategy. This method has advantages because it uses the concept of location and retail interaction in each region. The sample used is minimarket type of retail, both local and national in 6 villages in Ngaglik, Sleman Regency, Yogyakarta. Surveys also conducted to consumers about the perception of minimarket quality when shopping for basic needs. The analysis shows that every minimarket has different market share in every location. Consumers not only prefer minimarkets that provide complete facilities, professional waiters, and affordable prices, but also prefer shop at minimarkets located closer to their house, because it can save time and transportation costs. The MCI model used 48 interactions between $i = 6$ villages and $j = 8$ minimarkets. By least square estimation and $\alpha = 5\%$, locations, parking facility, and price of product influence to the minimarket consumer choice. The positive parameter estimates, i.e. 4.087, 13.288, and 6.965. It shows that minimarkets that have a high valuation of “convenient location”, “sufficient parking facility”, and “affordable price” would achieve a higher capture of consumers.

Keywords: marketing spatial, Multiplicative Competition Interaction (MCI) model, Retail

1. Introduction

The retail industry is a strategic industry in its contribution to the Indonesian economy. In the global context, the potential of Indonesia's retail market is quite large, which has grown from traditional retail to modern retail. The retail industry has a substantial contribution to Gross Domestic Product (GDP). In addition, the industry also gives benefits because it plays a role in absorbing labor, encouraging public consumption, and economic growth. According to the Association of Indonesian Retail Companies (Aprindo), the growth of retail business in Indonesia is between 10% -15% per year in 2012.

Today, consumers have many options for shopping their basic needs, in traditional market, minimarket, supermarket, store, online shop, and others. They chose place that selling cheap products, complete, convenient location, close location, and others. Therefore, every market, especially retail, should has a right strategy. Each retail as a shopping place has different marketing and service



strategies. Competition among retailers is also increasingly tight between modern and traditional retailers to attract consumers and increase sales. Some research on retail are [1] which uses qualitative method to know consumer perception and motivation to modern and traditional retail. [2] used logistic regression method, and Importance Performance Analysis (IPA) to know consumer decision in consuming local oranges and imported oranges in modern retail. These methods analyze the behavior, perception, or level of customer satisfaction regardless the geographical aspects between location of the consumer and retail.

Marketing strategy requires a lot of information from various aspects, such as consumers, markets, competitors, and products. Several methods of marketing strategy that have been used only provide information on consumer's behavior or customer satisfaction. More important information is geographical aspects. There are two main keys to retail success, location and inventory factors, but location has an important role. [3] and [4] states that there are three important factors determine a retailer's success: location and location and location. The choice of a retail location is a strategic decision, because if once a location is chosen then retail owner must bear all the consequences of that choice [5].

The marketing analysis method that use location information is Geo-marketing. Research [6] and [7] state that geo marketing is a marketing analysis that uses data collection which provides information geographically both consumers and companies. Geo marketing consists of systems that integrate data, statistical methods and graphical representation for decision making. This analysis is the basis for spatial marketing analysis, where the spatial characteristics of the market are influenced by two demand factors, the distribution system and the market geographical component [8].

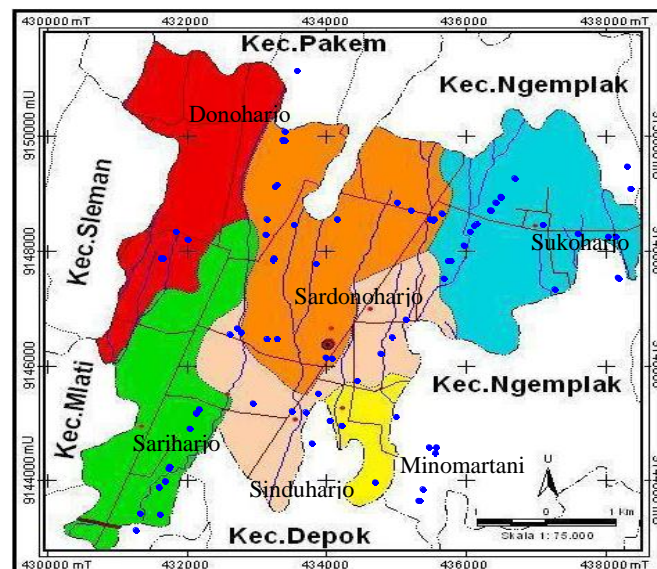
Spatial analysis is a method to get information of observations influenced by space or location effect [9]. There are several development spatial modeling, such as Spatial Autoregressive Models, Spatial Error Model, Spatial Durbin Model and Spatial Autoregressive Moving Average [10]. These model generally use in econometrics. Some spatial methods for the analysis of retail business areas are spatial interaction model, discrete choice logit model, and dynamic spatial model. These methods are developed using the information given by the past to understand the dynamics of retail competition and how consumers choose different alternatives to shopping. Research [11] and [7] uses spatial interaction functions and models for the first time in explaining consumer behavior. This method can be used to estimate the retail trade area. Some of them are Huff's model and Multiplicative Competition Interaction (MCI) model use information of distance factor along with other factors to predict consumer behavior in choosing shopping place. Research [8] have used MCI methods to analyze consumer behavior in store-based purchases based on spatial perspective on Gran Canaria. This method is used because it can identify how the selection of consumers based on their interest. This interest depends on the facility and the distance between the consumer and retail. Research [12] also uses MCI for analysis of supermarket election in Spain and Great Britain.

This research uses spatial marketing analysis, especially MCI model, to analyze consumer behavior in choosing retail, especially minimarket retail. It use to known how the characteristics minimarket that consumers need based on geo marketing information and the factors that influence consumers in choosing minimarket by notice the geo marketing information. It use the data case study in Sleman District, Daerah Istimewa Yogyakarta (DIY). Taking this location is based on the emergence of many modern retailers, especially minimarkets, in Sleman District. [13] also mentioned that the field of large and retail trade, not cars and motorcycles accounted for 6.80% in 2013 and increased to 6.84% in 2014 to Gross Regional Domestic Product (GRDP) in DIY.

2. Method

The data collection in this research consist of primary and secondary data collection. Secondary data is collected from references and data about the industry, especially retail, from Central Bureau of Statistics (BPS) and Village Potential Statistics (Podes). Primary data is collected from a survey, which includes observation and interview surveys conducted in 6 Villages in Ngaklik Sub district, Sleman Regency, Yogyakarta. Observations were done to select the retail that became the research

object and determine the attributes in the questionnaire. Furthermore, the retail location is mapped with the consumer location for the determination of the survey sample. The type of retail used is a modern and local minimarket retail that sells basic needs. The number of retail selected is eight minimarket which is a well-known and frequented by most of people in Ngaglik Sub district. The six villages are shown in Figure 1. Based on observation data, there are 84 minimarkets located in these villages. It shown on blue dots.



Source : Ngaglik Distric in Figures 2017, survey 2017

Figure 1. The research location in Ngaglik Sub district, Sleman, Yogyakarta

The survey was conducted by interviewing 150 consumers using a questionnaire in July 2017. The selected respondents are consumers who had been shopping at retail in Ngaglik Sub-district. The sampling technique is purposive sampling, which is based on the goal that the only respondent who ever shop in eight minimarket specified.

The analysis method to obtain the factors that influence the consumer choice is Multiplicative Competitive Interaction (MCI). The independent variable are the customer perceptions : convenient location (X_1), appropriate opening hours (X_2), professional and friendly waiter (X_3), clean and comfortable (X_4), product completeness (X_5), sufficient parking facility (X_6), and affordable price (X_7). Valuation of perceptions is use the scale 1-4, which the number 1 refer to negative valuation (disagree) and 4 refer to positive valuation (agree)

Market share is part of the market dominated by a company that is the percentage of sales a company's products against the total sales of its biggest competitors at a certain time and place. The greater the company's efforts in marketing its products the greater the market share will be obtained. The focus of Market share analysis is relationship of competition between brands in the market. One of the characteristics of market share analysis is competitive, the effects of an action must be analyzed by linking market positions and actions of competitors.

Spatial approach is important in marketing and market share, especially retail business. This approach is analogized between consumer behavior and Newton's law of gravity. Research [7] states that the reasons for using this method include: 1) Consumer demand varies greatly according to consumer space, such as income characteristics, number of households, or lifestyle; 2) Supply also varies according to location, i.e. in the case of available prices, services, products and stores vary by location; 3) Most economic activities are affected by location, and inter-site activities require cost. In order to better control, the location factor must be decomposed into a unit of analysis.

Multiplicative Competitive Interaction (MCI) is an econometric model for analyzing market shares and/or market areas in a competitive environment where the market is divided in j submarkets (e.g. groups of customers, time periods or geographical regions) and served by i suppliers (e.g. firms, brands or locations). The model is nonlinear (multiplicative attractivity/utility function with exponential weighting) but can be transformed to be estimated by OLS (ordinary least squares) regression using the multi-step log-centering transformation. MCI estimate parameter Huff Model with least squares approach at the "real" local market shares were observed.

The Huff Model is a spatial interaction model that calculates gravity-based probabilities of consumers at each origin location patronizing each store in the store dataset. The Huff Model [7]:

$$P_{ij} = \frac{S_j (T_{ij})^\beta}{\sum_{j=1}^n S_j (T_{ij})^\beta} \quad (1)$$

where P_{ij} = probability that a consumer in i moves to store j , T_{ij} = distance consumer in i moves to store j , S_j = square footage of store j ; β = customer sensitivity parameter of the distance consumer. MCI states that the attractiveness of consumers can be measured from the proportional relationship between market and marketing action, ie [7]:

$$s_i = \frac{A_i}{\sum_{j=1}^m A_j} \quad (2)$$

where s_i = market share in i , m = number of objects. A_i is a function of consumer appeal that influenced independent variables. This function can be linear, multiplicative or exponential.

$$A_i = \prod_{k=1}^K f_k (X_{ki})^{\beta_k} \quad (3)$$

where X_{ki} = independent variable, K = number of independent variables, and β_k = estimated parameter.

If equation (2) is approached by the distance between the consumer's location (residence) and the store location, then equation (2) can be written to [8]:

$$P_{ij} = \frac{\prod_{k=1}^q (X_{kij\beta_k})}{\sum_{j=1}^m \left[\prod_{k=1}^q (X_{kij\beta_k}) \right]} \quad (4)$$

Where P_{ij} = probability that a consumer in i moves to store j , X_{kij} = independent variable k which describes object j in situation i , β_k = parameter k , m = number of store, and q = number of independent variables.

Research [14] proposed a least square approach for estimating parameters of the Huff Model and named Multiplicative Competitive Interaction. Least squares means that the overall solution minimizes the sum of the squares of the residuals. Equation (4) is transformed into a linear equation that specifies error (ζ_{ij}^*) as in Equation (5)

$$P_{ij} = \frac{\left(\prod_{k=1}^q (X_{kij\beta_k}) \right) \zeta_{ij}^*}{\sum_{j=1}^m \left[\prod_{k=1}^q (X_{kij\beta_k}) \zeta_{ij}^* \right]} \quad (5)$$

Next equation (5) transformed into a regression equation as in equation (6)

$$y_{ij} = \sum_{k=1}^q \beta_k z_{kij} + \varepsilon_{ij}; i = 1, 2, 3, \dots, M \quad j = 1, 2, 3, \dots, m \quad (6)$$

with

$$y_{ij} = \log\left(\frac{P_{ij}}{\tilde{p}_i}\right) \quad z_{kij} = \log\left(\frac{x_{kij}}{\tilde{x}_{ki}}\right) \quad y_i' = [y_{i1}, y_{i2}, \dots, y_{im}] \quad \varepsilon_i' = [\varepsilon_{i1}, \varepsilon_{i2}, \dots, \varepsilon_{im}]$$

$$Z_i = \begin{bmatrix} z_{1i1} & z_{2i1} & \dots & z_{qi1} \\ z_{1i2} & z_{2i2} & \dots & z_{qi2} \\ & & \dots & \\ z_{1im} & z_{2im} & \dots & z_{qim} \end{bmatrix}$$

Equation (6) can be converted to matrix

$$Y = Z\beta + \varepsilon \quad (7)$$

So the parameter estimation

$$\hat{\beta} = (Z^T Z)^{-1} Z^T Y \quad (8)$$

3. Results and Discussion

3.1. Characteristic of respondent

The sample in this research is respondents who had been shopping at minimarkets selected in the study. They consist of 27 percent of male and 73 percent of female consumers who are 18 until 71 years old. They work as employee (20 percent), housewife (36 percent), farmers (6.7 percent), civil servant/army (10 percent), entrepreneur (20.7 percent) and others. Based on the last type of education, 60 percent consumers are graduate from senior high school, 20 percent are graduated from college, 12 percent are graduated from junior high school, and 8 percent are graduated from primary school.

3.2. Characteristic of minimarket attribute

The retail minimarket in this study, modern or traditional, spread in every villages. This data was obtained from observation. Sardonoarjo has the most minimarket, which is 24 minimarkets. In other location, there is 17 minimarkets in Sariharjo, 12 minimarkets in Sinduharjo, 8 minimarkets in Minomartani, 13 minimarkets in Donoharjo, and 10 minimarkets in Sukoharjo. Indomart and Alfamart are located in every village. Mina is located in Sariharjo, Donoharjo, and Sukoharjo. WS and Circle K are located in Sinduharjo. De Halal Mart and Ijo Royo-Royo are located in Sardonoarjo. Mirota is located in Sariharjo.

Table 1 shows the valuation of respondent perception about minimarket attribute which consist of about the location of minimarket (X_1), opening hours (X_2), service (X_3), cleanliness (X_4), product completeness (X_5), parking facilities (X_6), or price offered (X_7). There are three minimarket that have high valuation than others. Indomart has the high valuation of location, opening hours, and parking facilities. Alfamart has the high valuation of cleanliness. Mirota has the high valuation of service, product completeness, and price offered. Based on location on geographical aspect, it can be seen that consumer will prefer minimarkets that easy to reach from their house. An example, Indomart and Alfamart that have many outlets in every village.

Table 1. Mean of minimarket attribute

Minimarket	Attribute						
	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇
Alfamart	3.010	3.393	3.227	3.447	3.003	3.050	2.523
Circle-K	2.390	2.823	2.770	2.823	2.543	2.617	2.470
De halal mart	2.500	2.530	2.530	2.533	2.497	2.550	2.517
Ijo royo-royo	2.507	2.567	2.573	2.567	2.547	2.560	2.547
Indomaret	3.303	3.430	3.250	3.450	3.210	3.137	2.610
Mina	2.800	2.860	2.927	2.993	2.733	2.767	2.827
Mirota	2.320	3.267	3.273	3.387	3.350	2.687	3.147
WS	2.390	2.843	2.903	2.930	3.010	2.830	2.763
Average	2.653	2.964	2.932	3.016	2.862	2.775	2.675

3.3. Results of Multiplicative Competitive Interaction (MCI) model

Table 2 shows the market share every minimarket in every location. It is a part of the market dominated by a minimarket that is the percentage of sales a company's products against the total sales of its biggest competitors at six village. It calculated from the probability that a consumer living at village i chooses the minimarket j . Looking at the results of this probability, it can be found that every minimarket has different market share in every location. Indomaret has a high market share in Sardonoarjo (0.3384, which is almost 33.84%), Sinduharjo (34.48%), Sariharjo (35.45%), and Minomartani (97.18%). It beats the other retail in the survey in this study. In Sardonoarjo, this retail has a competitor who is also much in demand by consumers, such as Mina and WS in Sardonoarjo, Alfamart and Circle K in Sinduharjo, also Alfamart and Mirota in Sariharjo. In Minomartani, it very dominates the retail market. Mina has a high market share and dominate in Sukoharjo (32.03%) and Donoharjo (48.66%). It beats the other minimarket in Donoharjo and competing with Mirota in Sukoharjo.

In this location study, Mina located in three location (Sariharjo, Sukoharjo, and Donoharjo), but it has many consumers in Donoharjo. As a local or traditional ritel, it was able to compete with modern retail. Mirota located in Sariharjo has market share 29.8%. There are many consumer from other location even though the location does not exist, such as from Sukoharjo and Donoharjo. Retail WS, which located in Sinduharjo, has high market in Sardonoarjo although not dominating. It because the location of WS is in the border area between Sinduharjo and Sardonoarjo. Circle K has high market in Sinduharjo where located although not dominating. Other minimarket De Halal Mart and Ijo Royo-Royo has a small market.

Table 2. Market share in location i and minimarket j

Location	Minimarket							
	Indomaret	Alfamart	Mirota	Mina	WS	Circle-K	De halal mart	Ijo royo-royo
Sukoharjo	0.2422	0.0078	0.3203	0.3203	0.0859	0.0078	0.0078	0.0078
Donoharjo	0.0035	0.2118	0.1771	0.4896	0.1076	0.0035	0.0035	0.0035
Sardonoarjo	0.3384	0.0945	0.1250	0.2165	0.2165	0.0030	0.0030	0.0030
Sinduharjo	0.3448	0.3310	0.0014	0.0838	0.0838	0.1525	0.0014	0.0014
Sariharjo	0.3545	0.3404	0.2980	0.0014	0.0014	0.0014	0.0014	0.0014
Minomartani	0.9718	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040

Based on spatial studies, it shows that the location has high impact on market of retail minimarket. The first, minimarkets that have many stores in one location will have many customers. The second, consumers prefer shopping in the nearest minimarket. It was indicated by the minimarket that has a high market share in the location where it is. The third, every location have a different consumer

behavior pattern. These results used as a reason do to the next analysis, Multiplicative Competitive Interaction (MCI) model. It used to get factors that influence on retail or minimarket consumer choice. The consumer choice shown by the market share and can be measured from the proportional relationship between market and marketing action. In this research, the market share calculated from the probability that a consumer living at village i , $i=1,2,..,6$, chooses the retail minimarket j , $j=1,2,..,8$. The marketing actions are perform by everything which has been done by the minimarket and has been perceived by consumers, such as about the location of minimarket, opening hours, service, cleanliness, product completeness, parking facilities, or the price offered.

Research [15] states that MCI models derived from spatial interaction theory are the most widely used by firms when deciding where to locate new outlets. It conceptualizes consumers' spatial behavior and a part of spatial interaction theory. It also perform a competitive location, such that there is more than one minimarket competing in the spatial market and interaction between them. In these research, there were 8 minimarket that competing each other in 6 village. Consumer behavior about these minimarket also different among locations.

The summary results of MCI model are presented in Table 3. The dependent variable used are probability that a consumer living at village i chooses the minimarket. Independent variable are the customer perceptions, such as about the location of minimarket, opening hours, service, cleanliness, product completeness, parking facilities, or the price offered.

The model has coefficient determination (R square) 80.1%. In test of significance simultaneously with the null hypothesis test is $\beta_1 = \beta_2 = \dots = \beta_7 = 0$, it obtained the value of F statistics is 2.97. By the critical value for the test $F_{5\%,7,40} = 2.25$ and a 5% level of significance, it can be concluded that there are some independent variable that significant influence on minimarket choice. The significant independent variables at 5% level of significance are clean and comfortable (X_4), sufficient parking facility (X_6), and affordable price (X_7). It was perform by testing hypotheses using the t-test with the null hypothesis test is $\beta_k=0$, $k=1,2, \dots, 7$, and the critical value for the test $t_{5\%/2,40} = 2.201$.

Table 3. Estimation of parameter *Multiplicative Competitive Interaction* (MCI) model

Variable	Estimation	Standard Error	t _{value}	P _{value}
Convenient location (X_1)	2.873	1.45600	1.97	0.055
Appropriate opening hours (X_2)	5.141	4.43900	1.16	0.254
Professional and friendly waiter (X_3)	10.316	6.21200	1.66	0.105
Clean and comfortable (X_4)*	-13.387	6.14600	-2.18	0.035*
Product completeness (X_5)	1.809	2.67000	0.68	0.502
Sufficient parking facility (X_6)*	13.589	3.48400	3.90	0.000*
Affordable price (X_7)*	5.671	2.20200	2.58	0.014*
Stepwise				
Convenient location (X_1)*	4.087	1.305	3.13	0.003
Sufficient parking facility (X_6)*	13.288	2.213	6.00	0.000
Affordable price (X_7)*	6.965	1.445	4.82	0.000

Note: *) significant at $\alpha=5\%$

Stepwise process also done to get the best model. This model has coefficient determination (R square) 75.9%. The independent variables that significant at 5% level of significance are convenient location (X_1), sufficient parking facility (X_6), and affordable price (X_7). The choice of supermarket in location study depend on locations, parking facility, and price of product. The parameter estimation was use Least squares estimation such as in equation 8.

$$\log\left(\frac{P_{ij}}{\tilde{p}_i}\right) = 4.087 \log\left(\frac{x_{1ij}}{\tilde{x}_{1i}}\right) + 13.288 \log\left(\frac{x_{6ij}}{\tilde{x}_{6i}}\right) + 6.965 \log\left(\frac{x_{7ij}}{\tilde{x}_{7i}}\right)$$

In this case, the parameter estimate for three variables are respectively 4.087, 13.288, and 6.965. The positive value of parameter shows that supermarket with the higher valuation of “convenient location”, “sufficient parking facility”, and “affordable price” would achieve a higher capture of consumers, or higher probability P_{ij} . As example, Mina has a high market share and dominate in Sukoharjo (32.03%) and Donoharjo (48.66%) which is located. Most of consumer in two locations are choice Mina because it located close to the house. The number of Indomaret stores in every locations is more than other minimarket. It affects to the ease of consumers in reaching Indomaret and these minimarket has a high market share.

4. Conclusion

Spatial analysis in geo marketing has important rules to marketing strategy, especially in retail minimarket. Consumers will prefer minimarkets that provide complete facilities, professional waiters, and affordable prices. However, more consumers will also prefer shop at minimarkets located closer to their house, because it can save time and transportation costs. It is proved from the valuation of respondent perception about minimarket location. Some of minimarkets have high valuation because they have many outlets in every village and easy to reach from customer’s house.

Multiplicative Competitive Interaction (MCI) used to get factors that influence on retail or minimarket consumer choice. The consumer choice shown by probability that a consumer at village i will shop at minimarket j . The results analysis shows that the choice of supermarket in location study depend on locations, parking facility, and price of product. The positive value of parameter estimate indicated that supermarket with the high valuation of “convenient location”, “sufficient parking facility”, and “affordable price” would achieve a higher capture of consumers.

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References

- [1] Paramarta PD 2015. Analisis Persepsi dan Motivasi Konsumen terhadap Ritel Modern dan Ritel Tradisional (Studi pada Konsumen Toko Tanaman dan Alfamart Ki Mangun Sarkono di Kabupaten Tulungagung. *Jurnal Ilmiah Mahasiswa FEB* **3(2)**.
- [2] Shanti SI 2007 *Analisis keputusan konsumen dalam mengkomsumsi jeruk lokal dan jeruk impor di Ritel Modern: kasus konsumen Giant Botani Square Bogor*. Skripsi. (Bogor : Institut Pertanian Bogor)
- [3] Jones, Ken and Simmons J 1993 *Location, Location, Location, Analyzing The Retail Environment, Second Edition* (Canada: Nelson Canada)
- [4] Setyawardman A 2009 *Distribution Pattern and Factors Affecting the Selection of Modern Retail Location (Case Study Surakarta)* Thesis (Semarang: Program Pasca Sarjana Magister Pembangunan Wilayah dan Kota, Universitas Diponegoro)
- [5] Utami CW 2010 *Manajemen Ritel: Strategi dan Implementasi Operasional Bisnis Ritel Modern di Indonesia* (Jakarta: Salemba Empat)
- [6] Zio DS and Fontanella L 2014 Public geomarketing: Georeferencing IRT models to support public decision *Italian journal of Applied Statistics* **24(3)** 301-320
- [7] Cliquet G 2013 *Geomarketing : Methods and Strategies in Spatial Marketing* (United States : ISTE Ltd)
- [8] Vega RS, Acuna JLG and Díaz MR 2015 Spatial analysis of consumer behavior in a food

- products market *Theoretical and Empirical Researches in Urban Management*. **10(1)** 25
- [9] Anselin L 1988 *Spatial Econometrics: Methods and Models*. 1st Edn. (Netherlands: Kluwer Academic Publishers)
- [10] Bekti RD, Irwansyah E and Andiyono 2014 Mapping of Illiteracy and Information and Communication Technology Indicators Using Geographically Weighted Regression *Journal of Mathematics and Statistics* **10(2)** 130
- [11] Huff D 1963 A probabilistic analysis of shopping center trade areas. *Land Economics* **39** 81-90
- [12] Perales RC 2002 *Consumer choice in competitive location models* (Barcelona : Universitas Pompeu Fabra)
- [13] BPS 2017 *Ngaglik Distric in Figures 2017* (Jakarta : BPS)
- [14] Nakanishi M and Cooper LG 1974 Parameter estimation for a multiplicative competitive interaction model: least squares approach *Journal of Marketing Research* **11(3)** 303-311
- [15] Baviera-Puig A, Buitrago-Vera J and Escriba-Perez C 2016 Geomarketing models in supermarket location strategies *Journal of Business Economics and Management* **17(6)** 1205-1221

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