FACTORS INFLUENCES RESIDENTIAL LOCATION SELECTION PREFERENCES TOWARD FUTURE NEIGHBORHOOD

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Graphical abstract
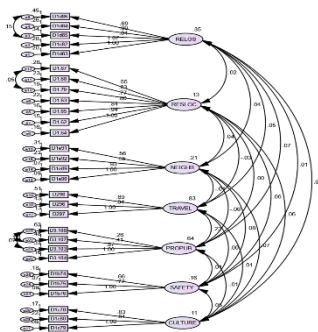
Abstract

It is critical to study the travel behaviour of residents as it provides an understanding on what people do over space and how people use transportation within that space. The objective of this study is to identify the factors that determine residential location preferences towards future neighborhood selection. Current literature focuses on preferences in relation to physical and demographic aspects, such as ownership, income, land use, facilities as well as transportation services. However, this study suggests safety and cultural aspects which are likely to be significant in many contexts. In order to further investigate these suggestions, a case study has been carried out based on Iskandar Malaysia's development region. A Structural Equation Modeling (SEM) is applied to 384 household heads on their housing selection preferences. The result shows that there are significant relationships between residential location preferences and travel behaviour.

Keywords: Residential location preferences, travel behavior, structural equation modeling

1.0 INTRODUCTION

Transportation problems have been given great attention in most countries. Many studies conducted before attempted to address the problems, but they remain unsolved [1-3]. Urban sprawl, low number of public transportation users and congestion are among the issues in most of the country. The problems failed to address the importance to change the travel behaviour for better solution in transportation studies as to some extend will be able to reduce long travel trips and change in transportation mode. Recognizing the potential of people's preferences, land use and transportation policy will be driven into the new perspective in which policy makers will need to understand the people's needs before proposing any policies [4]. In order to propose solution for transportation-related matters, understanding on people's preferences should not be framed solely with physical characteristics, but the inclusion of social aspects will add significance effects on people decision [5].

The literature studies have shown that urban form characteristics, such as density, settlement size, land-use mix, accessibility, local streets lay out, social demographic, lifestyles, attitude and habit are cumulatively affecting residential location preferences and travel behaviour [6]. Furthermore, Silva [7] describes that self-selection derived from the attitudes and lifestyles or to socio-economic attributes. The way they affect residential location could be different, where by attitudes would act as push influences, though that would act as an incentive to people locating in the places which enable their desired lifestyles.

Socio-economic characteristics might act in a different way, for example, as restrictions, specific preferences due to the household specific needs or could act as indicators to unobserved attitudinal variables [7]. However, many researchers failed to

include the social elements, where it has been given less consideration as new approach to understand travel behaviour by identify their preferences on residential location.

As indicated and strongly suggested by Mokhtarian and Cao [8], the use of Structural Equation Modelling (SEM) would be the best to meet all the methodological requirements for the analysis in terms of influences of residential selection preferences and its relationship with travel behavior. In fact, SEM is becoming widely used in travel behavior research, as witnessed by the reviews on journal cited in this paper. Golab [9] and Bangley and Mokhtarian [10] have strongly suggest of implementation of SEM in travel behavior related studies, especially studies involves to determine indirect relationships between variables and items. Further probe on the use of methodology in travel behavior research found that SEM provides a flexible tool to study the inter-relations between a large number of variables and its being increasingly used in transport studies [11].

2.0 CHOICE OF RESIDENTIAL LOCATION

The choice of a residential location is actually a cluster of related choices, including the decision to move from an existing residence, the choice of housing tenure (rent or own), neighborhood and housing unit [4]. According to Henser [12], households with the higher incomes with children or with two workers, for example, will demonstrate different consumption preferences for housing and location than will households of differing income and lifecycle characteristics.

2.1 Residential Location

According to Susilo *et al.* [13], eventhough numerous claims are made about the travel impacts on neighborhoods, it is very difficult to make comparisons because local context plays significant roles and therefore it is so critical and differ from other places. Many questions arise in particular of residential location or preferences that influence travel behavior. There are few questions that researcher thought might influence people, where either neighborhood characteristics influence or change travel behavior or do people choose a neighborhood based on its suitability for their pre-determined patterns of travel behavior [14].

Curtis and Perkins [15] explained that the decision to choose residential location derived from three stages as follows; i) the initial decision to move house is determine through the house characteristics itself; 2) when considering place to move to, access-related factors were most often cited; 3) the reasons for their eventual choice of area, access-related factors were once again top of the list, but slightly ahead of financial reasons.

2.2 Residential Location Selection Preferences and Travel Behaviour

Cram [14] explains that to travel to work, an affective (enjoyable or stimulating) and 'symbolic' (self-expression and status) factors may be important determinants of modal choice than factors such as convenience and comfort. This explains people decisions are derived from various reasons, especially with regard to travel behaviour in residential location decision making. Furthermore, place of work is set to become less and less important to determine where people choose to live. Besides that, Curtis and Perkins [15] explained that the value of housing is a factor which results in people "trading-off" the cost of living nearer to workplace against the cost of a longer work journey. Table 1 explains different perspectives on transportation and travel behaviour.

2.3 Factors of Residential Location Selection

Aditjandra [16] found that, based on UK experience, socio-economic factors are more important than land use factors in affecting travel behavior. Nonetheless, Cao *et al.* [17] seems closer to explain the effect of socio-economic factors on residential location and how they influences travel behavior.

Urban Form is indicates that land use and design proposals will influence the price of travel and hence the type of trip undertaken. Study by Boarnet and Crane [18] in California showed that the relationship between land use attributes and travel behavior to be statistically significant. Meanwhile, Cervero [19] studied the impact of 'new urbanist' areas on travel modes, where compact, mixed-use and pedestrian-friendly developments could significantly influence travel modes. Further studies by Srinivasan and Rogers [20] identified that location of employment opportunities should be considered in the planning of new housing particularly for low-income households in order to reduce travel times and distances.

Geographic and climate factors are other constraints in most of the south-east Asian countries. Having the tropical climates, countries like Malaysia, Indonesia, Singapore and Thailand will be getting rain and dry seasons constantly. As describe by Lies [21], geographical condition in certain areas also influences population distribution. Topography, mainly, affects the movement of people within the country. The intense heat and heavy rain, which are among the characteristics of tropical climates, may results in people more favourable to drive instead of taking public transportation, walking or even cycling.

Socio-demographic attributes have significant relationships between travel behaviour, such as age, gender, household composition and employment as well as education level [22-23]. A serious demographic problem in many countries is the steady shift of population from the rural areas to the cities, resulting in rapid and uncontrolled growth in

Table 1 Perspective on Transportation and Travel Behaviour

Perspectives	Transportation and Travel Behaviour
Human activities and purposes	Human activities and purposes are the ultimate drivers for land use, transport and their planning
Costs and benefits	- Destination activities (land uses) are associated with benefits - Travel is primarily associated with costs
Network	- The separation and distribution of people, activities and land uses gives rise to need for travel - Land uses are represented by zones - Transport network represented by nodes and links
Land value, location and accessibility	- Land uses influenced by location and land value - Transport creates a web of accessibility that stimulates and supports value of land and location
Infrastructure and land area	- Transport seen as 'just another land use' - Transport land uses connect up contiguously and connect all other land uses
The professional dimension	- Land use planning and transport planning are distinct professions - These may be integrated, fail to connect or be in conflict
The policy dimension	- Overall objectives of land use planning and transport planning are often similar with differences in detail or emphasis - Land use planning and transport planning policies may be disparate or integrated

Source: Adopted from Marshall and Banister (2007)

urban areas and eventually increased demand for passenger trips, average length of journey is increasing as well as traffic congestion.

Socio-economic status has been identified in various studies to affect mode choice as well. A characteristic of most developing countries is a highly skewed distribution of income, with the large majority of the population receiving extremely low incomes and a small minority earning very high incomes. Henser [12] and Handy *et al.* [24] explained in their research that the cost of the parking option was the most significant factor which determined travel mode. Curtis and Perkins [15] insisted that a stronger policy agenda is required to reduce the need for driving through the provision of public transport.

An attitude is derived from people behavioral intention. Research by Abrahamse *et al.* [25] describes attitudes as the degree to which a person holds a favorable or an unfavorable evaluation of the idea of commuting by car. This involves moral considerations to play an important role in the respondent's decisions. Susilo *et al.* [13] claimed that sustainability features are important in peoples' decisions to move, and indeed some, such as access to public transport did feature as important factors. The decision for residential locations is partly believed to be influenced not only by travel preferences but also a result of compromising many factors [13, 24].

Social factor which is in this research mainly focus on cultural and religious have been seen as 'highly potential' factors that may affect decision on people residential location selection preferences. In the case of United States and United Kingdom, Curtis and

Perkins [15] argued that understanding of travel behaviour tends to be on the travel behaviours of predominantly white majority populations. Eventually, the researchers suggested that further research is required in ethnic and racial groups in order to have balanced understanding and perceptions on travel behavior studies in the future.

In the current debate of the choices of residential location preferences, many studies have made efforts to address the self-selection issues by accounting for preferences and attitudes with physical and activities within and outside the neighborhood. Therefore, this study is crucial to include the social aspects of people within the neighborhood. It is interesting to explore the relationship or to understand such as religious and cultural attributes of residents in the neighborhood, thus, to establish the connection with choices of residential location preferences.

3.0 SURVEY METHODS AND STUDY AREA

This study uses both mixed-methods of qualitative and qualitative approaches. These approaches allows researcher to understand more comprehensive and observe the people's neighborhood preferences closer and more accurate. Focus group discussion was conducted in more quantitative manner to gather opinions and suggestions on research topics. It has been carried out in two sessions with a group of people, mainly from working group, to give input on their

preferences of selecting residential area. The quantitative approach will provide researcher on more specific answers, which has been designed in close-ended version.

In addressing the residential self-selection preferences, a cross-sectional design being used initially. This approach allows the observation and explores people's characteristics and their preference options. It is clearly relies on cross-section between respondent's background and their preference options and therefore neighborhood characteristics and other variables captured and used to show whether the preferences characteristics are associated with social backgrounds.

The methodology used in this research is designed to identify the factors that influence the relationships between people's residential preferences and travel behavior with a case study in Iskandar Malaysia region. A random sampling technique were used to randomly distribute questionnaires to 384 respondents. The data used in this paper were collected in a standardized household survey within the objectives of this research.

The survey was carried out in two study areas in the region of Iskandar Malaysia, which is in Pasir Gudang Municipal Council (PGMC-Eastern Gate Development flagship) and Johor Bahru Tengah Municipal Council (JBTMC-Western Gate Development and Nusajaya flagships) (Figure 1). The selections of these areas are based on three dimensions, which are, neighborhood type, land use and economic activities. Neighborhood type was differentiated as Johor Bahru Tengah Municipal Council area built more recent, while Pasir Gudang Municipal Council area mostly cover residential area built in the early 90's. While for land use and economic activities, PGMC mostly involve in industrial and services activities which provide more job opportunities and for JBTMC are very much related to government offices and commercial. Nonetheless, spatially or socially 'extreme' areas were not purposely targeted.

3.1 Statistical Analysis

This paper used Descriptive Analysis, Factor Analysis and Structural Equation Modeling (SEM) to identify

the correlated variables and to create a set of factor constructs. The reliability of the scales is considered in connection with measurement models. Factor Analysis identified the 33 statements or items on
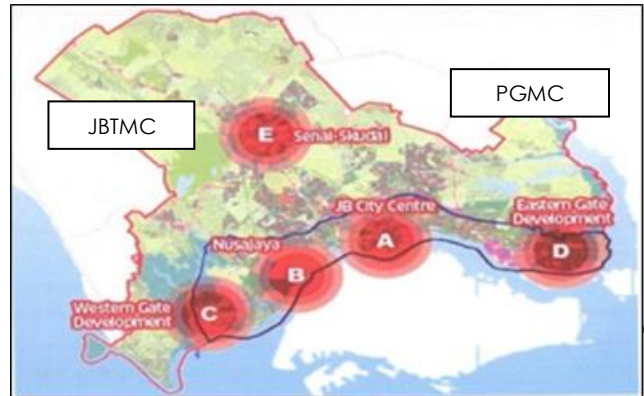

Figure 1 Flagship zones within Iskandar Malaysia

attitudes and preferences of residential locations selection. This is called as latent constructs or latent variables. The criterion "Eigenvalue>1" was used to determine the number of factors. Through this analysis, several factors were extracted and are shown in the next section of this paper.

4.0 RESULTS

4.1 Demographic Profile

The data for the analyses were collected in PGMC (73 respondents) and JBTMC (311 respondents). These areas were chosen because they differ in terms of their spatial or physical environment, economy activities, and status of housing areas (in terms of year of built). Furthermore, the land use activities are more varied and these were assumed to be best area for data collections. Table 2 below shows the distribution of ethnics group in the study area and also the district statistic data. Overall, the data has been represented by ethic group.

Table 2 Sample characteristics of population

Characteristics	Samples		Population	
	PGMC	JBTMC	PGMC	JBTMC
Size (People)	73	311	46,571	529,074
Ethic group (%)				
Malay	78	54	91	39
Chinese	11	32	3	47
Indian	10	13	5	13
Others	1	1	1	1

4.2 Factor Analysis

Table 3 summarizes the results of the factor analysis, which included variable statements, factor loading for every statement. In sum, 33 items or statements were subjected to principal axis factoring (PAF) with Varimax rotation. To indicate the adequacy of factoring with PAF, the extraction method was used and factors with eigenvalues greater than 1 were retained [26].

Accordingly, seven factors were identified; (1) religious practice, measuring one's acceptance level on religious practice between neighbours; (2) residential location, preferences on facilities and infrastructure in neighbourhood; (3) neighbourhood attractiveness, examining people's preferable choice on residential characteristics; (4) travel behaviour, the degree to which he or she will change their travel behaviour whenever possible; (5) pro-public transport, level of acceptance on public transport services and usage; (6) safety, awareness on safety issues and comfort; (7) socio-cultural, concerns on cultural attributes and practices among residents in the neighbourhood. These factors capture the most important dimensions of the residential location selection preferences.

4.3 Measurement Model Fit of Confirmatory Factor Analysis (CFA)

Structural model focus on the relationship between constructs rather than the relationship between latent constructs and measured variables [27]. The structural model represents the concept with a set of structural equations showing how construct are related to another and is usually depicted with a path diagram. In a path diagram, its specification is used to evaluate the theoretical model; how well it reproduces the observed covariance matrix and on the significance and direction of the hypothesized paths.

The maximum likelihood estimation (MLE), as is common practice, is used to develop the SEM [6].

The framework is developed from the literature and has been tested as showed in Figure 2. Measurement of model validity is mainly looking at Goodness-of-Fit (GOF) of the construct model. Furthermore, at this stage, construct validity of the measurement model has been evaluated.

Confirmatory Factor Analysis (CFA) was used to measure significance between factor constructs. Based on Table 4, significant value among factor constructs were evaluated using p-value at 0.05 significant levels. Religious practice (RELGS), statistically has relationship with neighbourhood attractiveness (NEIGHB), pro-public transport (PROPUB) and culture (CULTURE). Meanwhile, residential location too is associated with neighbourhood attractiveness, safety and culture. These findings have further confirmed of [24] and [6] studies, which explained that residential location preferences are influenced by safety and social factor, such as ethic background. Besides that, neighbourhood attractiveness is associated with safety and culture aspects, while travel behaviour, statistically, has relationship with pro-public transport. Safety factor is also justified to have relationship with culture factor.

A widely used index to determine model fit is the χ^2 statistic which measures the discrepancy between the observed and model-based covariance matrices [28]. The χ^2 increases with the sample size and so it is an acceptable GOF measure, though, the cut-off value indicates >0.95 is an acceptable level. However, RMSEA value shows that, the CFA model is statistically, accepted and therefore, all the constructs have been tested and identified to have relationships between factor constructs. The characteristics and type of colour blind has been studied and identified as well as the problem faced by individual that is colour blind. A real-time colour recognizing system using image processing technique is successfully developed and tested.

Table 3 Factors for residential location selection preferences

Neighborhood characteristics factors	Statements	Factor Loadings
Religious Practice	Diverse religious practice	0.756
	Many religious practice nearby	0.754
	Don't mind with prayers performed by neighbor from different races	0.689
	Frequent religious preaching	0.688
	Don't mind with neighbor from different religion listening to religious songs	0.587
Residential Location	Local shops within walking distance	0.714
	Easy access to workplace is an important factor	0.633
	Easy access to worship or religious centre	0.626
	Easy access to shopping centre	0.519
	Easy walking routes throughout the neighborhood	0.480
	Sufficient parking facilities are the main priority	0.432
	Prefer park and recreational area	0.377
Neighborhood Attractiveness	Adequate house space	0.771
	Affordable house	0.708
	Green environment	0.547
	Mix-land use	0.454
Travel Behaviour	Prefer to walk rather than drive whenever possible	0.917
	Prefer to cycle rather than driving whenever possible	0.719
	Walking is easier than driving	0.653
Pro-Public Transport	I prefer to take public transport rather than driving	0.727
	Most of the time, I will travel by public transport	0.719
	Public transport operate on regular basis	0.560
	Public transport routes cover my residential area	0.447
Safety	Safe for children to play outdoor	0.789
	Comfort to walk	0.707
	Low level of car traffic	0.455
Socio-culture	Less conflict among races are an important consideration	0.696
	Do not mind with different language within neighborhood	0.490
	Interaction among neighborhood are very good	0.435

*Factor loadings represent the degree of association between the statements and the factors.
Extraction Method: Principal Axis Factoring (PAF)
Rotation Method: Varimax with Kaiser Normalization
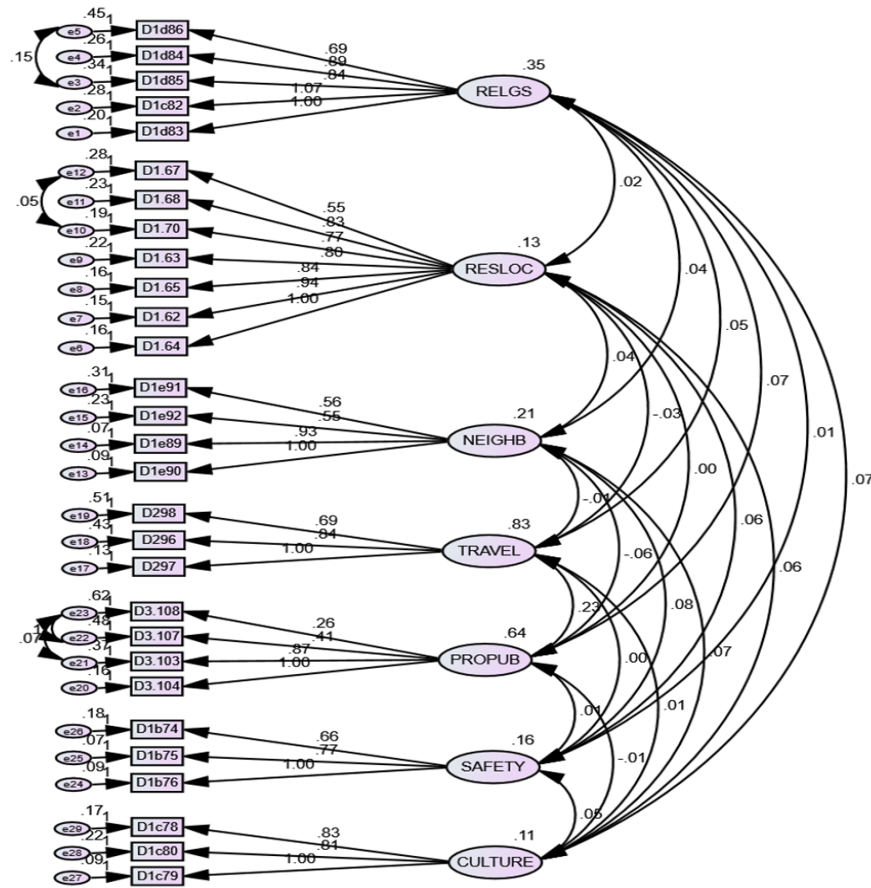*a.　Rotation converged in 6 iterations.*

Figure 2 Confirmatory Factor Analysis

Table 4 Model Goodness-of-Fit (GOF)

Degree of freedom	
Chi-square (χ^2) (df)	914.670 (df=352), P
RMSEA (root mean square error	0.000
of approximation)	0.065
CFI (comparative fit index)	0.845
GFI (Goodness-of-fit index)	0.860

5.0 DISCUSSION

The results from this study offer both theoretical and practical implications, where culture and safety factor suggests having an influenced and contributing to the new perspective as far as travel behaviour studies are concerned. The construct, which are safety and cultural factors, shed the biggest effect on residential location preferences and travel behaviour. Neighbourhood characteristics and residential location preferences indicates and reflects fundamental differences from the previous research or studies.

This study, though, enhance our understanding of the complicated and comprehensive relationships among residential location preferences, attitudes toward land use, travel and transportation. We have investigated to what extent respondent's preference differs not only by residential neighbourhood, but also by the present and level of mismatch their preference on neighbourhood environments and surroundings. The survey largely indicates that consideration on religious practice was among the important factor that has been considered in respondent's decision on residential location selection. So far, it has been established that the physical formed of consideration have been given importance consideration. However, social status is also positively highest and correlated with residential location selection.

The factor analysis produced many undiscovered issues in social context by other researchers. This, perhaps, will bring new perspective of travel behaviour studies where transport researchers need reject universal conclusions and be clearer about the contexts in which their findings most apply. So far, the findings generally confirm standard knowledge and findings in residential location considerations and travel behaviour studies. Turning our attention to social status and aspects, it was found that social

contexts to be the major impact for residential location preferences. In Malaysia context, social contexts among Malaysian appear to be very strong preference.

This study provides number of respondents from different races and religion background with Malay (58%), Chinese (28%), Indian (12%) and others (0.8%). Culture aspects that will add a different perspective in residential selection preferences and travel behaviour are more sophisticated issues among races and have been given important consideration. With regards to that, language aspects for example, should be given more space to be discussed or included in future studies to find any difference or effects among the people in residential neighbourhood. In case of Malaysia environment, which are mainly has three major races, will need to consider culture aspects in many aspects of decision making process to avoid any uneasy or unhappiness in that decision taken. This is very significant because to care of their sensitivity, especially in regards to their culture practice, respectively.

Hence, the research indicates that residential location preferences choices requires an unique, expanded of existing version of travel behaviour studies incorporating social aspects to improve and enhance the current framework in this context. More sophisticated analyses of these data, such as structural equations modelling (SEM), will help to establish the strength and direction of residential location preferences and its relationship with travel behaviour. Future studies that adopt research designs that more or less resemble this study will provide more evidence on this empirical result.

Further studies and experimentation like relationship between latent variables and further exploration on how these latent variables relates to travel behaviour decision process are needed to illuminate the complex and comprehensive relationships and their implications for policy and planning. Nevertheless, this study has seen the difference context of residential location and travel behaviour studies. The results presented here provide some encouragement that land-use policies designed to put residents closer to destinations will actually need to be given more considerations and deep understanding on people's social status and preferences.

6.0 CONCLUSION

Summarily, policies could attract people to shift near to their workplace, especially in the new areas that include mix-religious institutions which allow people to move within or closer to their respective residential area. Instead on focus solely on improvement of transportation facilities, this study provides evidence that, in multi-racial countries, cultural and religious aspects are very significance in influencing travel behaviour.

Acknowledgement

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