MODERATION MODEL FOR DETERMINANTS OF RESIDENTIAL LOCATION CHOICE AND RESIDENTIAL LOCATION IN PERI-URBAN AREAS OF SEBERANG PERAI PENANG

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by

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LIST OF SYMBOLS

$max\ U$	Utility Maximisation
h	Household
x	Combinations of Consumption Goods
p	Price
i	Residential Location
z	Set of Attributes
r_i	Cost of Residential Location
I	Income
R^2	Explanatory Power
f^2	Effect Size for Exogenous Latent Variable
Q^2	Predictive Relevance
q^2	Effect Size for Endogenous Latent Variable

LIST OF ABBREVIATIONS

UNDP	United Nations Development Programme
CO2	Carbon Dioxide
KTM	Keretapi Tanah Melayu
SP	Stated Preference
RP	Revealed Preference
DRAM	Disaggregate Residential Allocation Model
EMPAL	Employment Allocation Model
MEPLAN	Monitoring and Evaluation Plan
TRANUS	Integrated Land Use and Transport Modelling
PECAS	The Production, Exchange, and Consumption Allocation System
ILUTE	Integrated Land Use, Transportation, Environment
IRPUD	Urban Land Use and Transport Model
PLS-SEM	Partial Least Square – Structural Equation Modelling
AVE	Average Variance Extracted
HTMT	Heterotrait-monotrait Ratio of Correlations
VIF	Variance Inflation Factor
HOC	Higher Order Construct/Component
RL	Residential Location

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MODEL MODERASI BAGI FAKTOR PENENTU PILIHAN LOKASI KEDIAMAN DAN LOKASI KEDIAMAN DI KAWASAN PINGGIR BANDAR SEBERANG PERAI PULAU PINANG

ABSTRAK

Pemilihan lokasi kediaman melibatkan proses membuat keputusan mengenai lokasi hartanah perumahan yang tersedia untuk didiami oleh orang ramai. Kajian berkenaan hal ini didapati sangat terhad, khususnya dalam mengkaji faktor-faktor yang mempengaruhi pemilihan lokasi kediaman terutamanya di kawasan pinggir bandar. Hubungan antara faktor juga lebih kompleks, mengakibatkan penemuan kajian dalam kajian-kajian terdahulu tidak konsisten. Kajian ini bertujuan untuk mengkaji kekuatan dan signifikasi penentu pemilihan lokasi kediaman serta bertujuan untuk membangunkan model moderasi untuk lebih memahami hubungan yang kompleks dan kesan *trade-off* antara pembolehubah. Oleh kerana sifat penyelidikan ini, kajian ini menggunakan pendekatan kajian kuantitatif dan tinjauan soal selidik untuk pengumpulan data. Dengan menggunakan teknik persampelan rawak berkadar berstrata dan tidak berstrata, 484 daripada 240,616 respons telah diperolehi. Analisis deskriptif dan analisis Partial Least Square-Structural Equation Modelling (PLS-SEM) telah dijalankan untuk menjawab objektif dan soalan kajian. Penemuan mencadangkan ciri kejiranan adalah penentu paling kuat, sekurang-kurangnya untuk populasi ini. Di antara lima penentu, hanya tiga didapati signifikan, iaitu kualiti rumah, ciri kejiranan dan hubungan sosial. Bagi kesan moderasi, semua moderasi didapati signifikan dengan tahap pendidikan menunjukkan kesan moderasi ke atas semua penentu dan yang lain menunjukkan kesan moderasi pada sekurang-kurangnya satu penentu. Kajian ini akan bertindak sebagai rujukan bagi kajian-kajian akan datang untuk menyiasat faktor-faktor

yang mempengaruhi pemilihan lokasi kediaman di persekitaran pinggir bandar dengan memasukkan faktor dari semua perspektif (ekonomi, geografi dan sosial). Kajian ini akan membolehkan penggubal dasar dan perancang untuk menggubal dasar perumahan dan dasar perancangan bandar yang lebih baik.

MODERATION MODEL FOR THE DETERMINANTS OF RESIDENTIAL LOCATION CHOICE AND RESIDENTIAL LOCATION IN PERI-URBAN AREAS, SEBERANG PERAI, PENANG

ABSTRACT

Residential location choice involves making a decision on the location of available housing real estate for people to live in. There is limited research specifically investigating the factors that influence residential location choice especially in peri-urban areas. The relationships between factors are also more complex, resulting in inconsistency and trade-off effect. This study aims to examine the strength and significance of determinants of residential location choice and develop a moderation model to understand further the complexity of relationships and the trade-off effect. Due to the nature of this research, this study adopted quantitative research approach and used questionnaire survey for data collection. By applying stratified proportionate and disproportionate random sampling techniques, 484 out of 240,616 responses were obtained. Descriptive analysis and Partial Least Square-Structural Equation Modelling (PLS-SEM) analysis were conducted to answer the research objectives and questions. The findings suggested neighbourhood feature is the strongest determinant, at least for this population. Among five determinants, only three were found significant, which are house quality, neighbourhood feature and social relations. For moderating effect, all moderators found to be significant with level of education shows moderation effect on all determinants and other shows moderation effect on at least one determinant. This study will act as a reference for investigating the factors that influence residential location choice in the peri-urban setting with the inclusion of factors from all

perspectives (economic, geographical and social). This study will enable policymakers and planners to formulate better housing policies and urban planning policies.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In most developing countries, urbanisation has caused urban expansion that involved changes in structural and population growth in the surrounding territory. This phenomenon has become one of the main issues worldwide, including Malaysia (Abdullah et al., 2009) and as reported by Lee (2017) rapid urbanisation has caused people to migrate to peri-urban areas rather than remain living in the city.

Peri-urban can be described as 'a discontinuous spatial phenomenon around most cities' that grows in all directions unevenly (Lewis & Maund, 1976) that experienced transition from agricultural areas into urban land uses (Wehrwein, 1942) and having relatively low population density and containing a mix of land uses (Davis et al., 1994; McKenzie, 1996; Nelson, 1992; Newton & Bell, 1996; Thomas, 1990).

Peri-urban area had undergone a transition process from rural agricultural land into built up areas, dominated by housing settlements. It served the growing population not just from the city centre, but also from rural areas. These new and dynamically complex spaces were shaped by the household's preferences for their residences.

Modelling residential location choice in peri-urban settlements enable researchers to obtain a clear understanding of households' behaviour and the determinants that influence the decisions made as well as portrays the spatial variability and characteristics of localities. The model was originated from earliest attempt since 1960s in Urban Simulation Models from Bid-rent models by William Alonso (1964) to Lowry (1964) model on Gravity formulation; which has been discussed and then improved continuously by researchers (Bertaud & Malpezzi, 2003; Ellickson, 1981; Hurtubia et al., 2012; Kapur, 1982; Lerman & Kern, 1983; Wilson, 1970).

Residential location choice represents one of the essential models that were studied and analysed to provide vital information regarding human movement, behaviour and its relation to their residential location preferences to urban planners, urban designers, transportation planners, as well as policymakers. It is used not just for examining the existing pattern of human movement and behaviour but also was used to forecast and simulate to predict the future pattern.

Modelling residential location choice also was used in mitigating the negative impact of development by assisting the policies and strategies so that they are in line with the established vision. This can also help in maximising the potential of achieving sustainable development. Nowadays, modelling residential location choice has been widely used to present the preferred spatial location of a household and to suggest policy implications for future housing development (Jin & Lee, 2017).

Modelling residential location choice has been widely conducted in urban areas, but has rarely been conducted and investigated in a peri-urban context, even though housing development is one of the main drivers of peri-urbanisation worldwide. Malaysia is also no exception, where there is increasing demand to live in peri-urban areas that offer spacious residential land with lower cost as compared to the city centres (Rosni et al., 2016).

Among major cities in Malaysia, Penang is now ranked as the third-largest urban areas in Malaysia (World Bank, 2015). Peri-urban areas in Penang also experienced rapid transformation, mainly driven by various development plans, top-down investments, and economic initiatives to promote economic development into this region (Samat et al., 2020). These areas are expected to experience more significant changes, mainly due to the spill over effects of demand for housing from the people that lived in Penang Island (Samat et al., 2020). If this area is not systematically planned and

managed, this rapid development may bring negative impacts to the future generation as well as to the environment (Samat et al., 2020). Therefore, there is a crucial need to study the factors or the reasons that influenced people's decision to choose a residential location in these peri-urban areas.

This study identified accessibility, house quality, layout, neighbourhood feature and social relation as the five major factors that influenced residential location choice. In previous studies, accessibility was identified as one of the main factors considered in choosing a residential location (R. A. Acheampong & Anokye, 2013; Beckers & Boschman, 2017; Chiarazzo et al., 2014; J. Guo & Bhat, 2001; Karsten, 2003; Kim et al., 2005; Lawton et al., 2013; Pagliara et al., 2010; Pinjari et al., 2009; Prashker et al., 2008; Schirmer et al., 2014; Weisbrod et al., 1980).

The house quality is another main factor that is considered in choosing a residential location, especially the house price (Chiarazzo et al., 2014; Liu et al., 2018; Mohd Thas Thaker & Sakaran, 2016). Other than price, the layout also was identified as a factor that influences residential location choice, specifically related to the spatial layout feature, population density and land use distribution (Beckers & Boschman, 2017; Y. Guo et al., 2016; Hurtubia et al., 2010; Jin & Lee, 2017).

Neighbourhood feature was another factor that is considered having a strong influence on residential location choice, with most of the previous studies mentioning closeness to facilities and amenities (Acheampong, 2018; Aliyu et al., 2018; Balbontin et al., 2015; Chiarazzo et al., 2014; Dissart, 2018; Hurtubia et al., 2010; Pagliara et al., 2010; Schirmer et al., 2014; Usman et al., 2015; Zhu et al., 2017). Another factor identified as having a significant effect in influencing residential location choice is social relationships in terms of friends, family and people from the same ethnicity (Acheampong & Anokye, 2013; Nkeki & Erimona, 2018; Stokenberga, 2019).

However, there is a conflict in factors that are related to the life cycle and household characteristics (age, ethnicity, marital status, level of education, employment status, and income) in influencing the decision to choose a residential location. These factors were seen influencing the significance of five main factors mentioned (accessibility, house quality, layout, neighbourhood feature, and social relation) (R. A. Acheampong, 2018; Beckers & Boschman, 2017; J. Y. Guo & Bhat, 2007; Karsten, 2007; Nkeki & Erimona, 2018; Pagliara et al., 2010; Schirmer et al., 2014; Usman et al., 2015).

In the light of the aforementioned, this study is aimed at examining the relationship between determinants of residential location choice and residential location in peri-urban areas, with household life cycle and characteristics as moderators. The objectives were to identify the strength of the determinants of residential location choice of household in peri-urban; analyse the relationship between the determinants of residential location choice and residential location of household in peri-urban, and examine the moderation effects of household life cycle and characteristics between the determinants of residential location choice and residential location of household in peri-urban.

1.2 Problem Statement

Residential location choice involves people's decision in determining the location of land and houses available in the market as a place to live. As said by McFadden (1978), deciding residential location is a discrete choice between alternatives of houses or neighbourhoods. Due to this decision, it is not just about the spatial factors, but also related to human movement activities in daily life. Studies regarding residential location choice were conducted by researchers from various closely related fields, including human geography, social science, and others.

There are two main issues that motivate this study. The first is a complex relationship between factors (inconsistencies in prior studies of modelling residential location choice and the trade-off), and the second is rapid peri-urbanisation in Seberang Perai, which has resulted in significant alterations to the land.

Despite many attempts done from the multidisciplinary background, the inconsistency in previous studies of modelling residential location choice still occurs, making understanding residential location choice from one perspective to the other, challenging, because each perspective focuses on different factors. For instance, geographical perspective emphasises more on the spatial parameters such as the interaction between places with transportation whereas economic perspective emphasises on the financial factors like house price, income, and urban land market.

This problem has adversely impacted the way residential location choice of the household has been studied, creating a different explanation of results when different approaches have been used. This will cause the understanding of such a phenomenon incomplete, leading to inability to fully utilize the important information resulting from modelling residential location choice by various parties; such as authorities, developers, property agents as well as the household.

A possible cause of this problem is due to its multidisciplinary field that consists of various approaches that originated from several different perspectives. Based on the compilation of previous studies on modelling residential location choice, there are three main perspectives identified, economic, geographical and social. From an economic perspective, modelling residential location choice was mainly focusing on the inclusion of economic factors with developing the model of utility maximisation (William Alonso, 1960) and bid rent (Ellickson, 1981; Hurtubia et al., 2010). On the other hand, from a geographical perspective, modelling residential location choice was focusing on

the spatial interaction (Lowry, 1964), spatial parameters (Evans, 1973; Muth, 1969) and interaction with transportation (Pagliara et al., 2010) whereas from a social perspective, modelling residential location choice can be seen mainly focusing on the life cycle parameters (Lawton et al., 2013; Rossi, 1955).

In addition, the issue involving modelling residential location choice also has created another problem, where there is an inconsistent trade-off relationship between life cycle factors and other factors in influencing residential location choice. Based on the compilation of previous studies, there are seven life cycle factors identified that have trade-off effects on other factors in influencing residential location choice, which are age, ethnicity, household size, income level, level of education, marital status, and occupation. Age was identified to have trade-off relationship with accessibility, house quality, and layout (Jin & Lee, 2017; Lawton et al., 2013; Pagliara et al., 2010; Prashker et al., 2008). Ethnicity and occupation have trade-off relationship with only accessibility (Beckers & Boschman, 2017; Ben-akiva & Bowman, 1998; Boterman et al., 2010; J. Guo & Bhat, 2001; Lawton et al., 2013; Pagliara et al., 2010).

Other than that, household size has trade-off relationship with accessibility, house quality and neighbourhood feature (Beckers & Boschman, 2017; Boterman et al., 2010; Goffette-nagot, 1996; Karsten, 2007; Lee et al., 2010; Pagliara et al., 2010). Income level was identified to have the highest trade-off relationship, which is with accessibility, house quality, neighbourhood feature and layout (Aliu & Ajala, 2014; Boterman et al., 2010; Goffette-nagot, 1996; J. Guo & Bhat, 2001; J. Y. Guo & Bhat, 2007; Jin & Lee, 2017; Karsten, 2007; Lee et al., 2010; Pagliara et al., 2010; Prashker et al., 2008). Level of education also has shown trade-off relationship, specifically with accessibility and neighbourhood features (Beckers & Boschman, 2017; Boterman et al., 2010; J. Guo & Bhat, 2001; Prashker et al., 2008). Last but not least, marital status has

shown a trade-off relationship with accessibility and house quality (Pagliara et al., 2010). Given all these inconsistencies, this study attempts to assess these trade-off effects by having seven life cycle and characteristics factors (age, ethnicity, household size, income level, level of education, marital status, and occupation) as moderators on the relationship between factors influencing residential location choice and residential location.

The study also has identified another issue, which is peri-urbanisation. Penang demonstrates a polycentric city that is relatively more fragmented in terms of its urban spatial structure, where jobs are concentrated between two centres – George Town and Butterworth. As stated in a report by Khazanah Research Institute (2019), the sprawl of the George Town conurbation are likely to have crossed the state boundary. With Seberang Perai district being the area closest to George Town, and Butterworth is located in the district itself, this district experienced the most prominent peri-urbanisation process in this conurbation.

The rapid increase in population in George Town Conurbation (expected to reach 3,785,999 people in 2030) will cause significant changes to the land cover, mainly due to the spill over effects of demand for housing from the people of Penang Island and policy directed growth (Samat et al., 2020). High demand for built environment has forced the conversion of paddy fields into warehouses, industrial plants and housing (Kee, 2018). If left unchecked, this could become a very serious threat to agricultural sectors specifically rice production in Penang.

Investigation on the land use cover and forecast changes of peri-urban areas of the George Town Conurbation were conducted using *FutureSim* by (Samat et al., 2020). From the model, it is expected that peri-urbanisation will spread further north, where

Kedah-Penang border is located, as well as in Batu Kawan area, with the existence of a second bridge connecting the Batu Kawan area with the island.

Rapid urbanisation in Penang Island has caused people to migrate from George Town to its peripheries, Seberang Perai (Lee, 2017). This is probably due to the increase in property prices in 2016 as mentioned in the Dasar Perumahan Negara (2018), where all properties launched in 2016 were priced above RM250,000, with the bulk of newly launched properties situated in the RM500,000 to RM1,000,000 price bracket. To put this into perspective, the calculated market median house price for Pulau Pinang in 2016 was RM194,724. The housing markets in Penang were considered "severely unaffordable" and "seriously unaffordable" (Dasar Perumahan Negara, 2018).

Despite the federal and state governments' implementation of the Affordable Housing Scheme, a mismatch between supply and demand for housing based on location still exists, particularly in Penang (Dasar Perumahan Negara, 2018). As of now, all of the island's affordable housing is in Category C (maximum RM300,000 and household total income not exceeding RM12,000), with the exception of one in Balik Pulau (Category A, maximum RM42,000 and household total income not exceeding RM2,500), but too far away from the city centre, George Town, and Butterworth). Worse, the only landed house type offered under this scheme was available at Tasek Gelugor, which was also too far away from the city centres of both George Town and Butterworth, requiring them to incur higher transportation costs as a result of the greater distance.

Housing location has a significant impact on a household's housing expense burden and quality of life. As a result, some families have relocated further from urban centres in quest of lower-cost housing, sacrificing their distance from and time spent travelling to jobs and amenities, as well as incurring higher transportation expenditures.

According to a report by World Bank (2015),Malaysian cities' relative transportation costs are significantly higher than those in other East Asian cities, with the share of transportation expenditure in Kuala Lumpur, Johor Bahru, and George Town being at least 59.0 percent higher than in Hong Kong and Tokyo.

High housing costs near urban centres, as well as land use rules that encourage sprawl, are also mentioned in the World Bank research as factors that drive families away from cities (World Bank, 2015). As a result, these factors contribute to a greater reliance on private vehicles and a rise in household transportation spending. A longer distance from metropolitan or job centres is associated with less accessibility, increased reliance on autos, longer commute times, and hence a higher overall transportation cost burden, in addition to lower property prices. Though the case for polycentric cities is more complicated, the message remains the same: the benefits of lower house prices may not be as straightforward as they appear. While households may not do a cost-benefit analysis when determining where to live and work, the cost implications of their housing selections should be of interest to both planners and policymakers because they impact a household's quality of life.

There are some directions highlighted in the Seberang Perai Draft Local Plan that will address issues of peri-urbanisation by centralising and accelerating city development, as well as issues of connectivity and accessibility between housing areas and other sectoral areas with transportation systems (implementation of a 20-minute city). When it comes to housing, however, the strategy only addresses the issue of providing adequate housing, not improving quality, vibrancy, safety, integration, or liveability (MBSP, 2021). In the State Structural Plan 2030, Penang Transport Master Plan (PTMP) will be the main reference for enhancing the transportation system in Penang (Rancangan Struktur Negeri Pulau Pinang, 2019). Some of the proposals do

address the issues of connectivity and accessibility in Seberang Perai, but the proposals are not in line with the pattern of peri-urbanisation in Seberang Perai, where the north of the district (Teluk Air Tawar, Sungai Dua, Kepala Batas/Bertam, Tasek Gelugor, and Kubang Menerong) that experienced a rapid peri-urbanisation process and are not connected with the proposed LRT and train line, which will not improve the accessibility between housing areas in here and the city centre.

Planning in peri-urban areas can be further improved by incorporating urban algorithms where territorial analysis can be conducted, but only with high accessibility of data. But, with lack availability of data, data gaps in analysing the supply and demand, lack of online data (most of it still in physical state), and unavailability of centralised data that specifically related to the travel behaviour dynamics as mentioned in Dasar Perumahan Negara (2018), further improvement might still be far, let alone at the state and local level.

Many others will benefit from mitigating the negative effects of peri-urbanisation, such as public health. By having peri-urban areas that have efficient and better connected public transportation systems, it will result in reducing car ownership and can further impact on public health by promoting healthy lifestyles with an increase in human mobility instead of a high reliance on private vehicles.

Other than that, the built environment also can be more sustainable and green with applying circular economy in real estate industry, by optimising the resources towards the creation of the built environment, maximising the potential of land and built environment in terms of use and adaptability (Sethi, 2021), which will lead to also reducing carbon footprint where many of our daily activities such as living in our homes, using electricity and water, driving a car and disposing of waste create greenhouse gas emissions. In peri-urban context, the carbon footprint can be reduced

by having the neighbourhoods closer to city centres, reducing car ownership, building denser and greener suburbs, and reforming the urban planning policies to allow a flexible zoning system and avoiding promoting developments further away from the city centre (Think Forward Initiative, 2018).

Despite all of our knowledge in residential location choice in the peri-urban area, investigating the determinants of residential location choice; particularly in the peri-urban setting is still under-researched while more and more people choose peri-urban areas to settle down (Goffette-nagot, 1996). With blurring and expanding boundaries of metropolitan areas within peri-urban areas, more and more linkages are developed between those areas. There has been limited exploration in terms of behavioural linkages between activity patterns and households' residential location choice that influence land use (Guo & Bhat, 2001). In Malaysia, no research yet has been attempted to study residential location choice in George Town Conurbation although it is one of the metropolitan areas in Malaysia that undergo significant peri-urbanisation that is rapidly encroaching into its peripheries.

Based on the issues and problems mentioned, this study has identified several gaps. One of the gaps is there is limited research specifically studying the factors that influence residential location choice in a peri-urban setting. In general, there are many studies that have been conducted to understand the drivers of peri-urbanisation and peri-urban areas, (see Buxton & Choy, 2007; Narain & Nischal, 2007; Winarso et al., 2015) but only several studies focused on the factors that influence people to live in peri-urban, which is a study conducted in Bulgaria by Hirt (2007) and many other studies were conducted in African countries (see Adedire et al., 2016; Appiah et al., 2014; Doan & Oduro, 2012). Only a study conducted by Acheampong & Anokye (2013) that is closely related to this study, focusing on understanding the household's residential location

choice but was conducted in the African region, which is Kumasi's peri-urban settlements.

In George Town Conurbation, only a study in understanding and monitoring the peri-urbanisation process in Seberang Perai has been conducted continuously, (see El Hadary et al., 2007; Elhadary et al., 2013; Samat, 2002; Samat et al., 2010, 2011, 2014, 2020; Samat & Mahamud, 2017) but there is no attempt on studying the factors that influence residential location choice in George Town Conurbation despite its reputation of being the largest conurbation in Northern Peninsular of Malaysia.

In other conurbation in Malaysia, there are several similar studies that have been conducted but it is still limited. For instance, in Johor, a study conducted by Said & Juanil (2013) focusing on identifying the housing environment preference among housing consumers in Johor Bahru. There is another research done by Senbil et al. (2009), where it is a case study-oriented research between Kuala Lumpur and Kei-Han-Shin where it examines the relationships between residential location, vehicle ownership and mobility and noted the differences and similarities between those two metropolitan areas.

Due to modelling residential location that has been studied in many different perspectives, only several empirical researches on residential location choice were considered as a hybrid, where they attempt to investigate the relationship of the determinants from economic, geographical and social perspectives; (see Kim et al. (2005), Pagliara et al. (2010) and Wilson (1970)) for a hybrid approach. In addition, there is no further attempt that has been done in investigating the possibility of moderation effect in factors influencing residential location choice.

As a proposed solution, this study presents a moderation model for the relationship between determinants of residential location choice and residential location in peri-

urban. The model is proposed based on the effect observed, the effect of household life cycle and characteristics on the determinants of residential location choice. Therefore, this research aims at justifying the significance of the proposed household life cycle and characteristics to moderate the strength and significance of determinants on residential location in peri-urban.

1.3 Aim of the Study

The main aim of this study is to examine the moderation effect of household life cycle and characteristics on the relationship between determinants of residential location choice and residential location in peri-urban. This goal is to improve our understanding of the existing relationship between variables in modelling residential location choice and to enhance the effectiveness in explaining the factors that influence residential location choice in peri-urban areas.

1.4 Objectives of the Study

The prime objectives are as stated below:

(i) To identify the strength of the determinants of residential location choice of household in Seberang Perai.

(ii) To investigate the relationships between the determinants of residential location choice and residential location of household in Seberang Perai.

(iii) To examine the moderating effect of household life cycle and characteristics between determinants of residential location choice and residential location of the household in Seberang Perai.

1.5 Research Questions

Related research questions aimed at providing answers to the study objectives are as stated below:

(i) What are the main determinants of residential location choice and their strength among households in Seberang Perai?

(ii) What is the relationship between the determinants of residential location choice and residential location of households in Seberang Perai?

(iii) How do the household life cycle and characteristics moderate the effects of the determinants of residential location choice on the residential location of households in Seberang Perai?

1.6 Scope of the Study

This study will use a hybrid approach, taking into account a variety of factors from various fields in order to gain a holistic understanding of the relationship from the main point of view. If the study has to be more precise to comprehend a specific perspective, such as geographical, future research should focus on geographical perspectives with the use of GIS analysis.

This study also aims to examine the moderation effects of household life cycle and characteristics on the relationship between the factors that influence a household's residential location choice in peri-urban. The subject area of this study is the residential location choice of household in Seberang Perai, with attention to factors that influence their residential location choice.

From the literature review, this study discovered that accessibility, house quality, layout, neighbourhood feature, and social relation are the major determinants of

residential location choice. Subsequently, this study examined the moderation effects of household life cycle and characteristics on the determinants of residential location choice that influence residential location in peri-urban, Seberang Perai. This led to the inclusion of household life cycle and characteristics as moderators in modelling residential location choice.

This study used questionnaires as a survey instrument to collect primary data, where the data was collected from the head of households that reside in Seberang Perai districts including the Northern Seberang Perai, Central Seberang Perai and Southern Seberang Perai. According to Aluko & Seig (200) and Arimah (1997) as cited recently by Aliu & Ajala (2014), primary data have higher accuracy compared to secondary data regarding housing values and choices if carefully made.

The data will be analysed using descriptive analysis for obtaining the frequencies and percentages, PLS-SEM analysis for investigating the relationship between determinants of residential location choice and residential location, and moderation analysis to examine the moderation effects of household life cycle and characteristics on the determinants of residential location choice and residential location in Seberang Perai.

1.7 Significance of the Study

Previously, most of the studies in residential location choice were conducted in urban areas and only a few studies were conducted in peri-urban areas as mentioned in the gaps of knowledge. Furthermore, there is an absence of studies on factors that influence the decision of people to live in peri-urban areas, specifically in the George Town Conurbation, hence the significance of the current study. The main significance of this study is that it will investigate the factors that influence residential location choice in a hybrid approach (the inclusion of factors from economic, geographical and

social perspectives). Using a hybrid approach will ensure that the various factors involved in deciding where to live from various fields are fully considered. More importantly, this study will attempt to examine the moderation effects of household life cycle and characteristics on the factors that influence residential location choice and residential location, specifically in peri-urban.

This study will complement the previous studies conducted by Samat et al. (2020) on the peri-urbanisation process in Seberang Perai by investigating one of the factors behind this process. This study will investigate in detail the factors that attract people to live in peri-urban areas. In other words, this study could unravel the information on one of the major contributors to the peri-urbanisation process in Seberang Perai.

The significance of this study will be further elaborated in details according to the contribution to knowledge and practical contribution in the following sections.

1.7.1 Contribution to Knowledge

The findings of this study are expected to give a contribution to the urban planning knowledge, specifically in understanding residential location choice and peri-urban areas. There are two main contributions of this study to the body of knowledge. First, this study will act as a reference for investigating the factors that influence residential location choice in the peri-urban setting with the inclusion of factors from all perspectives (economic, geographical and social).

Second, this study will develop a moderation model for the relationship between factors influencing residential location choice and residential location in peri-urban. This finding is expected to be a new knowledge in modelling residential location choice, where it will complement the existing residential location choice model by the inclusion of household life cycle and characteristics as moderators.

This study also adds to the limited available literature on residential location choice in Malaysia that is still at its infancy. Plus, the framework and model developed in this study will be applicable to other study areas, particularly in Asian countries that portray similarities in peri-urbanisation process, residential, household and spatial characteristics.

1.7.2 Practical Contribution

The findings of this study will provide a deeper understanding of the factors that influence residential location choice. Hence, the main practical contribution of this study is helping the policymakers and planners to formulate better housing policies and urban planning policies in the future by having a better understanding of the demand for housing, characteristics of a population, with the inclusion of life cycle factors that people experienced as they are going through their life.

By having this study focusing on the peri-urban setting, it is hoped that it will bring awareness to the need to include peri-urban issues into city planning and urge the policymakers, planners and the government to figure out on how to leverage on the potentials of peri-urban areas, while working to minimise its threats.

1.8 Organisation of Thesis

The study was organised into six chapters. Chapter one covers the introduction that provides background information regarding the research, which consists of background, problem statement, gaps in knowledge, aim, objectives, research questions, scope, significance and contribution.

Chapter two comprises systematic literature review of previous research related to the study. The literature covers a brief description of residential location choice in the context of urbanisation and peri-urbanisation, that shaped the human settlements.

The literature continued with defining peri-urban and comparison of residential location choice in the peri-urban areas of developed and developing countries. This chapter also gives an insight into trends in modelling residential location choice, thus briefly positioning this study's contribution in the modelling field. Factors influencing residential location were also discussed in general and holistically to capture as many factors as possible before developing the theoretical framework. Subsequently, the chapter presents the theoretical framework, conceptual framework, and hypotheses.

Chapter three presents the research methodology. This chapter started with a brief description of research approach, research paradigm, research design, and research method. Then, the chapter presents a detailed description of the data collection instrument, the questionnaire design, variables and statistical analysis used in analysing the collected data.

Chapter four presents the data analysis conducted, results obtained and research findings. The hypotheses were tested according to research objectives. Chapter five presents the discussion of research findings according to research objectives with respects to previous studies in terms of comparison of relationships, similarities and differences.

Chapter six concludes the study and presents the main contribution of the study both in theoretical and practical aspects. The chapter also states research limitations and suggestions for future research.

1.9 Summary of the Chapter

This chapter discussed the background of the study related to modelling residential location choice and the factors that influence residential location choice. The issues of modelling residential location choice and peri-urbanisation were highlighted followed by the problems with some evidence. The chapter also summarised the gaps

of knowledge identified from the problem statement followed by presenting the aim and objectives, research questions, scope of the study, and significant contributions of the study to the body of knowledge and practices. The final part of the chapter presents a section on how the thesis was organised.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Previously in chapter 1, the researcher identified the problem and provided the background of research for residential location choice and its determinants. This chapter presents a comprehensive review of literature that is related to the core of the study, which is residential location choice and factors influencing it. The chapter begins with the discussion on the general concept of residential location choice followed by brief description in the context of urbanisation, peri-urbanisation, and peri-urban. Then, the chapter continues by briefly describing comparison of residential location choice in developed and developing countries followed by residential location choice in Malaysia. The process involved in choosing residential location (Location Choice, Attraction, Mobility, and Satisfaction) also were discussed followed by explanation on the differences between an actual and hypothetical preference in residential location with their advantages and disadvantages. The position of where this research can make contributions in modelling residential location choice with some history of how this modelling was started and some current trends in modelling was presented followed by brief discussion on factors influencing residential location choice. Next, theoretical framework and base theory adopted, which is theory of residential location were discussed to provide a solid base to build the conceptual framework of the study. Afterwards, the chapter continued with the proposed conceptual framework, determinants of residential location choice as independent variables, household life

cycle and characteristics as moderating variable, and residential location as dependent variable. Hypotheses of the study were presented and the chapters were summarised.

2.2 Urbanisation, Urban Sprawl, and Peri-urbanisation

Urbanisation can be described as a significant 21st century human society event where the cities grow continuously with infinite flow of people into cities (Franco et al., 2017). Urbanisation also can be defined as the increasing population that live in cities, and also the enlarging growth of the cities itself where rural areas turn into urban areas (Shang et al., 2018). In other words, urbanisation is where there is a high concentration of people within urban areas resulting in massive demand for land consumption, commercial, industrial, transportation, and last but not least, residential (Franco et al., 2017).

According to recent statistics in a report by the United Nations (2018), in 2018, 55 percent of the world population will live in urban areas and expect to increase to 68 per cent by 2050. Urbanisation may improve the urban economy and brings many improvements in life such as better access to services and improving people's lifestyle, but it also can lead to other negative impacts, for instance increasing slums settlements, social fragmentation, and pollute the environment (Bekhet et al., 2020; Bekhet & Othman, 2017).

The continuous consumption of land converted into urban areas eventually leads to a big problem, which is the urban sprawl (Rosni et al., 2016). As the population in the urban areas grows skyrocketing and there is a high demand on various aspects, the urban systems and its capacities will reach its limit and affected, including the housing, services, and infrastructure (Whyte, 2012). This phenomenon will end up affecting

people's daily life, the quality of their life and also the quality of the urban environment (Tobi et al., 2020). The bigger the cities grow, the more in energy consumption, hence the greater the pollution produced. According to the International Energy Agency (2014), from 2012 to 2040, the world electricity demand is expected to increase by almost 80% due to the urban sprawl. The process of urban sprawling usually leads to other processes, which are peri-urbanisation and rurbanisation.

Peri-urbanisation is perceived as comprising the physical development of urban areas, yet additionally the scattering of social, financial, and social patterns that are more towards urban in character (Durán, 2006). This process is also commonly known as a process of urbanisation in the rural that turns rural to urban (F Wu & Keil, 2020). Peri-urbanisation process happens when the boundaries of the urban spaces have been redefined and the peripheral areas surrounding the urban centres have altered (Gaspar, 2000; Monteiro & Tavares, 2015). In other words, the rural areas have been urbanised and commonly known as peri-urban areas.

2.3 Peri-urban

2.3.1 Definition of Peri-urban

Peri-urban can be defined as discontinuity of a built space with thriving land uses, high mobility and depends on the connectivity to the city (Rojas, 2002). It also can be defined as the interface zones located between the urban and rural where the interface, associate and interlace happened (Cobbinah & Amoako, 2014; Tacoli, 2003). In other words, it refers to the transition zones located in the city outskirts that experience rapid changes in terms of socio-economic, environment, and demographic where elements of both rural and urban can be found (Allen, 2003; Allen et al., 2014).

Peri-urban also commonly known as a spatial phenomenon where there is growth and expansion in all directions but not evenly distributed (Bryant et al., 1982; Lewis & Maund, 1976). Peri-urban usually has a fragmented and weak governance and planning controls. It may be reflected in the provision and maintenance of infrastructure fall under several separate administrative jurisdictions that are responsible for the provision and maintenance of infrastructure (Simon et al., 2004).

Many previous researchers have defined the physical characteristics of peri-urban and it is unique to one another. There are no distinct words in describing this space, due to its complexity. According to Wandl & Magoni (2017), peri-urban is known to be chaotic, fragmented and transitional physical space, where there is a complex mix of urban and rural land uses. The common patterns of physical development in peri-urban are lower density housing that is scattered and an "urban" type of development concentrated around the transportation hubs while on the other hand, sometimes peri-urban may be consists of large green areas (woods, farmland and nature reserves) with low density of population but functioned and belonged to the urban area (J. S. Davis et al., 1994; McKenzie, 1996; Murphy & Burnley, 1996; Nelson, 1992; Thomas, 1990; Wandl & Magoni, 2017). Other than that, peri-urban also can be an agriculture zone where there are also small housing areas, industrial areas and other urban land uses in the same area (Nilsson et al., 2013).

There are some key definitional approaches in explaining the fundamental components of the peri-urban area. One of the approaches is a set of discrete spatial limits through empirical studies where a certain distance beyond the urban edge is defined as peri-urban, which depends on the size and magnitude of the city centre. A suggested distance of about 30-50 kilometres for large cities (McGregor, 2006) and wider zones for metropolises (Acheampong & Anokye, 2013). Other than that, defining

peri-urban areas also can be done through urban-rural continuum, where peri-urban area, also known as Peri-Urban Interface (PUI) can be conceptualized as the;

"…the transition zone between fully urbanized land in cities and areas in predominantly agricultural use. It is characterized by mixed land uses and indeterminate inner and outer boundaries, and typically is split between a number of administrative areas" (Rakodi, 1999); as cited by (Webster, 2002).

This transitional landscape in peri-urban were caused by several factors, such as urbanisation, rural-urban linkages (the flow of capital, resources, commodities and people), urban migration, strengthening agricultural activities, industrialization and also re-location of specific centres for urban systems (distribution centres, waste treatment infrastructure, etc.) (Allen, 2003; Wandl & Magoni, 2017). The complexity of the formation of peri-urban areas lie in the story behind the formation of the space, the geographical feature, populations, as well as economic conditions (how developed is the urban area). Hence, this makes peri-urban as an interesting space to study, where there are complexities, ambiguities and issues, specifically in terms of socio-environmental and institutional (Friedmann, 2016).

2.3.2 Peri-urban Typology

Peri-urban typology is often confused with others such as Desakota and Suburban, probably because these three areas are located in the same location that is outside boundaries of the city centre. In fact, they have quite distinct definitions. Peri-urban can be defined as the zones surrounding the major cities of the urban hierarchy within a daily commuting reach from the city centre. These areas can extend as much as 30 kilometres from the city centre in some parts of Asia (McGee, 1991). On the other