AN EMPIRICAL STUDY OF THE SPATIAL DEMAND AND MARKET AREA: THE CASE OF MARKET PLACES IN PADANG CITY

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ABSTRACT

This study aims to analyze the role of location and distance in determining the spatial demand for goods, and then determines the size of market areas that can serve better the local customers. Furthermore, it also analyzes the role of local government in determining the location of the market areas to improve the function of traditional markets places managed by the government of Padang city. The data used are primary (questionnairesutilized to interviewed the consumers) as well as and secondary ones.

The empirical findings on estimated spatial demand function for each of the nine markets are considerable good. Beside the conventional variables of market prices and household incomes, the variable of distance which is the main element of the spatial demand functionare found all highly significant. But the positive sign of distance need some explanations. When distance from the household to the market place is relatively far, the consumers tend to buy more goods to be consumed for several days to avoid daily visit the market place. Oppositely, whenthe distance is relatively short, the consumer tends to buy limited goods because they can visits the market place every day to get fresh foods. The sign of income coefficient varies in accordance to types of commodities bought. Normal goods have positive sign, but the inferior goods have negative signs (Engle's law). Calculating of the market boundaries are conducted to determine the maximum covered households that can served by each market area. The results indicate that the existing market area in Padang City is still not optimal yet. This suggests that some adjustments of location of the existing market places areas are needed as well as constructing some new market places. Therefore, this study provides a new distribution of market places for Padang City based on the calculation of market areas.

Keywords: Spatial Demand, Market Area, and Market Boundaries

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1. Introduction

In developing countries, like Indonesia, most of the existing market places are still designed and organized traditionally. A traditional market usually consists of two, i.e. the market places where merchants sell their products and the market areas where the consumers live. Prices are determines throughout bargaining which means there is no fixed prices. The traditional market places mostly sell and buy basic consumer's goods such as foods clothes and other household's daily needs. The facilities available in traditional market are limited and its objective is to serve local community needs for basic consumption goods. Business activities in the market places are mostly in the form of small-scales and still use the traditional management.

Currently, markets places inPadangasthe capital ofWest Sumatra Provincehave increased their activities inthe number of vendors, visitors, merchants as well volume and variationsof trading goods. However, such an increase is not coinciding to the physical development of the market places. The management of Padang City seems too late to anticipate the progress market activities as well as the growth population nearby. As a result, the marketgrows without the support of market facilities which reduces the shopping convenience of the consumers. This condition is alsoexacerbatedby the earthquake of September 30, 2009, whichcaused the market places becomeunsuitable anymore as means of the community supporting facilities. With the relatively high growth of Padang City population, the demand for goods and services also increases rapidly. The Market places that serve as a means to meet the growing needs of the people are not sufficient to serve the local population. Consequently, people have to go to some other market places to buy their needs and it creates higher transportation costs. Moreover, the availability of consumer goods needed by the people at the nearest market become limited. This problems leads to the inefficient movement for residents to find stuff their needs. This condition indicates that the present locations of the existing market places are not optimal to serve the local markets.

Considering such a problem, there should be a study that provides an empirical analysis on spatial demand and market areas to improve the model of market places development for Padang City. This study aims to fulfill such an idea and derives its policy implications to promote the community trading activities as well as consumer services. The purposes of this study are as follow: (a) To analyze the role oflocationanddistancein determining the spatial demand for goods; (b) To determine the market boundaries of each market placethatcan serve the

local customersoptimally; (c) To formulatean operational model oftraditional markets places based on the Market Area Approach that suitable form Padang City. The result of the study may be used for the formulation of the market place site plan and its policy implication as well. Thus, this study could identify themodel ofmarket places in Padang City as well as its policy implication to improve the quality of market facilities.

2. Theoretical Foundation and Current Related Studies

The theoretical framework used in this study originated from the location theory developed by August Losch (1954). This pioneer work provides the economic analysis in selecting optimal location of economic activities from the demand side point of view. Moreover, this theory also provide analysis on the spatial demand as well as spatial competition can determines the size market areas serve by the firm, At the end of the analysis Losch gives an ideal types of market areas under equilibrium condition in the form of hexagonal shape which in reality is debatable and rarely exist. Nevertheless, Losch has provided an important and interesting theoreticallogic on the location of economic activities and equilibrium of market areas.

This fruitful idea is further developed by Mills and Lav (1964) by providing method to determine the size of market areas and elaborated comprehensively. On the other hand, Smithies (1941) also gives an analysis of spatial competition which also influence the market areas. Moreover, Greenhut and Ohta (1975 and 1986), Benson (1986) and Ishikawa (1998) provides a more comprehensive analysis on the spatial demand and market area for different types of market structure as well as price discrimination. These theories focused on the analysis of optimal selection of the location of the economic activities from the demand sides. Moreover, these theories also formulated the determinant of market areas as well as the calculation of the sizes by taking into account the spatial competition of the firms. Sjafrizal (2012) analyzes the the influence of market areas as well as spatial competition on selection of optimal location for economic activities.

The basic assumptions underlying in the study of the choice of location and determining market area are as follow: (1) consumers are relatively evenly spread between spot, which fits into effect in urban areas where the concentration of population and industry is relatively evenly distributed than in rural or remote areas. (2) Products are homogeneous, so that the competition will be determined by price and freight, (3) The cost of transport per unity distances (ton / km) is

the same (*No Economies of Long Haul*), (4) Consumers are rational, that is likely to visit a location that is close to where they live. All of these studies emphasized on the size of market area, which bases its view that the manufacturer will choose the optimal location based on the strength of competition between the place and the market area.

Several current empirical studies were provided by Chombes andOverman(2003) who demonstratesthroughtheirresearchthatnumber offactoriesthatchoosingthe location in order tomaximizeprofits tends to concentrates to particular location, based on the market area. At the same time, HolesandStevens(2003) found out that marketsare important factorsdeterminingplant location. Furthermore, Nakamura(2007) indicated that themarket areas are determined by the output spatial distribution but the concentration of demand and market prices given. Recently, Capello(2011) showed that thelocation theory could explainthe distribution ofactivities over space. In this case, selection of the location were conducted by consideringonly the main economic   power,   such   as   transport   costs, whichdiffusesactivitiesinspaceandagglomerationeconomies   which   encourage   concentrated activities..

Several related studies in Indonesia are also available. Morger and Feinberg (1997) in Zuliani (2005) on research that discussed the influence of the location and the price of the Sarinah Super Market, Semarang, It was found in this study that price is a significant factor influencing the consumer decisions in purchasing products. A consumer will make a short market before deciding to buy any items from the shop. On theother hand,Amaludin (2011) suggested that the main factors determining location of the traditional market places were the cost of construction, transportation cost, public response, availability of public parking space as well as the possibility of the development of the traditional market location in the future.

3. Descriptions of the Traditional Market Places

Marketis a resultofhumanactivitypatternsthatoccur because of theneed of consumers as well as producers which encourage exchange of goodsandservices. The complexity ofthe needswillresult ineitherthetype ofgoods,   meansof   exchange   andawider.(Kottler&Armstrong,   2001).Thompsonsaid   that themarketregulates social life, including economy.Due tothe achievement ofpersonalinterestsand individualwelfarewillbringthe best results, notjust those as a personbutalsoto societyasa whole(Thompson et al inDamsar, 2009). Marketis onethat drives thedynamics ofeconomic life. Function

ofmarketinstitutionsaseconomic institutionsthat driveeconomic lifecannot be separatedfrom theactivities undertakenbythe buyerandthe merchant.

In general, market can be defined as an institution or mechanism in which the buyer and the seller meet and exchange of goods and services (Campbell, 1990). Meanwhile, according to Stanton (1996) market where peoplewho need something and have the purchasing power. Accordingly Kotler (1998) defines that market places are the physical places where buyers and sellers come together and exchanges goods and services to satisfy their needs. Therefore, Mused (1997) identifies three major components of the market places, i.e. consumers, sellers and rational economic behavior.

Traditional market places are particular type of market places where transaction between sellers and buyers are conducted traditionally following the local, social and cultural behavior. Trade transactions are based on negotiation and there is no fixed prices of the goods traded in the market. The market facilities are so simple and very limited, low quality and no information technology are used in making transaction. Mostly, types of goods traded in traditional market places are daily consumption goods needed by households. These market places could be either organized by the local government or by local society organization. At the present time, there are 9 traditional market places managed by Padang City

Traditionalmarkets places require a sufficient area land to facilitate the shops, open trading areas as well as the parking lots. Such a sufficient area is necessary because the traditional market does not used high rise building for shopping facilities. Strategic location of the market places as well as the availability of public transportation facilities are also important to able to attract more consumers from the nearest residential areas. The role of traditional market places in Padang city is still quite important to serve low and middle income classes who are still majority of the city population.

4, Methods of Analysis

This study is based on a field research conducted in June 2014 to 8 traditional market places in Padang City, West Sumatra, Indonesia. Intensive interview to some sampling households in each market area were conducted based on a specific prepared questionnaires with 5 measurement scales (Cooper andSchnider, 2006). Interviews were conducted intensively in the market places when the consumers are shopping. To make a more comprehensive analysis, however, some secondary data obtained from the official reports were also utilized.

Number of sample interviewed were 332households who were determined by the Slovin sampling method from the total number population with 6% degree of significant level. Total populations were 119,219 taken from number of households who lives in each of the market area. Based on *Central Limit*

Theorem (CLT) the distribution will be normal, if minimum sampling are 30 (n = 30).Type of sampling used is incidental sampling, ie sampling by coincidence, that whoever the buyer who by chance met in traditional markets as object of study by researchers can be used as a sample when a buyer who happens to be found are considered suitable as a source of data. This sampling is done after knowing how many populations used in each of these traditional markets. Thus, the number of samples obtained consumers may be representative in answering the questions in the questionnaire and as a guide in determining the optimal coverage of the market in Padang. Table 1 provides distribution of sample and population by each traditional market places.

Tabel 1.Number ofSamples of the Consumers in Each Selected Market

No	Nameof Market	Village	Population	Sample (Slovin)	Sample (CLT)
1	LubukBuaya Market	LubukBuaya	20.642	48	52
2	UlakKarang Market	UlakKarang Utara	6.418	15	30
3	Alai Market	Alai Parak Kopi	13.101	30	31
4	InpresSiteba Market	SurauGadang	20.990	49	54
5	Belimbing Market	Kuranji	30.471	71	71
6	Bandar Buat Market	Bandar Buat	14.649	34	34
7	SimpangHaru Market	SimpangHaru	4.600	11	30
8	Tanah Kongsi Market	KampungPondok	4.012	9	30
	TOTAL		119.129	267	332

Following Greenhut and H. Ohta (1975 and 1986) as well as Sjafrizal (2008), the spatialdemandof a consumerin each market place may be formulated by taking into account the transport cost from the location *j* where household lives to market place *i* in the variable of price . Thus, the spatial demand function may be written as follows:

$$Q_d = f(P_i + t_{ij}d_{ij}), \qquad t_{ij}, d_{ij} > 0 \qquad (1)$$

For simplicity, it is assumed that the demand function is in linear form. If household income (*Y*) is also taking into account, then the empirical spatial demand function for each market place may be written as follows:

$$Q_i = \beta_0 + \beta_1 P_i + \beta_2 Y_i + \beta_3 d_{ij} + e \qquad (2)$$

where is:

Q_i=the value of dominant goodspurchased by consumersduringthe timeof purchase

P_i=price ofgoods(dollars) dominant

Y_i=household incomeconsumers(dollars)

d_{ij}=distancefromhometomarket (meters)

e_i=anerrororresidualvaluethatarises because of thedifference inthe actual valueof eachQ$_i$observedforeachindependentvariable.Individualobservationscanoccurnegative or positiveresidues, due torandomvariations inthe value ofQ$_i$.

The estimation of equation (2) is done in cross-section using the ordinary least squares method for each marketplaces. Numbers of observation are equal to number of samples in each market places, i.e332 respondents.

The next stepis to calculate theMarketBoundariesbetweenamarketwithits nearestmarket. Marketlimitoftwomarkets(egmarketAandBmarket) is determined bythe locationwhere thesale priceis the samein both markets(Sjafrizal, 2008), namely:

$$P_A + t_A d_A = P_B + t_B d_B \qquad (3)$$

where :

P_A=is theselling priceof goodsinamarketlocation

P_B=is theselling priceof goodsinthe marketlocationB

t_A=freightfromlocationA tothe homeconsumermarketA

t_B=freightfromthe location ofthe homeconsumermarketBtoB

d_A=distancefromA tothe homeconsumermarketA

d_B=distancefromthe homeconsumermarketBtoB

This equation shows the location of market boundary where consumers can choose whether they would buy goods in a market or market B. Through the above equation, what counts is the distance of each market A and B, so as to produce respective limits each market.

The selling price of goods in the market place A and B were obtained from Padang City office, while the freight were cost from the consumer of each residential location. Calculation of the distance from the market places A or B to the consumer's residential location   is done by taking into account information from the satellite imagery maps manually with a certain scale. Based on the equation (2), the distance that determines the market boundary of each market was calculated by using the following equations:

$$d_A = \frac{P_B + t_B d_B - P_A}{t_A} \qquad (4)$$

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$$d_B = \frac{P_A + t_A d_A - P_B}{t_B}$$

(5)

The calculated values of d_A and d_B were used to measure the size of each market area. For simplicity, however, the shape of market areas are assumed to be symmetry.

5. Empirical Findings

In conduction the market survey, totalsampleof consumersinsomemarkets actually exceedthe calculation made by the Slovin formula. This is conducted toanticipateif there isdamage toseveralquestionnairesthathave an impact onresearchdata processing. Consequently, number of samples in the market survey are 332 respondents. By using the SPSS program version 20, the estimated consumer spatial demand equations of eachmarket place were resulted. These equationsdescribe theeffect of eachindependentntvariable(price, incomeanddistance) on the dependent variable(demand). Table2describesthe empirical findings for each equation ineach ofthe traditionalmarket in Padang City.

Based on the prevailing theory, when the commodities are normal goods, the income has a positive relationship to number commodities demanded. This means that the higher is the household income, the larger are the quantity demanded, and conversely. This study found that only 3 of the equations were coincide with such a relationship. However, there were 6 market places have negatives income coefficients, which mean that the higher is the consumer income, the less number of commodity demanded. This is because of the respondents interviewed in traditional markets are dominated by housewife buy mostly are foods for daily consumption which are considered as inferior goods. Such anevidenceis in accordance with the famous Engle's Law in Microeconomics Theory. For example, when consumer income increased, the consumption of meat (normal goods) tends to will high, but the it will reduces the consumption of salted fish (inferior goods) Consequently, the income coefficients for normal goods will be positive and negative for inferior goods.

Another related variable is the distance that connects consumers to the location of a market place. Based on the prevailing theory, the longer is the distance from the residential settlements the less is the amount of the commodity demanded is and oppositely is true when the distance is short. But empirical findings of this study are oppositely since most o the distance coefficients were positive. This is because the distance between the household residential location to the market place in Padang City are relatively short, so that the influences of the transportation expenses to the commodity demanded were small. Besides, the local consumer behavior is also influenced their desire to acquire goods that vary although the location of the target market can be reached at the expense of transportation costs, time and effort.

Thus, consumers will buy goods needs in the traditional markets in large numbers at locations more distant markets from their settlements because there are things that should they sacrificed, such as transportation costs, time and effort. Materials stretcher staples can be used as a backup (stock) that can be used and processed at any time.

Table 2.Empirical Findings of the Spatial Demand Function of The Traditional Markets Managed By Padang City

NO	NAMA PASAR	MODEL
1	Alai Market	$Q_i = 0,022 - 0,016P_A - 0,012Y_A + 1,001d_{AB}$ $\quad(-1,968)\quad(-1,475)\quad(154,356)$ $\overline{R}^2 = 0,999$ $F = 8172,898$
2	Bandar Buat Market	$Q_i = 0,487 - 0,056P_A + 0,021Y_A + 0,990d_{AB}$ $\quad(-2,222)\quad(0,820)\quad(39,735)$ $\overline{R}^2 = 0,980$ $F = 544,904$
3	Belimbing Market	$Q_i = 0,492 + 0,120P_A - 0,039Y_A + 0,864d_{AB}$ $\quad(2,005)\quad(-0,675)\quad(12,413)$ $\overline{R}^2 = 0,836$ $F = 120,203$
4	Inpres Siteba Market	$Q_i = 0,169 + 0,209P_A - 0,013Y_A + 0,822d_{AB}$ $\quad\quad\quad(3,289)\quad(-0,212)\quad(13,006)$ $\overline{R}^2 = 0,816$ $F = 79,482$
5	Lubuk Buaya Market	$Q_i = 0,060 - 0,088P_A - 0,026Y_A + 1,021d_{AB}$ $(-3,801)\quad(-1,192)\quad(43,689)$ $\overline{R}^2 = 0,976$ $F = 702,115$
5	Simpang Haru Market	$Q_i = 0,000 + 0,997P_A + 0,073Y_A + 0,011d_{AB}$ $\quad\quad\quad(237,341)\quad(17,325)\quad(2,593)$ $\overline{R}^2 = 1,000$ $F = 18879,280$

7	Tanah Kongsi market	$Q_i = 0,000 + 0,996P_A - 0,012Y_A - 0,032d_{AB}$ (60,473) (-0,753) (-1,968) $\overline{R}^2 = 0,993$ $F = 1220,462$
8	Ulak Karang Market	$Q_i = 0,336 + 1,040P_A + 0,016Y_A - 0,139d_{AB}$ (76,601) (1,272) (-0,139) $\overline{R}^2 = 0,996$ $F = 2073,113$

Notes: i = traditional market place , j = household location)

Given the above empirical estimated spatial demand functions, the next step is to calculate the market boundaries with its nearest market to determines the size of market areas. Calculation of the boundaries of each market areas is based on the most expensive price of goods purchased by consumers when shopping at the market each of two adjacent markets. This price is obtained from the questionnaires filled by consumers when making transactions in the market place. The distance is the physical length from the location where the consumer lives to market place they visit. By using the equation (4) and (5) one can calculate such a distance (in meters) where price of goods from the two nearest markets are the same. The data used is the freight cost by routes obtained from The Padang office of Transportation Authority.

After going through the stages of analysis, the calculated distance to each market boundary can be obtained. Such a calculated distance of each market places are as follows: Alai is 1,073 m, Bandar Buat is 2,682 m, Belimbing 1,033 m, Siteba is 3,927 m, LubukBuaya is 1,500 m, SimpangHaru is 773 m, Tanah Kongsi is 1,971 m, and UlakKarang is 1,073 m. By using these calculated distances we can estimate the size of market areas that can optimally serves customers in each area. It is a radius of each of each the traditional markets as measured from the center of a circular market. The size of each market area obtained by plotted on a map of Padang area by using the calculated distances as basis for the measurement. Figure 1 provides a map of plotted each traditional market areas of Padang City. There are two empirical findings emerged from Figure 1. *First,* some of the existing market areas are overlapping each other which make the function of each market is not optimal. *Second*, some new residential areas are still cannot be served by the existing market areas which creates in efficient distribution of consumer goods in the city.
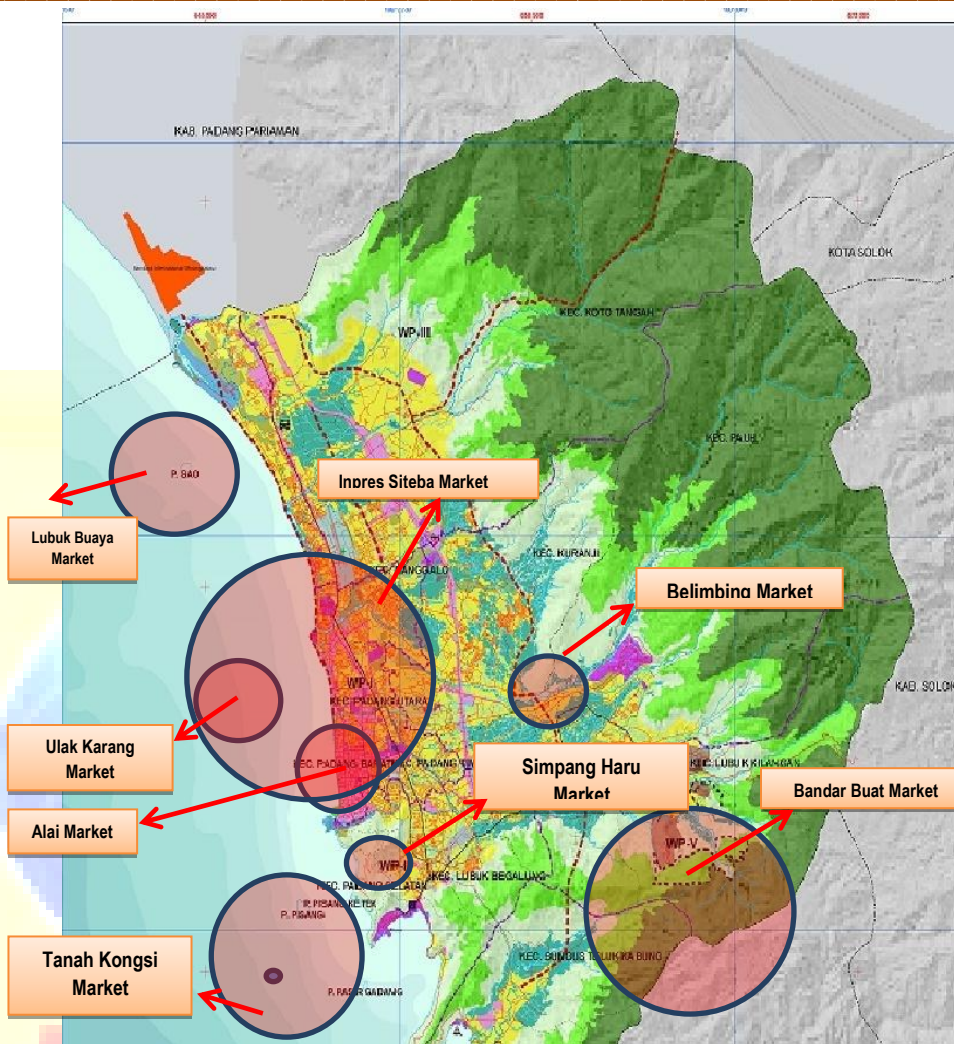
Figure 1.Empirical Findings on Calculated Traditional Market Areas Managed by Padang City

6. Some Policy Implications

To facilitate a better function of the existing traditional markets as well to provide a more efficient distribution of consumer goods throughout Padang City, a reallocation and building new market places are necessary. To encourage such an improvement, it is suggested to implement the following policies emerged from this study.

a. Since our analysis indicates that some of the existing market places are overlapping each other in terms of market areas it can serve, then related policy implication is to relocate some existing market places to new areas. Such a policy is important to create a more efficient distribution of consumer goods throughout Padang City;

b. Constructing some new market places in the new and growing residential areas to facilitates the society needs for consumer goods. As shown in Figure 2 such a policy is suggested for for three new local market places in Padang city;

c. Improving facilities of the existing market places to make a more convenience environment for the consumers. These facilities are parking spaces, shops, toilets, resting areas and other related supporting items. Moreover, management of Padang City should make some relocation of the street vendors and other related activities to make a more suitable condition for peoples who visits the market places.

d. Constructing 8 thematic traditional markets places which focus only for gtrading particular products such as electronics, fruits, rice, vegetables and fish. Establishing such a thematic market place is important to facilitate a more sound competition condition among the seller as well create a more convenience market location for related consumers.

e. Reducethe coverage foreach traditionalmarketsplaces in order to promote better services and more convenience condition to the related consumers in particular areas. Such an effort may be done by combining therevitalizationof the traditionalmarketswith construction modernmarket system.
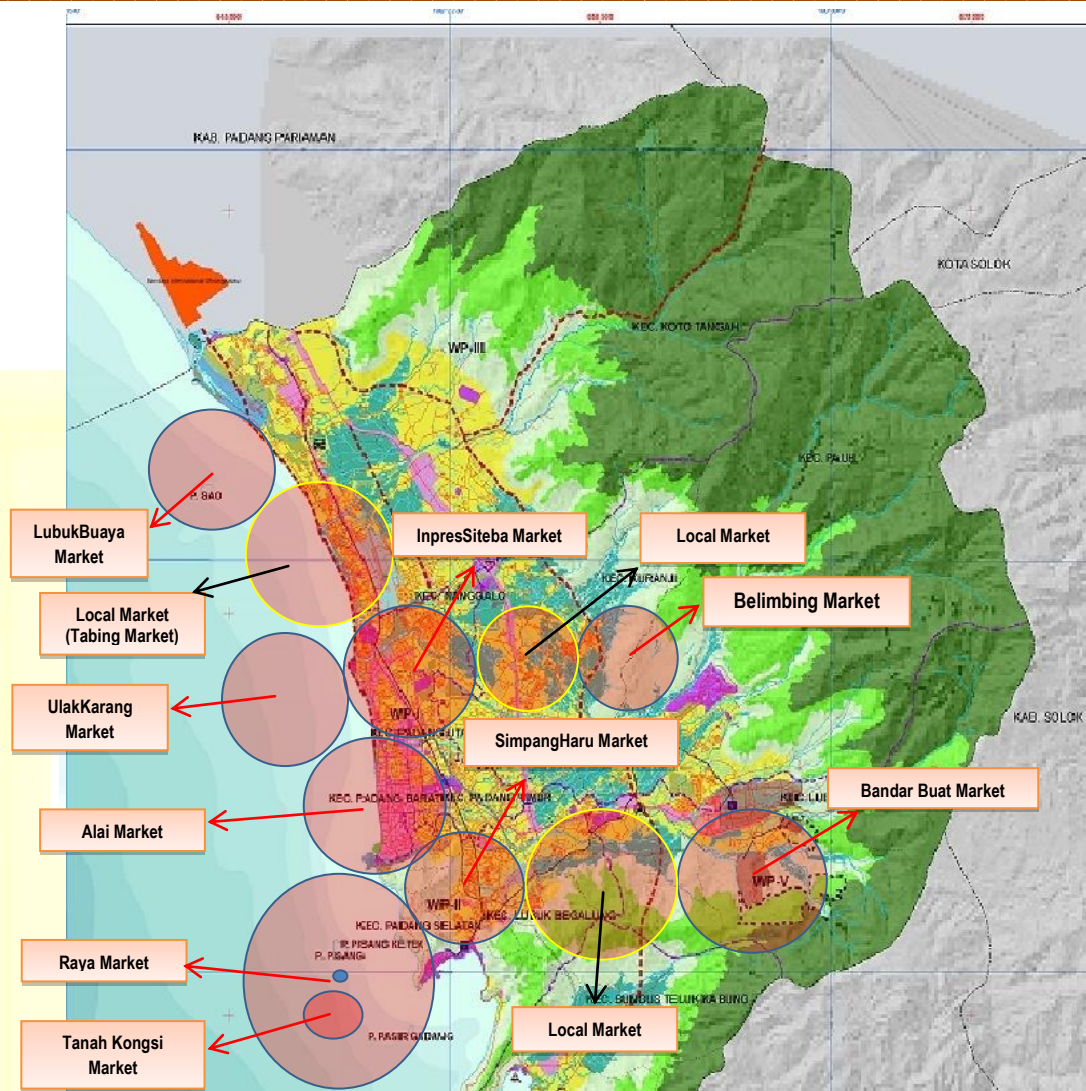
Figure 2.Suggested Relocation of Traditional Market Places for Padang City

Sources:Processed (2015)

7. Conclusions

This study provides an empirical analysis of the spatial demand function and calculating the size of market areas that can serves the local consumers optimally. Beside the conventional variables such price and household income, distance from market place to location where the consumers lives is as the spatial element in the demand function. While that market boundaries is based on the distance where the prices of good for two nearest market are equal. In other words, the market boundary is the location where the consumer is indifferent whether to buy the consumer goods from one market or to another closest one.

For simplicity, it is assumed that the market area is in circle. The data are collected through field survey on 332 local consumers of 8 traditional market places managed by the Padang City office.

The empirical findingsindicate that the variable of distance which is the main characteristic of the spatial demand function, as well as price and household income are highly significant. But the positive sign of distance need some explanations. When distance from the household to the market place is relatively far, the consumers tend to buy more goods to be consumed for several days to avoid to daily visit to the market place. Oppositely, when the distance is relatively short, the consumer tends to buy limited goods because they can visits the market place every day to get fresh foods. The sign of income coefficient varies in accordance to types of commodities bought. Normal goods have positive sign, but the inferior goods have negative signs (Engle's law).

Using these empirical findings of the spatial demand functions, the market boundaries are then be determined by solving the distance values when the selling prices (including the transportation costs) of both neighboring markets are equal. From this measurement of size of the market areas, it found that some of the existing market areas are overlapping each other. Moreover some new and growing residential areas do not have sufficient market area facilities to serve the local consumers. Such a empirical findings suggest that some policy implication are needed to relocate the market places as well establishing some new ones for new the fast growing residential areas. These policy implications are necessary for better serve of local consumers.

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