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ANALYZING THE SPATIAL TEMPORAL OF PROPERTY CRIME HOT SPOTS. A CASE STUDY OF KUCHING, SARAWAK

Norita Jubit¹, Tarmiji Masron², Azizan Marzuki³

^{1,2}Centre for Spatially Integrated Digital Humanities (CSIDH),

Faculty of Social Science and Humanities

UNIVERSITI MALAYSIA SARAWAK

³School of Housing, Building & Planning,

UNIVERSITI SAINS MALAYSIA

Abstract

This study aims to determine the monthly hot spots of property crime in Kuching, Sarawak from January-December, 2015-2017. Hot Spot Analysis (Getis Ord G_i^*) was chosen for this study because it can detect the areas that have spatial clustering with similar values around its neighboring boundaries. It can present an output for hot spots and cold spots with different levels of statistical significance. Gita Police Station sector boundaries were identified as a high-value cluster for eight months in 2015 and also have a high-value cluster for seven months in 2016. However, in 2017 Padungan Police Station sector boundary was identified as a high-value cluster for four months. The hot spots of property crime in Kuching, Sarawak change over time and places. This study found that holidays and festivals are exogenous factors that can influence the increases of property crime rate in Kuching, Sarawak. The findings of this study can help police to predict temporal crime trends accurately which would be beneficial for management planning.

Keywords: Spatial Temporal, Property Crime, Getis Ord G_i^* , Kuching

¹ Postgraduate (PhD) at Universiti Malaysia Sarawak. Email: noritajubit90@gmail.com

INTRODUCTION

Urbanization is a global trend that has brought about development to major urban areas in most metropolitan cities around the world. This trend has also resulted in high level of crime in urban areas (Chen et.al, 2016). The rapid urbanization process has been identified as the cause of insecurity in urban areas and the prevalence of crime is rampant in developed and developing countries (UNHABITAT, 2007). In Malaysia, there is a high level of property crimes including daylight burglary, night burglary, lorry-van theft, car theft, motorcycle theft, bicycle theft, and snatch theft being reported. Property crime is the major contributor to the index crime over violent crime in Malaysia (Ghani, 2017; Muhammad Amin et.al, 2014; Muzafar and Law, 2008; Nor-Ina Kanyo et.al, 2017). Some areas are more prone to crime and crime incidents are not randomly distributed as well as crime hot spots do exist within city boundaries (Cozens et.al, 2005; Marotta, 2017; Garnier et.al, 2018).

Today crime mapping and spatial analysis are far useful to understand where crime activity is likely to occur (Güven and Gerçek, 2018). Today planners utilize GIS around the world in a variety of applications. GIS tools can provide the necessary planning platform for visualization, modeling, analysis and collaboration (ESRI, 2011). GIS has seen significant developments in research areas such as crime analysis, police station placement, and crime reduction strategies (ESRI, 2019). GIS is employed for developing, storing, managing, analyzing, and visualizing spatial data and non-spatial data-related activities (Tarmiji et.al, 2015). Studying crimes using spatial analysis and temporal distribution is very important because information about the occurrence of crime is the most essential tool in preventing crime in urban areas (Yar and Jamal, 2016).

Previous research related to monthly spatial and temporal analysis of crime mostly focusing on the relationship between crime and climatology, time-space, seasonal pattern, air pollutants, water quality, dengue fever, road accidents and casualties, characteristics of rainfall, the pattern of mass flowering, and Phytoplankton during monsoon season (Mohd Nasir dan Janusz, 1996; Zaini and Noor Shah, 2010; Siti Aekbal et.al, 2012; Mohd Ekhwan et.al, 2015; Norziha, 2015; Mohd Shafiq et.al, 2016; Shamsuddin et.al, 2015;).

This paper aims to analyze the spatial and temporal of property crime hot spot in Kuching, Sarawak by using the police station sector boundaries as the unit of analysis. The findings of this research revealed that the property crimes of both spatial and temporal trends are related to festivals and holidays.

LITERATURE REVIEW

Luo (2017) explored the patterns of burglary crimes at multi-spatiotemporal scales in Chicago between 2006 and 2016. The objective of this study was to

indicate how the clusters shifted in space and time by using Getis Ord Gi*. There were some areas detected that have high-value clusters by month and weekdays. One police district was identified as a high-value cluster for nine months. Norita Jubit et.al, (2019) in their study also used Getis Ord Gi* to explore property crime hot spots in Kuching, Sarawak. The result found that the tool can help to detect the changing of hot spots of property crime (2015-2017) by police station sector boundaries.

Yar and Jamal (2016) conducted a study on crime with special reference to its spatial and temporal distribution in Mardan City of Pakistan using hot spot analysis and revealed that most crime occurs during summer (May to September) with a total of 5 hot spots. The finding of their study found that when the weather gets hot people tend to get mad more easily and would lead them to lose their tempers.

Bold and Borg (2016) used the aoristic analysis method in GIS to conduct a temporal analysis of home-based case analysis in Sweden from 1 January 2010 to 31 December 2014. Their study found that aoristic methods are best suited to estimate the frequency of home-based crime over time when data is limited. Andresen and Malleson, (2015) also using spatial point pattern tests to investigate the differences in spatial and temporal patterns of criminal events for some different types of crime in the City of Vancouver British Columbia. The study found that crime increases during the summer months and occurs mostly during weekends.

Valente, (2019) found that crime concentration changes over time depending on temporal dimensions such as the season, day of the week and the hour of the day in the Brazilian state capital. Fan, (2014) used kernel density analysis and nearest neighbor hierarchical clustering (NNHC) to predict crime in the city of Houston and found that temporal-spatial analysis showed that crime occurred more frequently during September to December of 2011 in central and southwest Houston.

Tarmiji Masron et.al, (2020) conducted a study on spatial distribution of Universiti Malaysia Sarawak (UNIMAS) students and COVID-19 pandemic and found that GIS technique was able to screen students based on their origin and location. Zaini and Nor Shah, (2010) conducted a study on Safe Cities in Malaysia using aoristic analysis techniques in GIS to identify non-specific crime incidents. Mohd Ekhwan et.al, (2015) conducted a study on spatial and temporal assessment of drug addiction using multivariate analysis and GIS.

The result found that a cluster analysis helped to identify areas of drug problems in Terengganu, Peninsular Malaysia. Siti Aekbal et.al, (2012) also used kriging, buffer and overlay analysis to investigate the relationship between burglary and temperature in Shah Alam Selangor. The finding indicated that there is a correlation between hot spot area from burglary activity with the surrounding climatology behavior.

STUDY AREA

Kuching is the most populated city in Sarawak with a total population of 598,617. Besides that, Kuching has also relatively high industrial productivity and has a high share of manufacturing with 58% (World Bank, 2015). The case study has been selected because Kuching was reported to have the highest property crime rate compared to other districts in Sarawak. In 2015-2017, Kuching has recorded 4,123 cases (81.3%) of property crime while violent crime was about 18.6%. For this study, 9 police station boundaries have been identified such as (1) Santubong, (2) Gita, (3) Satok, (4) Sentral, (5) Sungai Maong, (6) Padungan, (7) Tabuan Jaya, (8) Bintawa and (9) Sekama. Kuching District Police Headquarters divided each boundary of police stations into 57 sector boundaries as shown in Figure 1.

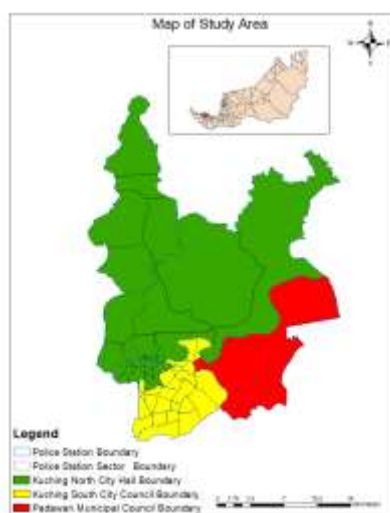


Figure 1: Map of Study Area

DATA COLLECTION

The study was first approved by the Criminal Investigation Department, Bukit Aman. The spatial data was obtained from the head of the police station in Kuching including Kuching district boundary, road data, police station boundaries and police sector boundaries. The non-spatial data was collected from Kuching Criminal Investigation Department and Kuching Headquarters Police District which include data of Property Crime (2015-2017) that were categorized by month, location and address of property crime occurrences by police station. The geocoding of the property crime data was carried out based on the address of the crime occurrences because the property crime report obtained from the Police Reporting System only has the address of the incidents without any reference of the coordinates on the ground. The geocoding process is very important to allow

the distribution of property crime to be displayed on the map and enabled spatial analysis to be conducted.

METHOD

Getis Ord G_i^* was chosen for this study because this technique can identify an output hot spot and cold spot with different levels of statistical significance between 90% (p-value<0.10), 95% (p-value<0.05), and 99% (p-value<0.01) respectively (Martin et.al, 2019). Besides that, it also can detect the areas that have spatial clustering with similar values around its neighboring boundaries. Other clustering analysis such as Kernel Density Estimation (KDE) only can show the location of the cluster but it cannot tell whether the clusters are significant or not (Li et.al, 2017). Local Indicator Spatial Autocorrelation (LISA) can confirm the clusters with different levels of statistical significance but it is more efficient at identifying the outliers (Liet.al, 2017).

Getis Ord G_i^* is a local spatial statistic that consider each feature or polygon (Luo, 2017). This method was used to identify high and low crime cluster values determined through three outputs namely (i) z-scores (ii) p-values and (iii) confidence levels for each polygon. The Getis Ord G_i^* statistic is a z-score that measures whether a crime occurs with high or low cluster values. Significant statistical value is that when the z-score is positive (+), the greater or higher the z-score value the higher the density of the high-value group (hot spot). For z-scores that indicate a negative (-), the smaller the z-score the higher the diversity of crime groups with low scores (cold spot) (Matijosaitiene et.al, 2019).

FINDINGS

Figure 2 shows the total crime incidents by month at Kuching Sarawak from 2015-2017. From the statistics, the result shows the property crime tends to be higher in February with 184 cases and 132 cases in 2015 and 2017 respectively.

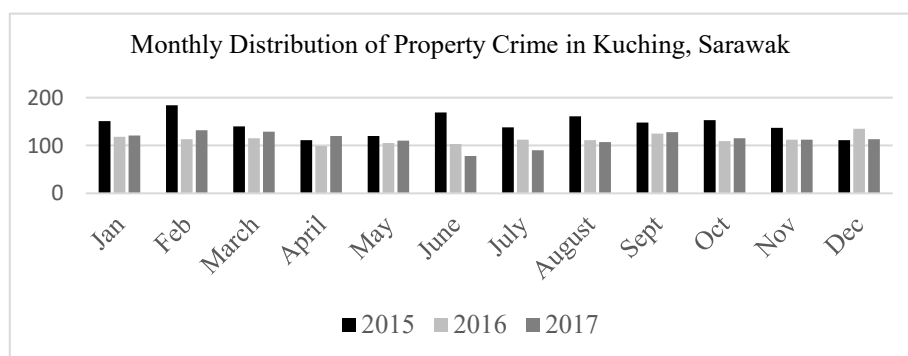


Figure 2: Monthly Distribution of Property Crime in Kuching, Sarawak
Source: Kuching District Police Headquarters (2018)

In 2016, the property crime was reported higher in December with the total incidents of 135 cases. This shows a high and increasing rate during the festival season. Minister of Welfare, Community Wellness, Women, Family, and Child Development Datuk Fatimah Abdullah said that criminal activity will not stop immediately even during the festive season, but will continue to grow if not monitored and controlled (Borneo Post Online, 2019). Festival events are good examples of crime generators (Cohn and Breetzke, 2017).

HOT SPOTS OF PROPERTY CRIME FROM JANUARY TO DECEMBER IN 2015-2017

Figure 3 shows the spatial temporal hot spots of property crime in Kuching, Sarawak from January to December, 2015-2017. Results found that Gita Police Station sector boundaries were identified as a high-value cluster (p-value <0.01) which were considered as significant hotspots at 99% confidence level for eight months (January, February, March, April, May, August, September and November) in 2015. Gita Police Station sector boundaries were also identified as a high-value cluster (p-value <0.01) for 7 months (February, April, June, July, August, September and October) in 2016. Thus, Gita Police Station has been identified as the high-value cluster concentrated in Kuching North City Hall boundary during 2015 and 2016.

However, only two sectors in Santubong Police Station boundary was classified as cold spots in January 2016 as shown in Figure 3, while Sekama Police Station sector boundaries were identified as a high-value cluster (p-value <0.01) for four months (March, April, November and December) in 2016. The result also reveals that sector 2 at Padungan Police Station boundary was identified as a high-value cluster (p-value <0.01) for four months (January, March, May and June) in 2017. However, it was reported that both Gita Police Station boundary and Sekama Police Station boundary have high-value clusters (p-value <0.01) for three months in 2017 as shown in Figure 3.

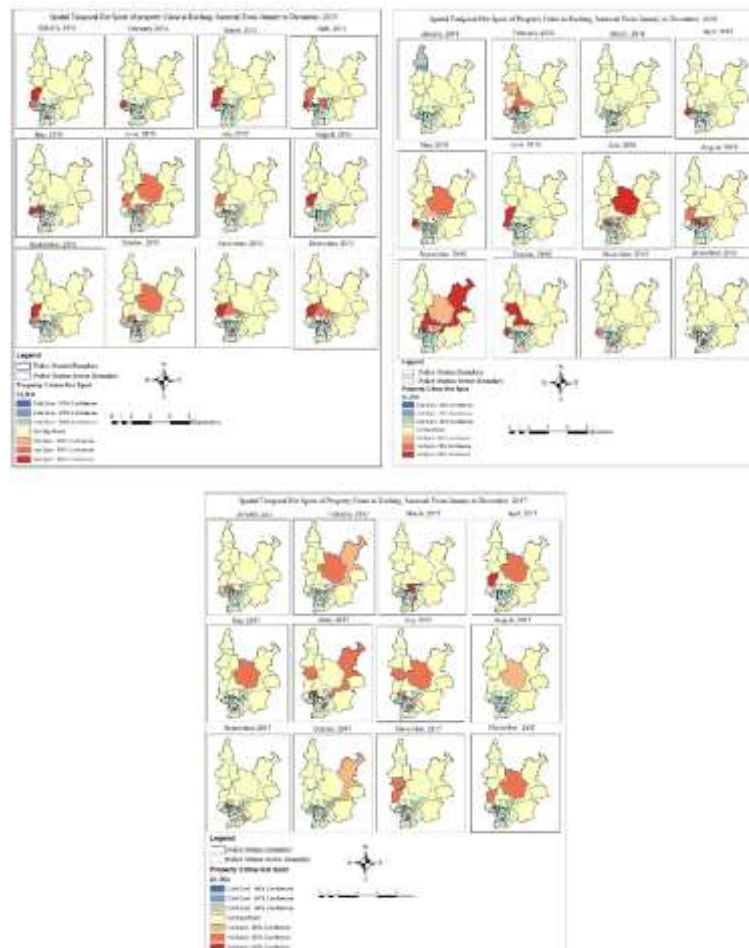


Figure 3: The Spatial Temporal Hot Spots of Property Crime in Kuching, Sarawak from January to December, 2015-2017

DISCUSSION

Getis Ord Gi* is able to identify monthly hot spots and cold spots across police station sector boundaries in Kuching, Sarawak that represents spatial clusters with significantly high or low property crime. Generally, in 2015, the hot spots of property crime are more likely to occur in April, May, June, September, and December. In 2016, hot spots tend to occur in February, May, July, and December, while in 2017 hot spots mostly occur in January, June, July, September to December. This indicates that hot spots of property crime in

Kuching, Sarawak tend to occur during the period of festivals and school holidays. This finding is supported by the theory of routine which states that shopping activities, school holidays and festival seasons are associated with crime due to residents in urban areas either leaving to go back to their hometown or going on vacation and this lead to the offender taking the opportunity to commit a crime (Cohn, 2000; Towers et.al, 2018).

Most holidays occur during festival seasons, such as Chinese New Year, Hari Raya, Hari Gawai and Christmas Day. This situation will also motivate offenders to commit crimes due to the increase of chance and suitable target. The previous study found that holidays and festivals are exogenous factors that might influence the incidents of crime (Lopez and Lauritsen, 2013). Most people from the urban areas would either go back to their hometown, spend more time outdoors, travelling, shopping or visiting their family and friends during the holidays which create crime seasonality. During the holidays, many premises such as schools, government offices and some business outlets will be closed. This routine activity leaves homes, offices and certain places empty and unguarded. (Cohn and Rotton, 2003). Hence, creating opportunities for criminal offences as those who are away indirectly make themselves an easy target to victimization.

CONCLUSION

The result of this study can be used by city planners and the Royal Malaysia Police (PDRM) to strategize and better monitor areas that are classified as hot spots of property crime. GIS information technology systems and criminal theory can shed insights on high-risk crime areas and provide better understanding in the phenomenon of property crime in Kuching, Sarawak. By using the Getis Ord G_i^* technique, this study has been able to detect hot spots of property crime in Kuching Sarawak with statistically significant value in the spatial context.

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SETTING THE CRITERIA FOR URBAN TREE VANDALISM ASSESSMENT

Helmi Hamzah¹, Noriah Othman², Nur Huzeima Mohd Hussain³

^{1,2,3}Faculty of Architecture, Planning and Surveying
UNIVERSITI TEKNOLOGI MARA MALAYSIA

Abstract

An urban tree monitoring programme is a management procedure that determines the performance status of trees by conducting an inventory of the number of trees, their condition, their structure, and other quantitative or qualitative characteristics. The ability to successfully carry out a monitoring programme is highly dependent on precise data. At the same time, comprehensive and strategic urban tree policies require accurate baseline and trending data. Accordingly, there is a need for an improved assessment technique for tree monitoring. Due to the increasing number of tree vandalism incidents in urban areas, the immediate objective of this research was to determine the criteria for a precise tree vandalism assessment technique. A modified Delphi method was adopted to obtain the most reliable consensus among tree care experts through a series of questionnaires. Prior to conducting the Delphi survey, the initial tree vandalism criteria were identified through a preliminary survey conducted by means of the photo-elicitation technique. Experts provided the input for generating the criteria, and at the end of the second round of the Delphi survey, the experts reached a consensus on a set of criteria, which included 10 criteria related to aspects of specific motives and actions, 11 criteria related to aspects of ideologies and practices, and 11 other criteria related to the aspect of victim of circumstances. The selected criteria can be applied in a monitoring programme to assess the incidence of tree vandalism.

Keywords: Delphi Method, Tree Management, Tree Monitoring, Tree Vandalism

¹ Lecturer at Universiti Teknologi MARA. Email: helmi.treecv@gmail.com

INTRODUCTION

An urban tree monitoring programme is believed to play an important role in guiding policymakers and tree managers in making decisions to improve planting programmes. A standard monitoring procedure should cover aspects of the structures, functions and health of urban trees. It has been suggested that urban tree monitoring efforts are more about the performance of urban trees in response to those policies or management strategies. In this case, site attributes (land use and type of site) and tree attributes (GPS coordinates, species, diameter at breast height, mortality status, and tree condition) are measured to counter-check against the aims and goals of the management (UTGL, 2015).

However, these approaches are becoming increasingly unreliable, where the social attributes are underestimated, especially in the context of tree vandalism. Researches tend to focus on physical attributes rather than social attributes. Despite these observations, the assessment technique for tree vandalism remains unclear. Hence, additional studies on the assessment of tree vandalism for tree monitoring programs are needed.

The objective of this research was to determine the criteria that can be used to assess the incidence of tree vandalism in urban areas. This research focused on a strategy to guide decision-makers and tree managers in making the right decisions with regard to the issue of tree vandalism. This approach will provide an effective monitoring program for urban tree management. The remainder of this paper is divided into three sections. After the introduction and the literature review, the second section clarifies the methodology, while the third section presents the results of the study. Finally, the fourth section provides the conclusions and suggestions for future research.

LITERATURE REVIEW

Trees and vandalism are old issues that deserve new thought. Vandalism causes harmful consequences that affect the performance of trees in terms of their contribution to ecosystem services. Some scholars have explained that tree vandalism may reduce the number of safe and comfortable environmental spaces (Donovan & Prestemon, 2012; Hami, Suhardi, Manohar, & Malekizadeh, 2014; Hasan, Othman, & Ismail, 2018; Mohd Yunos & Md Saring, 2012), lower tree appraisal values (Grande-Ortiz, Ayuga-Téllez, & Contato-Carol, 2012) and increase environmental degradation (Roy, Byrne, & Pickering, 2012). Vandalism is synonymous with mechanical injuries that become the starting point for tree damage, thereby leading to tree failure (Moore, 2013). These phenomena are known as tree disservices, and they result in unexpected economic costs, physical damage to the infrastructure, and create fears or inconveniences due to poor health conditions (Lyytimäki, 2017). Hence, it is important to address the incidence of tree vandalism in order to mitigate tree disservices and sustain urban trees. Therefore, in this study, tree vandalism is defined as an act that may cause

damage to trees, and thus, have deleterious effects on the economy, society and environment. The economic, social and environmental deterioration will definitely have a negative impact on the well-being of humans, who depend on the benefits provided by trees in urban areas.

There is a lack of urban tree monitoring guidelines or models that can guide decision-makers and urban tree managers specifically with regard to the subject of the incidence of tree vandalism. Thus, although urban trees are being managed with good strategies and implementation efforts, the issue of urban tree vandalism remains unresolved. The incidence of tree vandalism is increasing annually in most cities in the world (Hamzah, Othman, Mohd Hussain, & Simis, 2018; Mullaney, Lucke, & Trueman, 2015; Sieghardt et al., 2005). It occurs at all stages of urban tree management, either at the planning, implementation or maintenance stage. Implementing an urban tree monitoring program is recognized as a practical approach for interpreting the incidence of urban tree vandalism as it can explain in detail the factors of failure. However, existing urban tree monitoring programs do not look specifically into urban tree vandalism issues, especially in terms of the social factors, at all stages of tree management. Subsequently, the status of the incidence of tree vandalism, which may explain the significant criteria and activities, is unknown. As such, there is a lack of proper monitoring mechanisms in urban tree management to improve their strategies and implementation toward tree vandalism issues.

The references for an urban tree monitoring manual were mostly developed by the Urban Tree Growth and Longevity (UTGL) Working Group. The manual, known as the “Urban Tree Monitoring Protocols: Field Guide”, was published by the UTGL (2015). Its aim is to provide a standardized long-term data collection method for urban tree monitoring programs. It involves field collection procedures for five datasets of variables. The datasets include a: (1) Minimum Dataset - field crew information, location, site type, tree species, diameter at breast height, mortality status, and fine twig dieback; (2) Site Dataset - the characteristics of the site surrounding the trees, including the planting site, soils, and built environment; (3) Tree Dataset - tree growth, and health issues, including height, crown spread, maintenance tasks, and presence of pests and diseases; (4) Management Dataset - tree care practices by local organizations, including information institutions that plant and care for trees; and (5) Community Dataset - socioeconomic information of the community surrounding the trees, including income, housing value, and population density. Based on the datasets outlined in this manual, information relating to social attributes is lacking, and it is difficult to relate the data with the incidence of tree vandalism. To fill this gap, this research was undertaken to investigate the significant criteria that influence the incidence of tree vandalism. The criteria that were determined were then verified to assess the incidence of tree vandalism in urban areas. The results generated through this tree vandalism assessment are expected to provide

evidence to decision-makers and tree managers on the necessary collective efforts required to solve problems of tree vandalism in their management.

Researchers have conducted some studies on urban tree conditions that affect public preferences (Abd Kadir & Othman, 2012; Hamzah, Othman, & Mohd Hussain, 2017). These studies examined tree conditions that could influence the incidence of tree vandalism. It is common sense that people would reject trees that cause them problems. A study by Hamzah et al. (2017) found that the Kajang local authority received 935 public applications for the removal of trees in 2016. It can be concluded that this was due to the fear of the public of the risk to their safety that would be inflicted by dangerous tree conditions such as overgrown trees. Furthermore, a preliminary study in old Klang town carried out by Abd Kadir & Othman (2012) found that there are issues regarding the condition of urban trees that contribute to the inconvenience experienced by Klang citizens. Abd Kadir & Othman (2012) revealed that the issues had to do with overgrown trees, the conflict of urban trees versus overhead utility lines, minimum shading capability (poor tree canopy coverage), and aggressive urban tree roots that damaged sidewalks or paved areas. Those were among the tree conditions that were deemed a public inconvenience.

A growing number of studies have investigated the human misconduct behind the vandalisation of trees across urban areas. Previous studies noted that human misconduct led to the widespread vandalisation of urban trees across the city centre of Oakland (California), eleven cities in the north of England, Eastern Cape (South Africa), and Mexico City (Gilbertson & Bradshaw, 1985; Hernández Zaragoza et al., 2015; Nowak, McBride, & Beatty, 1990; Richardson & Shackleton, 2014). The authors almost exclusively cited differences in attitude toward urban trees as a major factor in the tree vandalism incidents, with a pessimistic, rather than an optimistic, attitude contributing to the higher incidence of tree vandalism. The issue of personal attitude and its relationship with the incidence of tree vandalism was briefly addressed by Long & Burke (2015) and Richardson & Shackleton (2014), where people who are bored, have a passion for delinquency, negative behaviour, and lack of appreciation for trees contribute to a high incidence of tree vandalism.

The term “urban stresses” means that urban trees are constrained in their growth and performance due to threats from malicious, accidental and other anthropogenic activities (Osakabe, Kawaoka, Nishikubo, & Osakabe, 2012; Vogt, Watkins, Mincey, Patterson, & Fischer, 2015). Urban stresses give rise to poor tree conditions and disservices that impact all urban tree populations (Delshammar, Östberg, & Öxell, 2015; Lyytimäki, 2017). The studies detailed above outline the factors that affect “human misconduct” (e.g. poor workmanship approaches and ignorance of urban trees) in a dynamic urban environment, and its detrimental impact on urban tree populations. The nature of the dynamic

characteristics across an urban area would mean that urban trees are exposed to urban stresses, leading to deliberate or accidental incidents of vandalism.

Thus, the factors that influence the incidence of urban tree vandalism can be categorized into three criteria, namely, tree conditions, humans and the environment. The criteria of tree conditions refer to the characteristics of urban trees, while the human criteria refer to human misconduct, as well as safety and convenience. Finally, the environmental criteria refer to anthropogenic factors.

MATERIALS AND METHODS

Research Design

A two-round modified Delphi technique was used to solicit the independent opinions of experts in constructing a set of criteria for the assessment of tree vandalism. In this modified Delphi technique, the qualitative round (first round) was replaced by a preliminary survey (Stewart et al., 2017). The preliminary survey employed a photo-elicitation technique comprised of 35 damaged tree situations that were interpreted by the expert respondents as vandalism incidents. The initial criteria, which were generated from a preliminary survey, were then used to guide the development of statements for the Delphi questionnaire rounds. The final set of criteria developed at round two of the Delphi survey was then evaluated in terms of their ranking and importance, which were consistent with the budget allocation process (BAP) (Greco, Ishizaka, Tasiou, & Torrisi, 2019; Nardo, Saisana, Saltelli, & Tarantola, 2005).

Data Analysis

Qualitative data from a preliminary survey were extracted through a coding analysis using the NVivo 11 program. All the interpretations of the experts were transcribed and imported into the program. Then, the main ideas in each answer were coded (Mayring, 2000). As many categories as needed were created to synthesize the information provided in the survey that had been mapped with the identified criteria for tree vandalism incidents. Next, similar categories were merged to find patterns.

A descriptive data analysis for the first and second rounds of the Delphi survey was undertaken using the Statistical Package for the Social Sciences (SPSS) version 25. The group mean was used to determine the consensus among the experts (Alvarez Etxeberria, Garayar, & Calvo Sánchez, 2015; Henning & Jordaan, 2016; Salazar-Elena, Sánchez, & Otamendi, 2016). The impact value of each criterion on the incidence of tree vandalism was calculated from the weightage ranking in round two of the Delphi survey.

Selection of Expert Respondents

The expert respondents involved in this study (both in the preliminary and Delphi survey) were Malaysian tree care experts who were qualified as Certified

Arborists by the International Society of Arboriculture (I.S.A.). The preliminary survey questionnaires were handed to 92 Malaysian certified arborists in the form of a Google survey through email. Consistent with Sekaran & Bougie (2016), this survey adopted the rule of thumb for most researches, where the sample size should be larger than 30 samples and the minimum size of a sample should be 30% of the population.

A total of 60 potential experts, who had been identified for the Delphi survey, were informed and invited to participate in the research. However, only 47 respondents agreed to participate. A total of 30 responses were received for round one of the surveys. However, after the second round, 12 experts dropped out due to time constraints, leaving a remainder of 18 experts. This number was acceptable since it was consistent with the Delphi sample size of between 10 to 60 (Hasson, Keeney, & McKenna, 2000; Bogner, Littig, & Menz, 2009; Jeste et al., 2010). Local experts from various employment sectors related to urban tree management were engaged to elicit their ideas and responses. The group consisted of six main players; the researcher, academia, local authority, consultant, contractor, and federal government sectors. Specifically, all the potential respondents were selected based on at least one of the following criteria: (1) established academics who have either published their work in international journals or have lectured in the field of urban tree management; (2) established practitioners who have extensive experience in urban tree management; (3) officers from federal and local governments who have been involved in decision making or in managing urban tree planting programs; and (4) public from non-governmental organizations who have been involved in urban tree planting programs.

Administration of the Delphi Survey

In the Delphi procedure, several measures were taken to ensure the validity of the course of action. A formal letter of invitation was sent out via email to each of the 60 potential respondents identified earlier in the sample selection process. The letter of invitation included an explanation on the purpose of the research, a request for participation as an expert, and a feedback notification as to whether the potential respondent agreed or disagreed with this request. Within two weeks after the invitation letter was sent through email, a total of 47 experts gave their consent to participate. The questionnaire for round one of the survey was sent to the 47 experts who had agreed to participate. A total of 30 responses were received for this round of the survey. The questionnaire for the final (second) round of the survey was sent to all 30 experts who had previously participated in round one of the Delphi survey. In return, a total of 18 completed responses were received from these experts.

A Delphi survey approach was used for the data collection to determine the criteria for the incidence of tree vandalism and to establish the weighted

criteria for a tree vandalism assessment. The questionnaire was designed to be consistent with the suggestion by Neuman (2014) that they include introductory remarks on instructions for clarification and questions to measure each variable. A Delphi draft questionnaire should be subjected to a pilot survey to check possible ambiguities that might affect the intended meaning (Bryman, 2012). Thus, the questionnaire was tested in a pilot study to ascertain its reliability before being used with a larger sample of respondents.

The Delphi survey questionnaire was designed individually for each round because different rounds served different purposes. The questionnaire in round one was to identify the relevant criteria for the incidence of tree vandalism and to ascertain the content validity of the criteria according to their categories based on expert perceptions. Meanwhile, round two of the survey was to revalidate and finalize the relevant criteria, which had yet to achieve group consensus (Brennan Ramirez et al., 2006). The survey in round two was also to examine the level of importance of each criterion for urban tree care monitoring. For the measurement of social desirability, a four-point Likert scale was used for round one, and a five-point Likert scale was used for round two of the Delphi survey (Asún, Rdz-Navarro, & Alvarado, 2016). The questionnaires and feedback were sent and received through email. Table 1 shows the processes for the preliminary and Delphi surveys of this study.

Table 1: Analysis Process for Preliminary and Delphi Surveys

Items	Preliminary Survey	Delphi Survey		Results
		Round 1	Round 2	
Database	Photo elicitation	<ul style="list-style-type: none"> • Literature review • Results of preliminary survey 	Results from round 1	Comprehensive criteria of the incidence of tree vandalism (Final).
Number of experts Selected	92	60	30	
Number of experts that Responded	37	30	18	
Data analysis	Coding analysis	Mean analysis & Amendment	Mean analysis	
Findings	Tree vandalism categories	Tree vandalism criteria	Revised & Finalized	

RESULTS AND DISCUSSION

Demography of Respondents

Out of the 92 questionnaires that were distributed to the experts, only 37 were completed in the preliminary survey. The sample comprised 27 male and 10

female respondents. Their ages varied between 25 to 60 years, with the majority of them being from 45 to 60 years old. The respondents were predominantly Malays (26), followed by Chinese (7) and Indians (4). Almost 30 of the respondents had more than 5 years of experience as Certified Arborists, and about half of them (19) were involved as private tree care practitioners, while the rest were government servants. This indicated that the respondents in this study possessed in-depth knowledge of the topics. Table 2 presents the characteristics of the experts in the preliminary survey.

Table 2: Characteristic of Expert Respondents in Preliminary Survey

Sector	N	Gender		Race/Ethnic			Experience (Arborist)	
		Male	Female	Malay	Chinese	Indian	< 5 Years	5 Years ^
1. Academic	4	3	1	4	0	0	1	3
2. Researcher	4	4	0	3	0	1	0	4
3. Local Authority	9	7	2	7	0	2	1	8
4. Consultant	17	12	5	9	7	1	4	13
5. Contractor	2	1	1	2	0	0	1	1
6. Federal Government	1	0	1	1	0	0	0	1
Total	37	27	10	26	7	4	7	30

Meanwhile, in round one of the Delphi survey, a total of 30 responses were received, thereby giving a response rate of 63.8%. Of the total number of respondents, 10.0% (3) were researchers, 13.3% (4) were academics, 20.0% (6) were from local authorities, 43.3% (13) were consultants, 6.7% (2) were contractors, and the remaining 6.7% (2) were from the federal government. In terms of their experience, 14 or 46.7% of them had been involved in the field of urban tree management for more than 20 years, another 5 experts (16.7%) had between 15 to 20 years of experience, while the rest had between 5 to 14 years of experience. This implied that the majority of the experts had wide experience in their fields. Table 3 describes the background and experience of the experts who participated in round one of the Delphi survey.

Table 3: Profile of Expert Participants in Delphi Survey

Sector	>20yrs	15-20yrs	5-14yrs	Total	%
1. Researcher	1	1	1	3	10.0
2. Academic	1	0	3	4	13.3

3. Local Authority	4	0	2	6	20.0
4. Consultant	7	4	2	13	43.3
5. Contractor	0	0	2	2	6.7
6. Federal Government	1	0	1	2	6.7
Total	14	5	11	30	100
%	46.7	16.7	36.6	100	

Round two of the survey received a total of 18 responses (Table 4). Of the total number of respondents in round two, 11.1% (2) were researchers, 11.1% (2) were academics, 22.2% (4) were experts from local authorities, 44.5% (8) were consultants and 11.1% (2) were contractors. Unfortunately, there was no respondent from the federal government.

Table 4: Expert Participants in Round Two of the Delphi Survey

Sector	Experts	%
1. Researcher	2	11.1
2. Academic	2	11.1
3. Local Authority	4	22.2
4. Consultant	8	44.5
5. Contractor	2	11.1
6. Federal Government	0	0.0
Total	18	100

Preliminary Survey

A descriptive analysis was executed in a systematic manner through the process of coding, sorting and synthesizing the respective meanings of the criteria for the incidence of tree vandalism. The following three categories, as stated in the theory of planned behaviour (Ajzen, 1985), were focused on: (a) the attitude of those who commit tree vandalism, (b) the perception of social pressure or subjective norms in tree vandalism behaviours, and (c) the ability to perform tree vandalism. In the first cycle of the coding process, 63 coding aspects that had been noted by the experts were sorted and synthesized by merging the repeated codes or codes that represented the same meaning. These were summarized to only 22 coding aspects and synthesized to the respective three categories; 5 codes in the Attitude category, 8 codes in the Subjective Norms category, and 9 codes in the Ability category. The coding process for identifying the criteria for the incidence of tree vandalism is reported below in Table 5.

Table 5: Coding Process for Identifying the Criteria for the Incidence of Tree Vandalism

First Cycle Coding	No. of Respondents	Sorting	Categorizing & Synthesizing
<i>Attitude</i>			
1. No Attitude.	7	1. Lack of Awareness	Specific Motive & Action
2. Awareness.	7		
3. Curving.	1		
4. Irresponsible.	11		
5. Beauty.	4	2. Preferences & Acceptance	
6. Painting.	6	3. Safety & Security Priority	
7. Safety.	2	4. Tree Hates	
8. Convenience.	1	5. Uncomfortable	
9. Kill the Tree.	27		
10. Unhappy.	1		
11. Not Comfortable	1		
12. Privacy	1		
<i>Subjective Norm</i>			
13. Collaboration Failure.	2	1. Collaboration Failure	Ideology & Practices
14. Poor Collaboration.	1	2. Common Practices	
15. Canopy Removal.	1	3. Design Failure	
16. Design Failure.	6	4. Enforcement Failure	
17. No Enforcement.	1	5. Ignore the Tree	
18. Enforcement Failure.	4	6. Management Failure	
19. Ignore the Tree.	6	7. Practices Failure	
20. Don't Like Tree.	34		
21. Management Failure.	5		
22. No Tree Protection.	1		
23. No Monitoring	1		
24. Maintenance Failure.	13		
25. Practices Failure	3		
26. Topping.	3		
27. Usual Practices.	1		
28. Wrong Approaches	4		
29. Wrong Practices.	16		
30. Bad Practices.	14		
31. Careless.	4		

First Cycle Coding	No. of Respondents	Sorting	Categorizing & Synthesizing
32. Wrong Pruning Method.	1		
33. Poor Practices.	2		
34. Religious Purposes.	13	8. Religious Purposes	
35. Patriotic.	2		
Ability			
36. Conflict with Others Activities.	6	1. Conflict with Other Activities	Victim of Circumstances
37. Burning & Dumping Rubbish.	12		
38. Other Purposes.	12		
39. Improper Usage.	6		
40. Construction Work.	16	2. Construction Work	
41. Construct Structure.	11		
42. Conflict with Infrastructure.	4		
43. Machinery.	5		
44. Construct Materials.	8		
45. Earthwork.	16		
46. Grade Change.	14		
47. Root Zone Disturbance.	10		
48. Illegal Activities.	11	3. Illegal Activities	
49. Incidentally.	1	4. Lack of Knowledge	
50. No Knowledge.	31		
51. Not Aware.	4		
52. Obstruction.	22	5. Obstruction	
53. Disturbance.	1		
54. Opportunities.	8	6. Opportunities	
55. Priority of Space Usage.	1	7. Priority of Space Usage	
56. Space Conflict.	4		
57. Electrical Fixtures.	9	8. Structure Attachment	
58. Signage Attachment.	13		
59. Structure Attachment.	21		
60. Nailing.	8		

First Cycle Coding	No. of Respondents	Sorting	Categorizing & Synthesizing
61. Structure Attachment.	2	9. Supporting Element	
62. Supporting Element.	6		
63. Tying.	11		

The codes were then categorized according to their overall meaning. The attitudes of the vandals for a specific motive and action influenced their intention to vandalise trees. Therefore, the tree vandalism criteria stemmed from the attitudes of the vandals that had been categorized according to specific motives and actions. Meanwhile, for the subjective norms, the ideologies and practices of the vandals influenced their performance of tree vandalism. Thus, the tree vandalism criteria stemmed from the subjective norms or social pressures that had been categorized as ideologies and practices. Finally, the tree vandalism incidents also occurred in a victim-of-circumstances situation. Therefore, the tree vandalism criteria also stemmed from the abilities that had been categorized as a victim of circumstances.

The criteria for the tree vandalism categories derived from the preliminary survey were then mapped with the previous research to align with the three factors that influence the incidence of urban tree vandalism, namely, the criteria of tree conditions, humans and the environment. These generated the initial criteria, which were finalized through the two rounds of the Delphi survey (Table 6), thereby yielding 21 initial criteria in three categories for the incidence of tree vandalism.

Table 6: Mapping the Criteria for Tree Vandalism Categories with the Previous Research

Categories in Tree Vandalism	Criteria for Tree Vandalism Incidents	Sources (Author, Year and Country)
1. Specific Motive and Action	1. Species of the Tree	Camacho Cervantes, Schondube, Castillo, & MacGregor-Fors (2014); Mexico
	2. Age of tree.	Richardson & Shackleton (2014); Eastern Cape, South Africa
	3. Size of the tree.	Fernandes, Da Silva, Teixeira, & Costa (2018); Portugal
	4. Location of the tree.	Moore (2013); Melbourne, Australia
	5. The owner of the tree.	Raskin (2015); California, United States of America

Categories in Tree Vandalism	Criteria for Tree Vandalism Incidents	Sources (Author, Year and Country)
	6. Tree characteristic.	Camacho Cervantes et al. (2014); Mexico
	7. Tree health condition.	Kirkpatrick, Davison, & Daniels (2012); Australia
	8. Tree growth rates.	Camacho Cervantes et al. (2014); Mexico
2. Ideology and Practices	1. Religious and cultural beliefs.	Sharma & Pegu (2011), India
	2. Level of knowledge.	Richardson & Shackleton (2014); Eastern Cape, South Africa
	3. Socio-economic status.	Nowak et al. (1990); California, United States of America
	4. Rule and regulations.	Roos (1992); Washington, United States of America
	5. Design and layout.	Kirkpatrick et al. (2012); Australia
	6. Tree maintenance approaches.	Moore (2013); Melbourne, Australia
	7. Tree maintenance status.	Hernández Zaragoza et al. (2015); Mexico
3. Victim of Circumstances	1. Tree for structure attachment.	Travelia & Arifin (2018); Tangerang, Indonesia
	2. Trees cause interference/obstruction.	Gwedla & Shackleton (2015); South Africa
	3. Conflict with other activities.	Kirkpatrick et al. (2012); Australia
	4. Priority of space usage.	Bhati & Pearce (2016); Singapore
	5. Use of tree parts for other purposes.	Richardson & Shackleton (2014); Eastern Cape, South Africa
	6. Tree without a protective structure.	Richardson & Shackleton (2014); Eastern Cape, South Africa

Round One of Delphi Survey: Identifying the Relevant Criteria

A list of 21 criteria from three categories was included in round one of the Delphi survey. Upon completion of this round, a descriptive analysis was conducted to identify the criteria that the group of experts considered as being relevant for the incidence of tree vandalism. Table 7 shows the results for all the 21 criteria in the three tree vandalism categories (specific motives and actions, ideologies and practices, and victim of circumstances) and their respective mean scores. The group mean scores for relevance ranged from the lowest, 2.30 (age of tree: specific motives and actions category, and socio-economic status: ideologies and

practices category) to the highest, 3.67 (tree for structural attachment and conflict with other activities: victim of circumstances). Based on the group mean agreement of relevance (≥ 2.01 group mean value), the results indicated that all the 21 criteria examined in this survey achieved consensus among the experts, and, thus, were selected as relevant criteria for the incidence of tree vandalism.

Table 7: Results of Round One of Delphi Survey

Item (N=21)	Mean
<i>Specific motive and action category (8 criteria)</i>	
1. Species of the tree.	2.47
2. Age of the tree.	2.30
3. Size of the tree.	2.57
4. Location of the tree.	3.57
5. The owner of the tree.	2.90
6. Tree characteristic.	2.67
7. Tree health condition.	2.83
8. Tree growth rates.	2.63
<i>Ideology and practices category (7 criteria)</i>	
9. Religious and cultural beliefs.	3.00
10. Level of knowledge.	3.37
11. Socio-economic status.	2.30
12. Rule and regulations.	3.37
13. Design and layout.	3.13
14. Tree maintenance approaches.	3.00
15. Tree maintenance status.	3.07
<i>Victim of circumstances category (6 criteria)</i>	
16. Tree for structure attachment.	3.67
17. Trees cause interference/obstruction.	3.63
18. Conflict with other activities.	3.67
19. Priority of space usage.	3.60
20. Use of tree parts for other purposes.	2.90
21. Tree without a protective structure.	2.97
Note: 0 – 1 = Strongly disagree, 1.01 – 2.0 = Disagree, 2.01 – 3.0 = Agree, 3.01 – 4.0 = Strongly agree	

The experts were encouraged to modify or delete any criteria that they believed were duplicates of other criteria, and also to suggest new criteria that they believed were important but had not been included in the list so as to increase the richness of the data. Out of the 30 respondents, 16 experts took the opportunity to suggest some new criteria. There were no suggestions for the existing criteria to be modified or deleted; however, the experts took the opportunity to suggest 11 new relevant criteria which they believed were important to consider but were not included in the existing list of criteria. Table

8 shows a shortlist of these new criteria derived from a pool of suggestions from these experts. There were an additional two criteria for the specific motives and actions category, four criteria for the ideologies and practices category, while five new criteria were added to the victim of circumstances category.

Table 8: Additional New Criteria Suggested by Experts

New criteria	Category
1. Tree debris.	Specific motive and action
2. Tree value.	
3. Coordination and cooperation.	Ideology and practices
4. Demographic (age).	
5. Tree care monitoring.	
6. Information on Tree Benefits.	
7. Infrastructure upgrading/extension & urbanization/development.	Victim of circumstances
8. Event and occasion.	
9. Rate of the human population.	
10. Memorial display.	
11. Tree as a protective structure.	

Round Two of Delphi Survey: Identifying the Important Criteria

Following the identification of the relevant criteria in round one, round two was conducted to confirm these relevant criteria and examine their level of importance for a tree vandalism assessment. A list of 32 criteria was sent out to all the 30 experts who had completed the previous round of the Delphi survey. The results indicated that the group mean value of importance ranged from the lowest: 1.83 (socio-economic status: ideologies and practices category) to the highest, 3.78 (conflict with other activities and infrastructure upgrading/extension & urbanization/development both in the victim of circumstances category). All the 32 criteria from all three categories achieved consensus (≥ 1.01 group mean value) (Table 9).

The analysis to determine the level of importance of each criterion was conducted based on the ranking order of the mean values (Gosavi, 2015), as shown in Table 9. The results indicated that the 'location of the tree' was the most important criterion (ranking no. 1), and the 'age of the tree' was the least important (ranking no. 10) for the specific motives and actions category. The 'level of knowledge' was the most important criterion (ranking no. 1), while the 'socio-economic status' was the least important (ranking no. 11) in the category of ideologies and practices. Meanwhile, the 'conflict with other activities' was the most important criterion (ranking no. 1), and the 'tree as a protective structure' was the least important (ranking no. 11) for the victim of circumstances category.

Table 9: Delphi Round Two Results

Item (N=32)	Mean	Variance	Ranking
<i>Specific motive and action (10 criteria)</i>			
1. Species of tree	2.78	0.54	5
2. Age of tree	1.94	0.53	10
3. Size of tree	3.17	0.85	2
4. Location of tree	3.61	0.37	1
5. The owner of the tree	2.72	0.57	6
6. Tree characteristic	2.72	0.80	7
7. Tree health condition	3.11	0.58	3
8. Tree growth rates	3.11	0.81	4
9. Tree debris	2.61	0.37	8
10. Tree value	2.06	0.64	9
<i>Ideology and practices (11 criteria)</i>			
11. Religious and cultural beliefs	2.72	0.80	8
12. Level of knowledge	3.67	0.24	1
13. Socio-economic status	1.83	1.44	11
14. Rule and regulations	3.67	0.35	2
15. Design and layout	3.11	0.58	4
16. Tree maintenance approaches	3.06	1.00	6
17. Tree maintenance status	2.94	0.64	7
18. Coordination and cooperation	2.67	1.41	9
19. Demographic (age)	2.33	0.82	10
20. Tree care monitoring	3.06	0.88	5
21. Information on tree benefits	3.22	0.65	3
<i>Victim of circumstances (11 criteria)</i>			
22. Tree for structure attachment	3.67	0.35	5
23. Trees cause interference/obstruction	3.67	0.24	4
24. Conflict with other activities	3.78	0.18	1
25. Priority of space usage	3.72	0.21	3
26. Use of tree parts for other purposes	2.67	0.71	8
27. Tree without protective structure	3.06	0.64	6
28. Infrastructure upgrading/extension & urbanization/development	3.78	0.18	2
29. Event and occasion	3.00	0.71	7
30. Rate of the human population	2.39	0.72	9
31. Memorial display	2.39	0.84	10
32. Tree as a protective structure	2.39	0.96	11
Note: Mean 0 – 1.0 = Not important, 1.01 – 2.0 = Least important, 2.01 – 3.0 = Average important, 3.01 – 4.0 = Absolutely important.			

CONCLUSION

The research generated 32 important criteria for use in assessing the incidence of tree vandalism for urban tree care monitoring. The set of criteria determined in this study provides the necessary guidance to identify the incidence of tree vandalism in urban areas. More importantly, it provides accurate data for policymakers and tree managers to make effective decisions concerning tree vandalism issues.

This research has shown that the photographic method known as the photo-elicitation technique is able to provide richness to the qualitative data required from experts for an initial investigation into tree vandalism. This research has also demonstrated the value of the Delphi survey as a potential tool for generating important tree vandalism criteria, and in helping to generate the criteria ranking. Undoubtedly, since the criteria for a tree vandalism assessment have been determined in this research, further studies are needed to develop the indicators to represent the status of tree vandalism.

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ARCHITECTURAL HERITAGE VALUES AND SENSE OF PLACE OF KAMPUNG MORTEN, MELAKA

Nur Raqena Mohd Rahil¹, Mimi Zaleha Abdul Ghani², Yazid Sarkom³

*Center of Studies for Architecture,
Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA (UiTM), MALAYSIA*

Abstract

Architectural heritage holds a variety of values towards the community and helps to enhance the image of a city. Currently, heritage sites all over the world are facing intense pressure from modernisation. This paper attempts to explore the relationship between the values of the architectural heritage of Kampung Morten, Melaka to its 'sense of place' amongst the community. To achieve this aim, the authors examine the occurrence of 'a sense of place', identify the architectural heritage values and analyse the challenges set by the surrounding modernisation. Methods of observation and interview were utilised in this study involving the heritage village of Kampung Morten in Melaka and its community. The findings from this study would highlight Kampung Morten's community level of attachment to their heritage village as they reflect their experience involving the 'sense of place'. In developing more sustainable urbanisation for Kampung Morten, this study also explores the community's level of awareness regarding the risk of modernisation.

Keywords: Architectural heritage, sense of place, urbanisation

² Corresponding author: Senior Lecturer at UiTM. Email: mzaleha@uitm.edu.my

INTRODUCTION

Architecture relates to the local identity of a place and culture. Unlike modern architecture, traditional architecture brings us back to our unique roots. The aesthetical value showcased through the detail of the traditional architecture is a physical proof of history reflecting the identity and character of a culture and community (Samadi, 2009). Psychologically, the sense of belonging helps a person to see values in life. As value is seen and felt by a person towards a certain place, attachment is created within the process and this builds up a ‘sense of place’. On the other hand, acceptance as a member or a part is considered as the feeling of belonging (Hall, 2014). Inherited from generations, the distinctive architectural heritage has become a significant value as it is connected to the sense of belonging amongst the community. While urban development is inevitable, heritage conservation is seen as the most relevant way to sustain historic cities (Said, Aksah, & Ismail, 2013). However, elements of historical architecture could suffer from deterioration caused by modernisation when a city goes through drastic changes in form and style, hugely departing from its local identity and subsequently losing its sense of place. This is among the reasons why protection of valuable heritage especially of heritage sites should be sustainable to ensure its longevity.

Today, the architectural heritage of Kampung Morten is heavily challenged by modernisation, affecting the sense of place nurtured by its unique heritage. The decaying of the conserved architectural heritage of Kampung Morten due to the modernisation weakens the area’s sense of place as it interferes with the cultural identity, causing the loss of authenticity within the locality and shaken the state’s title as UNESCO World Heritage Site. Previous research found that the values of heritage sites in Melaka are facing issues relating to authenticity and survival due to development and modernisation process of the city (Aziz, 2017).

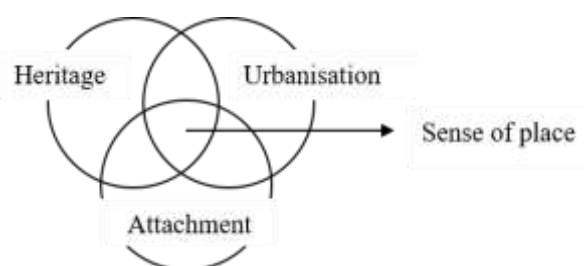


Figure 1: Relationship between heritage, urbanisation and attachment towards the “sense of place”.

As illustrated in Figure 1, this study aimed to identify the heritage values of the architectural heritage of Kampung Morten, Melaka towards the ‘sense of place’

through identifying the city through people-place attachment amongst the community. The study focused on the Malay traditional architectural elements of Kampung Morten. It involved exploring the sense of place amongst the local Malay community whom are the largest number of residents of Kampung Morten and directly experiencing the transitional impact of urban development towards modernisation. Findings from this study would establish the attachment between the community and the village, further suggesting the relevancy of the ‘sense of place’ within Kampung Morten. This could help to create awareness within the community on potential threats of modernisation and help increase the level of appreciation towards the value of conservation for architectural heritage sites like Kampung Morten, Melaka.

RESEARCH BACKGROUND

Sense of place

A place is a medium where traditions can be circulated and cultural reminiscence can be reproduced (Kathrin, 2012). The bond that connects those meaningful places to individuals is recognised as a place attachment (Altman & Low, 1992). It is the experience of pursuing a connection to a specific place that holds specific meaning or value. On the other hand, the place attachment that each individual develop may be underpinned by different values (Quinn, Bousquet, & Guerbois, 2019). Illustrated in Figure 2, the attachment built between a person and a place leads to a psychological aspect known as ‘sense of place’ (Jorgensen & Stedman, 2001). Functional attachment is built through one’s interaction with the particular place while emotional attachments are built through feelings that are felt towards the particular place such as the feelings of pride, love, and sadness (Tan, Tan, Kok, & Choon, 2018).

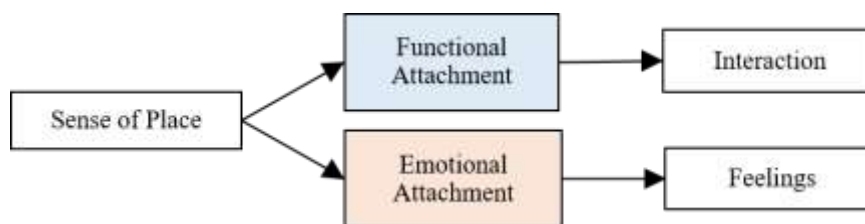


Figure 2: Types of attachment involves in the occurrence of ‘sense of place’

A strong ‘sense of place’ is potentially built through the experience conveyed by the heritage buildings and live displays. The General Conference of UNESCO in 1972 states that heritage sites with significant importance should be protected to prevent the loss of cultural and natural heritage all over the world (Ertan & Egercioglu, 2016). Failing in preserving and acknowledging heritage will lead to further loss of authenticity and identity along with the quality of ‘sense of place’.

Such concern is relevant to heritage sites in Melaka that are facing issues affecting the values as a result of the ongoing modernisation and development process of Melaka (Aziz, 2017). Othman (2017) added that urban development has caused the sense of place in some areas in Melaka to gradually fade as they experience physical changes that weaken their local identity and spirit. This is worrying because, without proper control of development, our local heritage will gradually be destroyed and replaced with a universal imprint (Samadi, 2009). Today, the modern development of Malaysian cities is accelerating fast (Said, Aksah, & Ismail, 2013) resulting to such pressure on the building industry to respond to the contemporary modern and international style that has become a benchmark for the world's growth and advancement (Samadi, 2009). While modernisation is inevitable, conservation can be defined as a shield from any environmental or human force that threatens to impair the heritage (Aziz, 2017). This could reduce the development impact while balancing with local built heritage (Toore, 1999).

Architectural Heritage Values

Architectural heritage conveys the quality of richness and variations into the urban design and plays a significant role in enhancing the historical value and image of a city since it is acknowledged as a distinctive character that represents the history and the national identity of the community (Samadi, 2009). Heritage is also known as a strong element that is shared within a community where each member shares the value that is inherited from previous generations representing their uniqueness (Liu, 2017). Existence of heritage within a city helps strengthen the historical background of the city and acts as a medium in stimulating the city to potential visitors because the permanent heritage setting created through a well-restored heritage building turns a city into a more essential place to visit. The conserved values of a place and community are important as they are not only beneficial for the development of the present generation but also to be inherited and passed on to the future generations (Aziz, 2017). Table 1 shows the significant values and their indicators of Kampung Morten that include historical, aesthetical, social and economic.

Table 1: Types of values of Kampung Morten.

Value Indicator	Significant Value
Historical value	<ul style="list-style-type: none">▪ Physical evidence of history▪ Showcased legacy of the past
Aesthetical value	<ul style="list-style-type: none">▪ Cultural design expressions▪ Traditional features
Social value	<ul style="list-style-type: none">▪ Strengthens the community▪ Retains traditions
Economic value	<ul style="list-style-type: none">▪ Commercial potential

	▪ Worthy investment
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Attachment

The attachments identified in Kampung Morten are divided into functional and emotional attachments (Tan, Tan, Kok, & Choon, 2018). The table categorised the elements according to the pattern of words used by the respondents as shown in Table 2.

Table 2: Types of attachments of Kampung Morten.

Functional Attachment		Emotional Attachment	
Indicator	Elements	Indicator	Elements
Engagement	▪ Community’s social relation	Pride	▪ History and legacy ▪ Uniqueness ▪ Tradition
Reliance	▪ Business opportunity	Loyalty	▪ No intention of moving out
Satisfaction	▪ Facilities ▪ Services ▪ Accessibility	Feeling content	▪ Lively atmosphere ▪ Acceptance
Familiarity	▪ Environment ▪ Lifestyle	Fondness	▪ Environment ▪ Community

The main functional attachment between Kampung Morten and its residents is engagement through community’s social relation and unity. Throughout generations, Kampung Morten’s residents are a close-knit community that sharing engage the whole community in social activities including preparations for traditional ceremonies such as wedding and circumcision. The second functional attachment is reliance which occurs through the business opportunity in the village highly identified within the homestay owners and eatery operators as the needs for homestays have dramatically increased along with the advertisements of Kampung Morten as a popular tourist attraction in Malacca city. The third functional attachment is satisfaction and it is expressed through the availability and variations of public facilities, services and accessibility found in the village that may not be present in other villages as part of the government’s commitments to promote Kampung Morten for tourism. The final functional attachment is a familiarity to the traditional way of living that has been practised from the earlier time. These traditions have shaped the unique environment of Kampung Morten that the village community feel attached to.

On the other hand, the main emotional attachment between Kampung Morten and its residents is pride. Architectural heritage is one of the elements that hold value within the community and the city. Heritage prevails in Kampung Morten with its unique history, legacy, and traditions, turning Kampung Morten as a popular tourist village amongst Malaysians and outsiders. This has created a sense of pride amongst the community which is identified as an indicator for emotional attachment. Loyalty amongst the residents to remain in Kampung Morten with no intentions to move out from the village is another emotional attachment between the people and the place. Lastly is contentment which is the experience suggested through respondents' feelings of acceptance and the lively village atmosphere found in Kampung Morten. This emotional attachment is experienced even amongst the temporary residents as they feel highly accepted by the village community. Respondents also expressed their fondness through the growing bond between their community and the environment, reflecting the natural feeling of fondness that gives pleasure and happiness to people.

Urbanisation

Modernisation weakens the identity and character of Kampung Morten due to insensitivity of developments surrounding it, causing it to be sandwiched in between huge new structures, affecting its heritage essence (Aziz, 2017). It intrudes with the area's sense of place as it disturbs the design and culture and causes loss of local identity. The residents of Kampung Morten are aware of the ongoing physical transformation of the Malacca city surrounding their village. Highly commercial activities and developments of modern looking buildings and structures have affected the architectural language of Kampung Morten including the establishment of homestays and eateries within their village. Increase of pollution and new developments such as hotels and malls have also resulted in ground vibration causing damage to their timber buildings and structures.

CASE STUDY

Kampung Morten

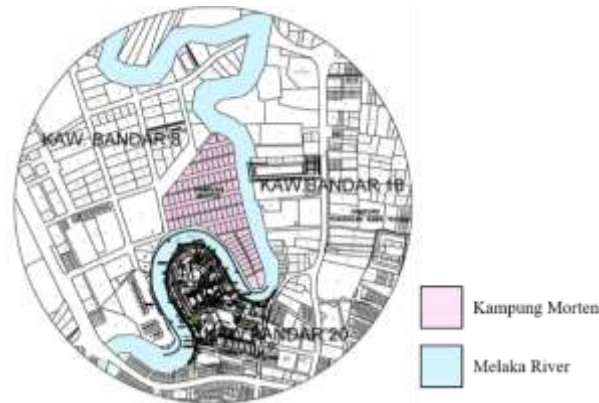


Figure 3: Municipality around Kampung Morten within a 500-meter radius.
(Source: Author)

A Malay traditional village, Kampung Morten is located in the heart of Melaka Town. Founded in 1923, it is amongst the oldest town in Malaysia; a heritage gem that portrays the uniqueness of the Malay culture not only through architecture but also lifestyle. This village of 5.02 hectares is circulated by Melaka River (Figure 3) and comprises of 98 building lots. Majority of the dwellings are single-storey structures built on stilts with lifted floor level, which is the common character of a traditional Malay house and structure. The present majority of residents of Kampung Morten range from the third to fifth generations, and are from the Malay race and practising Islamic religion.



Figure 4: Perspective view of Kampung Morten from 2008 (left) to 2012 (right).
(Source: Ahmad, 2012)

Nestled between the modern fabrics of Melaka city, Kampung Morten is a ‘living museum’, preserving the Malay elements of traditions and practice. Figure 4 shows the rapid transformation of urban development surrounding

Kampung Morten from year 2008 to 2012. The city of Melaka stated in its declaration to preserve the village, its heritage, and its sense of place. While museums are known as a building that stores and exhibit historical, cultural or artistic pieces, Kampung Morten serves as a living museum where parts of the village become the exhibit itself. The dwellings display various artefacts properly maintained by the community such as antique weapons, furnishings, appliances, and ceramics. In this living museum, the community of Kampung Morten carry out their cultural practices that have been inherited through generations.



Figure 5: A residential heritage house in Kampung Morten
(Source: Unknown, 2013)

The houses and structures that are established as a museum in this village have successfully retained the original and structural form for many decades and are occupied by living families. Besides maintaining both traditional exterior and interior of the building, the village museum is also complete with the traditional landscaping. The museum of Kampung Morten embodies a variety type of dwellings. They are characterised by specific activities or purposes assigned for each type of dwellings. Most of the residential houses in Kampung Morten still retain their traditional features, especially the roof design and the entrance or front part of the houses (Figure 5). However, some design changes are made at the tail-end of the houses. The original materials of the houses are also replaced by modern materials in some parts of the houses. Some of the houses in Kampong Morten serve as homestays to provide the experience of living in a real village to guests without having them to travel to the rural. Commonly, these homestays are either the existing and original residential houses or new structures attached to the living areas of the owners' original houses, or in some rare cases, built separately. This suggests that the commercialisation of Kampung Morten has affected and changed the original dwellings in application and design.

Community Background

Figure 6 illustrates the various status of residential of Kampung Morten. Amongst the 12 respondents, the permanent residents are the largest (41%), followed by homestay owners (25%), while museum owners and temporary residents share the same percentage of 17%. Permanent residents and museum owners have lived in the village throughout their lives, suggesting that they inherited the dwellings from the previous generation.

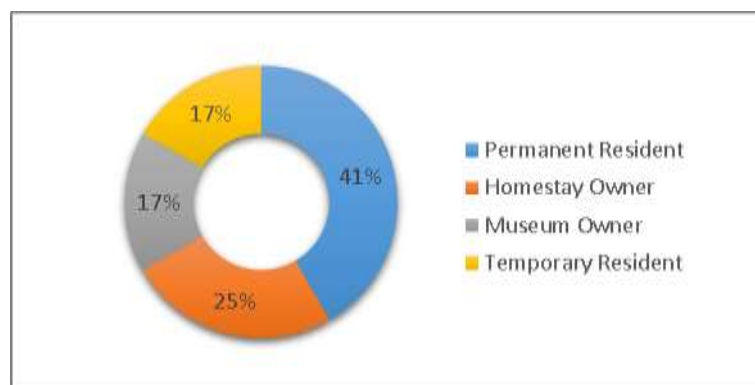


Figure 6: The various residential status identified in Kampung Morten.

FINDINGS

Values of Architectural Heritage

Majority of the respondents inherited their traditional houses from previous generations. This process of changing hands has disrupted the originality of the building form. As shown in Figure 7, only 20% of the respondents retain the original form of their houses compared to the other 80% who have carried out changes to their houses. The bar graph (Figure 7) further displays the types of residents that maintained or changed their building form. The study finds that the reasons for changes or renovations are mainly due to the occupants' current spatial needs. As for the permanent residents, one of the main reasons behind their house renovation is due to the expanding number of family members. Another important reason includes homestay owners having to accommodate and fulfil their homestay guests' needs. They also stated that maintaining or rebuilding the old traditional dwellings involve high cost, therefore, renovations are preferred. Despite the difficulties, the residents of Kampung Morten are still making all efforts to maintain the originality of their houses and structures, especially the entrance or the frontage.

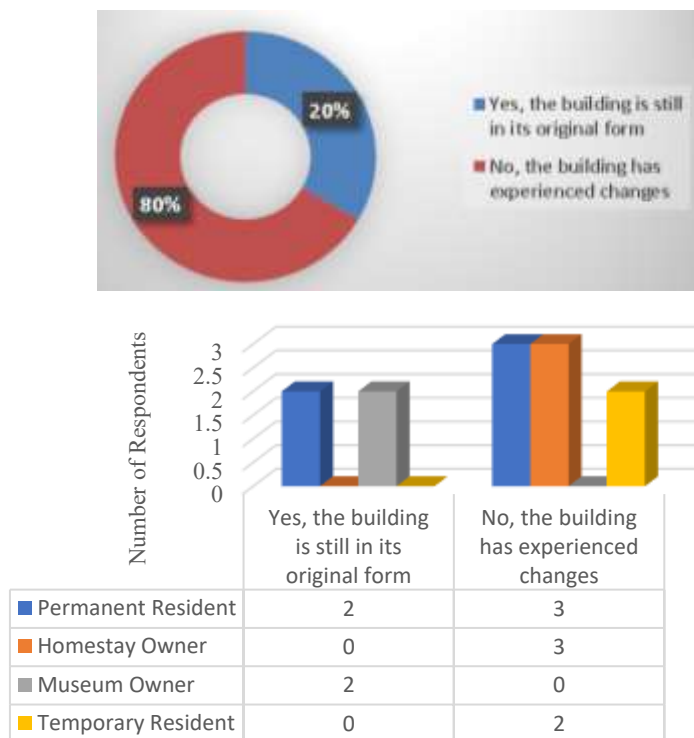


Figure 7: Types of residents and originality of building form

Every respondent agreed that conserved architectural heritage does carry significant value for future generations. Value indicators were established through the pattern found in the overall collected data that was analysed during data arrangement. This eased the process of data organisation and helped in providing a clearer data exposition. The insights from the respondents were then organised according to the indicators established. As shown in Table 1, the variations of value carried by the conserved architectural heritage in Kampung Morten are historical, aesthetical, social, and economical. The historical value serves as physical evidence of history as the dwellings that were passed down from one generation to the next is proof of a legacy lived throughout the past and present community. Besides traditional costumes, it is widely known that traditional architecture comprises unique cultural details and features. This aesthetical value is one of the values carried by Kampung Morten’s conserved architectural heritage in terms of the traditional Malay architecture such as the interior arrangement, carvings, and wood decorations. As the conserved architectural heritage provides meanings to the community, it indirectly carries the social value in Kampung Morten. The bond within the community tends to grow stronger in their attempt to protect their heritage and traditions. Kampung

Morten has been one of the commercialised elements of Melaka city for years now. As the world evolves, the idea of a traditional village in the middle of the city sure increases the merit of Kampung Morten, making it a worthy investment for the future. As stated by the respondent, this proves that the conserved architecture as part of Kampung Morten’s heritage does carry an economic value that is beneficial for future generations.

Sense of Place Through People-Place Attachment

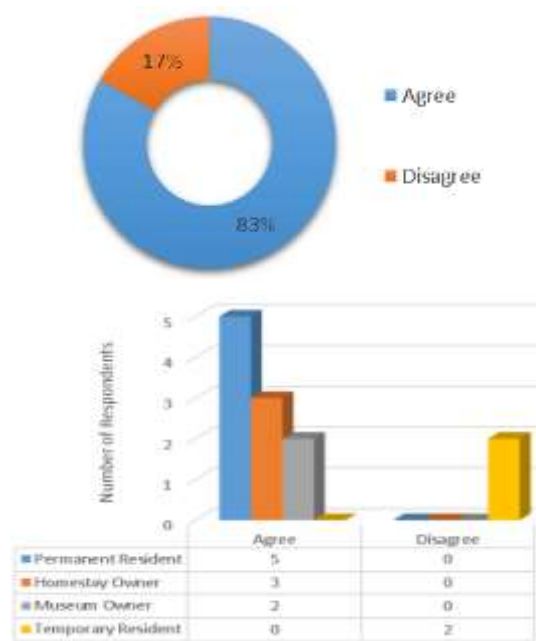


Figure 8: Respondents’ agreement on the contribution of conserved architectural heritage to the ‘sense of place’ in Kampung Morten.

The ‘sense of place’ is identified through the experience of interactions between the respondents and Kampung Morten. According to Figure 8, 83% of the respondents agreed that architectural heritage does contribute to the occurrence of ‘sense of place’ of Kampung Morten. However, 17% of the respondents who are temporary residents disagreed. The respondents stated that they felt more connected to the community of the village compared to the architectural heritage elements. They believed that the lifestyle and environment created by the community are the actual contributors towards the sense of place of Kampung Morten. On the other hand, they felt that the architectural heritage is merely the physical symbolisation of the culture behind the community. While

their status was recorded as temporary residents of the village, this might have influenced their viewpoints compared to the permanent residents.

City Modernisation and Urban Development

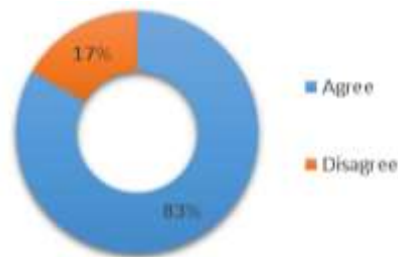


Figure 9: Respondents' agreement on the contribution of modernisation to the 'sense of place' in Kampung Morten.

Referring to Figure 9, 83% of the respondents also agreed that modernisation does affect the 'sense of place' of their area. The respondents had also stated that the modernisation surrounding their village had increased their insecurity on the probability of loss of attraction of their village. This suggested that modernisation has led to the decreased of the village 'sense of place' as the respondents are very much attached to their village through business reliance, services, and facilities. However, the minority (17%) of the respondents disagreed with the statement as they believed that Kampung Morten is not affected by the surrounding development. They felt that the traditional village atmosphere of Kampung Morten is strong and would not be affected by the changes happening along its perimeter. This 'sense of place' of kampung Morten, they believed will remain for as long as the community continues to live there.

As the surrounding rapid urbanisation is leading Kampung Morten into high commercialised activities, the majority of the respondents have expressed their fear that the authenticity of their architectural heritage has been compromised for the sake of economic gains. This is mostly related to the establishment of homestays in the case study area. Another related aspect emphasised by the respondents relating to modernisation is involving the surrounding high-rise buildings that are soaring and overlooking onto their heritage village and the activities within it as shown in Figure 10. They felt that these buildings are affecting the presence of their village and slowly decreasing its attraction. They also expressed their concerns regarding the degradation effects on their environment due to urban development.



Figure 10: Residential houses in Kampung Morten with highrise backdrop.

Established as a ‘living museum’ by the government, Kampung Morten offers the essence of traditional Malay architecture through experience to its visitors which include eateries serving traditional food, living practices, decorations, landscape design and others. The government initiative is aimed to protect Kampung Morten from the rapid urbanisation surrounding it. As it generates economical gain to the residents, it has also increased the level of pride amongst the community as guardians of their heritage. While the majority of its residents agreed that it had generated positive impacts on their village and society in general, they also felt that this is creating extra burden as various expectations were placed by the government on their community. They were also worried if the architectural heritage of their village would reduce from the high tourism of their village that included the mushrooming of homestays and eateries.

CONCLUSION

Urban development and heritage conservation are important elements and need to be paralleled to achieve sustainable development. While conservation is beneficial for the present generation and future generations (Aziz, 2017), it is crucial to identify the values of Kampung Morten so that proper measures could be taken in the process to conserve them. This study had identified the values of architectural heritage and their relationship with the village’s ‘sense of place’ as historical, aesthetical, social, and economical through qualitative interviews and quantitative surveys conducted amongst the residents of Kampung Morten. While some respondents had highlighted the crucial role of the community in shaping the environment and atmosphere of their village, this study has also indicated that the architectural heritage does contribute to the identified values and significant values of Kampung Morten. This is demonstrated through the people-place attachment, both functional and emotional, that occurs between Kampung Morten and its community.

ACKNOWLEDGEMENT

The authors thank the community of Kampung Morten for their kind and valuable contributions to this research.

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A FRAMEWORK OF CHALLENGES FACING THE SAFE CITY PROGRAMME IN KUALA LUMPUR

**Seng Boon Lim¹, Yong Chee Kong², Mohd Fadzil Abdul Rashid³,
Jalaluddin Abdul Malek⁴**

*^{1,4}School of Social, Development and Environmental Studies
Faculty of Social Sciences and Humanities
UNIVERSITI KEBANGSAAN MALAYSIA*

*²PLANMalaysia (Federal Department of Town and Country Planning)
MINISTRY OF TERRITORIES, MALAYSIA*

*³Department of Town & Regional Planning, Faculty of Architecture,
Planning & Surveying
UNIVERSITI TEKNOLOGI MARA (PERAK BRANCH)*

Abstract

The Safe City Programme was launched one and a half-decade ago in Malaysia as one of the National Key Result Areas (NKRAs) strategy to curb crimes. However, the crime rates, in particular in Kuala Lumpur (KL), have shown little evidence of abating. Little is understood of the actual challenges facing the programme. Therefore, questions have been raised and many researchers are attracted to focus on this scenario. Thus, this study aimed to assess local players' views of the challenges facing the safe city programme in KL and to provide a framework for the prevention strategies. The research involved qualitative in-depth interviews with key players in the area of safe city, crime experts and officials, and community heads. Themes and a framework were formulated through thematic analysis. The results showed that the understanding of a safe city programme could be differentiated through the lens of sustainability and resilience challenges, as well as their levels of prevention. Thus, the grey area of tertiary prevention strategies could be identified and strengthened.

Keyword: Crime-free city, crime prevention, sustainability and resilience challenges, safe cities, urban policy

¹ Postdoctoral Researcher at Universiti Kebangsaan Malaysia. Email: lims@ukm.edu.my

INTRODUCTION

The Safe City Programme in Malaysia was proposed in early 1998 to the government by the Malaysia Crime Prevention Foundation (MCPF) to minimise the opportunities for crimes and create a safer environment (Ahmad Nazrin et al., 2012). Based on the positive effects of crime prevention as demonstrated through a pilot study conducted in Bangsar Baru, the cabinet had accepted the proposal and launched the Safe City Programme in the year 2004. In 2005, the National Council for Local Government endorsed this programme and instructed all 38 local authorities (city and municipal councils) in Peninsular Malaysia to participate in this programme, including Kuala Lumpur (KL) (Shuhana et al., 2013). In the year 2009, the Safe City Programme was revised and formally listed under the National Key Result Areas (NKRAs) to create awareness on public safety issues related to crime and policing (Yong, 2019). As for KL, the safe city programme and crime prevention through environmental design (CPTED) measures have been integrated and included as one of the development strategies under the city's Draft KL Structure Plan 2020 (Yong, 2019) and continue to be the main concern in preparing the KL Structure Plan 2040. These measures are meant to prevent uneven scenarios, such as crimes and evil behaviours, faced by urban residents.

According to the Royal Malaysia Police (RMP), the crime index rose significantly between 1980 and 2009, where the worst index was recorded in 2007 in which RM2.04 billion was allocated for crime prevention programmes in Malaysia (Shuhana et al., 2013). In between 2010 and 2017, 42.4% of the total index crimes in Malaysia happened in KL and Selangor (Dass, 2019). As for the reported street crime rates in KL's central business district (CBD) area, snatch theft and total crimes were increasing, while robberies without firearms and gang robberies without firearms cases were maintained at certain levels (Figure 1).

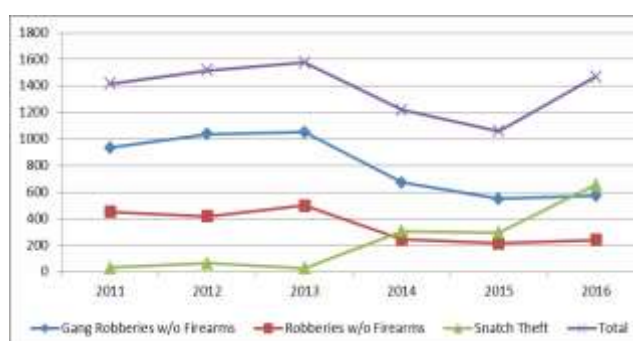


Figure 1: Reported Street Crime in KL's CBD Area

Source: RMP (2017)

Based on the above statistics, a question arises as to why despite the ongoing awareness programme on the safe city and the massive amount of budget allocation to fight crimes, challenges are still faced in reducing crimes on the ground. With this curiosity, the current study aimed at understanding the challenges faced by Kuala Lumpur City Hall (KLCH) in conducting the Safe City Programme, and subsequently formulating a structured framework as a tool for managing and synergising the impact of future safe city programmes. To achieve the above objectives, two research questions were formulated in this study, namely, 1) what are the tools for managing and reducing crimes in KL's Safe City Programme? and 2) what are the challenges faced by KLCH in making the safe city programme impactful and in shaping the social well-being of urban residents? The questions were later on turned into interview items so that they could be addressed accordingly.

This paper is structured as follows. The following section discussed the literature related to the relationships of safety, sustainability, and resilience with the urban policy in curbing crimes in Malaysia. Next, the study will elaborate on the qualitative methodology adopted, followed by the findings based on the research questions, discussion, and finally, the conclusion.

LITERATURE REVIEW

Relationships among the Concept of Safety, Sustainability, and Resilience: To Cast Light on Safe City Challenges

The study observed that most researchers defined the safe city concept as mainly related to "crime-free cities" and also put safety as part of the macro concepts of sustainable and resilient cities. For example, Jalaluddin and Mohd Asruladlyi (2015) and Shuhana et al. (2013) stated that the safe city concept is a micro concept involving the security aspect to achieve macro development in building a sustainable and liveable city. The New Urban Agenda and the call of SDG 11 also stated the aim of making cities "safe, resilient, and sustainable" (UN Habitat, 2017). UN Habitat (2017) shared their vision for a safe city as a city which is suitable for inclusive human settlement and for the people to perform daily activities without the fear of crime and violence. Concerning the sustainability concept, Leach et al. (2010) defined it as "the capability of maintaining over indefinite periods specified qualities of human well-being, social equity, and environmental integrity". Thus, to maintain and surpass the quality of "safety scenarios" of human settlement in crime-free cities, it is imagined as to sustain the intergenerational equity of human's life, transcending from the level of high-crime, medium-crime, low-crime and finally reaching the crime-free status in living, working, and playing. However, as opportunities and problems co-exist in routine human activities in cities, the evil side of likely offenders also co-exist with decent citizens (potential victims) and capable guardians (see Baum, 2011). When criminal acts occur, the injured victims or remorse offenders will still have

to face their lives, whether leading a positive livelihood or continuing to indulge in the negative incivility acts.

Therefore, the concept of resilience comes in where society needs to “bounce” back to be able to perform daily activities well without fearing crimes. According to Roostaie et al. (2019), the concept of resilience refers to gaining momentum, having the capacity to persist in the face of change, and practising response to the damage caused. The National Security Strategy of the United States defines resilience as “the ability to adapt to changing conditions and prepare for, withstand, and rapidly recover from disruption” (President of the United States, 2010). Until recently, this resilience concept has gained ground as it has been adopted in the Safe City Index (Economist Intelligence Unit, 2019) and policy documents such as the US national doctrine in 2010. Another study by Achour et al. (2015) reported the Japanese CASBEE® and the German DGNB as the tools in which resilience has been integrated into the sustainability assessment framework. Despite the existing differences among the concepts, Roostaie et al. (2019) formed four types of relationship between sustainability and resilience (refer Figure 2).

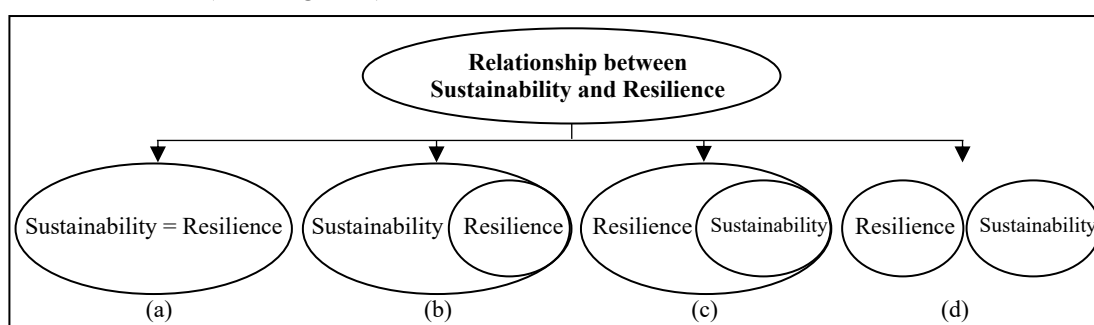


Figure 2: Difference relationships between sustainability and resilience
Source: Roostaie et al. (2019)

From the four types of relationship between the concept of sustainability and resilience summarised by Roostaie et al. (2019) and the above examples of assessment tools, the study found that “sustainability” maintains its dominant role as the preferred development paradigm with the concepts of “resilience” and “safety” as components of it (refer Figure 2(b)). The study views these concepts as in ideal states and the scenario in Figure 2(b) could be turned into challenges of action in addressing the safety issue in urban policy planning and development (Davidson et al., 2019).

Urban Policies and Strategies Relevant to Safe City and Crime Prevention in Malaysia

The study observed that there are notable urban development planning policies and strategies related to the safe city and crime prevention in Malaysia. However, the designed strategies and programmes seem to be based on solving ad-hoc scenarios of rising urban crime rates, as well as lacking in understanding of the challenges faced and of introducing a long-term solution to achieve the vision of a crime-free city. Such urban policies and strategies can be traced back to the top-down five-year plans adopted by Malaysia. For example, the Fifth Malaysia Plan (1986–1990) incorporated measures to foster and maintain a close relationship between the police and the public in fighting crimes. Systems such as the “Community Constable” (KONMAS) were introduced in selected areas in Georgetown, Ipoh, Johor Bahru, and Petaling Jaya. In the Sixth Malaysia Plan (1991–1995), the “Rakan Muda Programme” was introduced for youth development and to prevent them from unhealthy activities and crime. Consequently, the Seventh and Eighth Malaysia Plans (1996–2000 and 2001–2005, respectively) introduced the Caring Community and Neighborhood Committee expansively to promote good neighbourliness in helping to reduce the crime rates in residential areas.

Another important programme that emphasises the social aspect is the National Social Service Programme, which was also introduced during the Eighth Malaysia Plan period. The programme was aimed at promoting a spirit of cooperation and partnership among government agencies, private and non-governmental organisations (NGOs), and other volunteer bodies to help combat crimes (Nor Eeda, 2006). In ensuring continuity, the Ninth Malaysia Plan (2006–2010) introduced the Lifelong Learning Programme and Centre of Unity to form community patrolling and knowledgeable organising committees in preventing crimes (Nor Eeda, 2006). To continue to bring prosperity and safety to the nation, the Tenth and Eleventh Malaysia Plans (2011–2015 and 2016–2020, respectively) included three key strategies to enhance safety in the country. One of the strategies is to reduce the crime rate (overall index crime rate), especially street crime via public concern and awareness (Yong, 2019).

The National Physical Plan 3rd Edition (2016) also incorporated the safety aspect to sustain national growth. Thrust-3, which mentioned “building inclusive and liveable communities – creating a safe environment as one of its strategic directions” was timely. Before that, the Fifth Thrust in the First National Urbanisation Policy, which addressed “the realisation of a prosperous urban living environment” also highlighted the importance of promoting safety aspects in city planning and development (FDTCP, 2006).

Presently, as mentioned earlier, the CPTED strategies are the main actions being integrated into safe city programmes both locally and nationally. This approach needs to be materialised at community and local authority levels. Most of the key elements of the CPTED are based on the opportunity theories such as the Routine Activities Theory (Cohen & Felson, 1979) and Broken

Window Theory (Wilson & Kelling, 1982) in creating environmentally safer urban environments.

At the local authority level, the KLCH touched on the Safe City Programme from the physical planning perspective. Further, the KLCH provided more details by introducing policies of Urban Design (UD 23) and Communities Facilities (CF 18) (KLCH, 2004). UD 23 states that KLCH shall draw up an urban design framework together with a comprehensive set of urban design guidelines to ensure public safety and health, and designate a body responsible for implementation and coordination with other relevant authorities and policy. Meanwhile, policy CF 18 states that KLCH shall, in consultation with the appropriate authorities, ensure that sufficient police stations, police posts, and neighbourhood watch centres are provided and adequately distributed. These programmes will be revisited during their implementation stages to determine their effectiveness and to understand the challenges and future intervention strategies to be implemented.

METHODOLOGY

As stated in the Introduction section, this study applied a qualitative approach to deal with the designed research questions and subsequently synthesised the challenges faced by safe city programmes in Malaysia, in particular, by the KLCH. It includes, first, in-depth interviews with the key players which were identified through purposive and snowball sampling techniques (see Creswell & Poth, 2018). The interview sessions involved informants that possess the knowledge and background information related to the safe city programme in KL. All of them were recommended by other informants interviewed in the study. In total, nine informants were selected from diverse backgrounds, such as government officials, police, NGOs, and local community heads (Table 1). The study found that these nine informants provided enough data saturation to answer the research questions due to the diversify of their background, which provided multi-perspective answers, thus enriching the finding dimensions.

Table 1: Numbers of informants

Informant	Quantity
Federal and local government officials (G)	2
Police (P)	3
NGO representatives (N)	2
Local community head/safe city programme partners (C)	2
Total	9

Thematic analysis through Atlas.ti was applied in this study. Using this analysis, the study looked for similarities and differences, or plausible and spurious data, as well as classifying them into axial coding that consists of categories and themes (Creswell & Poth, 2018). Then, a constant comparative

method was applied to create the coding scheme. The emergent network of themes was then presented as the final and most important output to help the study identify any relationships or patterns in the data (refer to Figures 3 and 4).

FINDINGS

This section discusses the analysis of results from the interviews and reports the summary of critical findings according to the research questions.

Tools for Reducing Crimes in KL Safe City Programme

In its inaugural year of fighting crimes, the government official informant G1 mentioned that the top-down Reducing Crime NKRA framework had introduced programmes such as identifying crime hotspots, strategic deployment of police in these hotspots, and implementing the Omnipresence Programme. As for measures related to the CPTED, many strategies have been launched including installing close-circuit television (CCTV) cameras in high-risk areas and in areas prone to snatch thefts. All the informants concurred that alarms and surveillance cameras are useful. When thieves are aware that their criminal activities will be captured on camera, they might think twice about committing a crime. Similarly, safety mirrors are a great source of security solution. Safety mirrors are effective in ensuring pedestrians' safety, especially at secluded spots and crime hot spot areas. Besides, street lights are also effective. The police informant P1 and government official informant G1 mentioned that KLCH and police recently changed the voltage of all the street lights. Many related agencies such as the FDTCP viewed the programme as successful and it is growing to shape urban prosperity and a secure living environment. *"Our streets are no longer dark, and the perception is city centre is a much safer place for public now,"* mentioned the community head C2. Figure 3 provides a summary of the critical findings for Research Question 1.

As far as KLCH is concerned, the government official G2 pointed out that mixed-use zoning appears to cut down the crime rates. A city centre with lunch counters, offices, condos, and nightlife activities is likely to have more "eyes on the street" at more frequencies in a day. This collective surveillance ostensibly deters criminals. It also makes sense that people would feel a greater sense of ownership and security and care for the city centre where they live, shop, or go to work. Informant G2 suggested that the relevant agencies should consider zoning laws as the current one largely overlooks this tool for crime prevention. More often, when police think about the environmental design for crime prevention, they focus on interventions like sidewalk cameras, street lighting, or new cul-de-sacs. G2 suggested that they should also look at the level of land use alongside urban planners.

In addition, informant G2 revealed that KLCH has started exploring how urban nature affects crime. They have reassessed the policies about cleaning

and greening vacant lots, as well as developing parks with green installations. This is consistent with the notion by Jane Jacobs (1961) regarding “eyes on the street”, well-kept lawns, and community plots that encourage more people to spend time outside in those spaces, leading to a greater degree of informal surveillance of the area and deterring crimes. Beyond the ecological and aesthetic benefits, these investments create a safer environment for the people who work and live nearby.

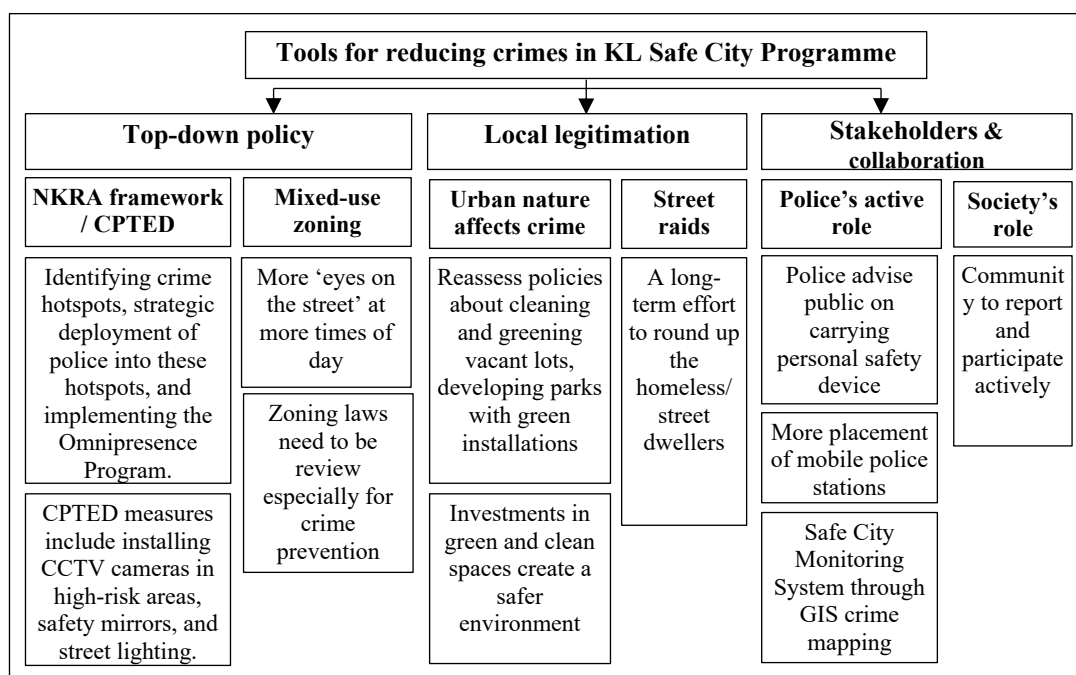


Figure 3: Network of themes on tools for reducing crimes in KL Safe City Programme

The community head informant C1 noticed that street raids conducted by KLCH are part of the efforts to round up the homeless as the council hopes to clean up the city. Besides, the police informant P1 encouraged the public to play their roles in preventing street crimes. P1 added that the police advised the public to carry a personal safety device like a flashlight (Maglite) when one goes out at night. Government efforts such as the introduction of mobile police stations at certain hotspots have helped much in crime prevention. The police station at Berjaya Times Square (Imbi Street) is one of the examples. Informant P1 added that the placement of mobile stations and patrols by patrol vehicles and the motorcycle patrol unit in focused areas such as Ampang Street and Bukit Bintang area have been effective in reducing the crime index. Meanwhile, the NGO

informant N1 hoped that the police could increase patrolling or station more men at snatch theft hot spots.

Collaboration is a key initiative in preventing crimes. In preventing street crimes, all the informants concurred that the agencies responsible for security could not work in a silo. Inward-looking mindset and resistance to sharing information and resources with other people or departments within the organisation must be avoided. Other departments and related agencies have to work closely with the police. When an accident or incident occurs, effective and accurate response and reaction to the accident or incident should be made possible. Also, the government official informant G2 revealed that municipal surveillance demands a non-intrusive security solution and at the same time must address the diverse range of sensitivities, routines, and systems used by various emergency services.

The Safe City Monitoring System (SCMS) is an award-winning project collaboration between the police and FDTCP which can identify crime displacement and potential crime hot spots. This system was highly promoted by the government official informants G1 and G2 during the interview session. The objectives of developing the SCMS are to improve crime data sharing among the crime prevention agencies and to monitor the effectiveness of crime prevention programmes through the provision of Geographic Information System (GIS) crime mapping facilities to the police and local authorities.

Other critical success elements are public awareness and community engagement. The police informant P1 mentioned that safe cities are built through small and scalable initiatives, and people are the critical success factors in building safe cities. Safe cities imply smart citizens. Furthermore, as the public becomes more connected with smartphones and broadband access, more information reaches law enforcement agencies from the public and the public's expectations for governmental services and safety increase accordingly.

Challenges Facing the Safe City Programme in KL

Concerning the challenges facing the safe city programme in KL, the government official informant G2 informed that previously, most of the projects were funded by the federal government through the Ministry of Home Affairs. The FDTCP as the project manager monitored the spending and budget distribution to the local authority. However, due to the new top-down policy direction of Shared Prosperity Vision 2030 (adjusted from Vision 2020), this safe city programme has been pending for further action and is under the "budget review" status. The NGO informant N2 and community head informants C1 and C2 pointed out that the government's seriousness in preventing crime by allocating appropriate budgets is crucial. Data from (FDTCP, n.d.) showed that the budget allocation for safe city programme in Malaysia was decreasing from RM4.2 billion in the year 2013 to RM10 million in the year 2019. Without sufficient budgets, the

existing CPTED facilities could hardly be maintained and improved, and new strategies that are to be implemented at the ground level might be abandoned. Hence, there will be ambiguities and uncertainties due to the failure or delay in implementing the plans (see Matland, 1995).

As for the role of the police, the informant C1 wished the police would act fast if a crime happens, have a closer appearance to the public, would build public confidence, and also would deter criminals from committing crimes. When this information was conveyed to the police informants P1 and P2, they defended that the police have worked hard in performing their duties, and sometimes the lack of staff is unavoidable. Nevertheless, they agreed that the police act as the main “guardians” in protecting the residents. They also pointed out that the police have set up mobile kiosks in the CBD area and are doing frequent foot-patrolling. Moreover, the police informants mentioned that they face the hurdle of inadequate crime information being provided by the public, as many residents are afraid to interfere with the potential offenders and related gangsters or *kongsi gelap*. The NGO informant N1 informed that the public is inclined to think that the police have the highest responsibility in reducing crimes, and they tend to criticise rather than helping (see Figure 4).

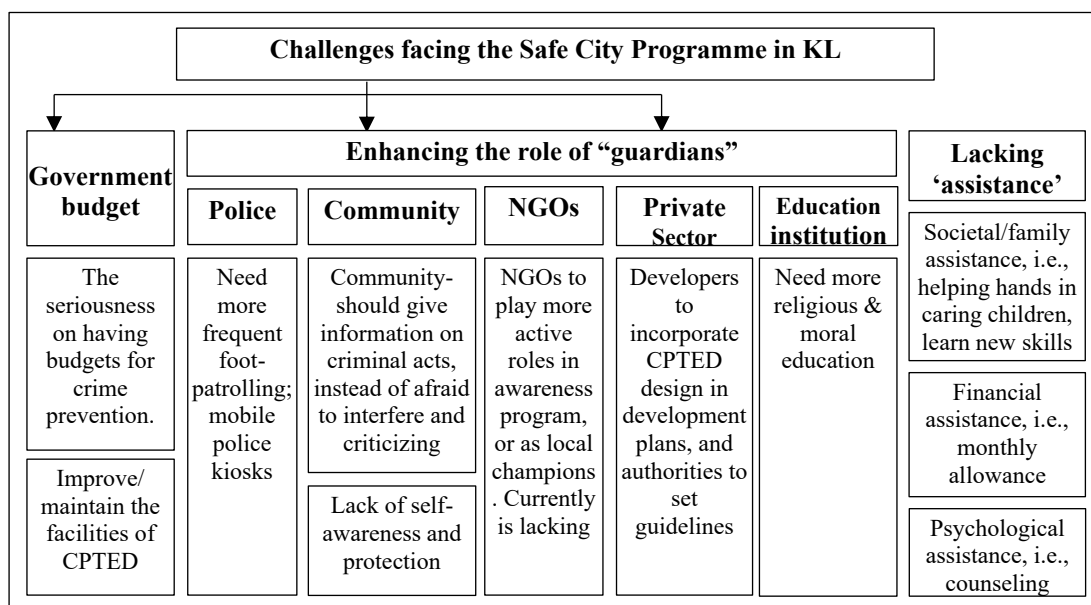


Figure 4: Network of themes on the challenges facing the Safe City Programme in KL

The police informant P3 is concerned about the need for community training on self-awareness and protection, and highlighted that awareness is the key for self-protection. P3 advised that the public, especially pedestrians, should

always look around, avoid stepping out while talking on the phone and never allow criminals to strike by not wearing valuables when they are in secluded areas. The public should discard the mentality that such crimes “are never going to happen to me”. Instead, they should take proactive measures to ensure their safety. Senior citizens and women, particularly, must be “street smart” and always alert when walking alone. People should ride bikes on the street instead of on the sidewalk. Thus, pedestrians are advised to get inside a building and wait until the motorists or riders have passed if they see motorists or riders on the sidewalk. The informant P3 added that they must also know the latest tactics employed by snatch thieves, including asking for directions before grabbing the victim’s bag or other valuables.

According to the NGO informants N1 and N2, the MCPF has periodically organised crime awareness events the public and town hall sessions with the police besides encouraging the setting up of crime prevention clubs in secondary schools. However, N1 felt that in practice, not many NGOs have followed the footsteps of Komuniti Polis Malaysia (CAP) and Safer Malaysia in organising crime prevention activities. Hence, the informant urged more NGOs to play more active roles as local safety champions. N2 added that currently, the crime prevention efforts by NGOs are lacking.

Meanwhile, the government official G1 pointed out the challenges faced by the private sector in helping to curb crimes. For example, in applying for planning permission for the development plan, property developers should try to incorporate the CPTED design. However, not many property developers take this crime prevention step into serious consideration. Thus, the informant suggested that the local governments should impose stringent guidelines in ensuring full implementation of the CPTED design on the ground. G1 added that besides the private sector, education institutions should play their role by increasing the number and scope of religious and moral education classes to enhance awareness among children and graduates. The community head informant C2 concurred that children should receive adequate education in crime knowledge, observe good moral behaviour, and refrain from committing crimes, which will help in curbing the vicious cycle of them being turned into criminals in the future.

Apart from the government and the “guardian” roles discussed above, another challenge faced in the implementation of the Safe City Programme is the lack of “assistance”. The NGO informant N2 mentioned that after the occurrence of a crime, three types of assistance are usually needed by the victims, family members of the victims, and the offenders. These three types of assistance are family, financial, and psychological assistance. For family assistance, the offenders’ family could be in helpless situations when the breadwinner has been arrested by the police and jailed, or the victims are hospitalised or even died during the criminal acts. In such difficult scenarios where family and childcare

assistance are lacking, government departments, community, and society need to assist the family members, for example by providing free childcare or teaching new skills to the ladies so that they can earn a living. Secondly, financial assistance is related to family assistance, and it refers to the monetary assistance provided to the family of victims and offenders. Thirdly and most crucial is the lack of psychological assistance such as counselling services to the victims and offenders. For the former, consistent counselling helps the victims to get out and heal from the fear of crime. For the later, counselling helps the offenders, who are mostly in prison, to feel remorse about their incivility behaviour and the harm that they inflicted. This assistance will help in reducing the cycle of crime in the future. The police informant P1 admitted that not all the criminals are “bad guys”, and most of them need better psychological guidance which is currently lacking in society.

DISCUSSION

From the above findings, the study found that in the security landscape, the street crimes in KL’s CBD area are generally at acceptable levels and the police are confident in curbing street crimes. However, there is still some uncertainty in public confidence. These findings reflect the crime statistics shown in Figure 1 where crimes still exist in society, and long-term and consistent efforts are needed to curb these incivility acts. The implementation of the safe city programme in KL’s CBD has taken place for 15 years, and it has been generally acknowledged as a good move by the government in curbing crimes. However, the inevitable urbanization trend in KL has caused increasing crime rates. Hence, the CPTED strategies and the utilisation of technology, infrastructure, personnel, and processes need to be monitored and improved from time to time.

For the first research question regarding the tools for reducing crime, three main areas were derived from the interview themes, namely top-down policy, local legitimation, and stakeholders’ collaboration (Figure 3). Besides the NKRA framework and urban policies mentioned in the literature review, insights such as rethinking crime from the perspective of mixed-use zoning and urban nature are good points for curbing crimes as the long-term measures. Urban planners in this context play an important role in guarding the new development plan approvals, such as by applying strict rules in CPTED design checking as well as balanced zoning of residential, commercial, or industrial development and traffic flow to improve the “public eyes” in each zone.

For the second research question regarding the challenges faced by the safe city programme in KL, the study found from the interviews that three factors are crucial, namely the government’s budget, enhancing the role of the “guardians” (i.e., the police, community, NGOs, private sector, and educational institutions), and assistance in family, financial, and psychological aspects

(Figure 4). The challenges faced by the safe city programme necessitates collaboration and responsibility by all the stakeholders.

The study argues that the safe city programme should be carried on not only in KL but also in other urban areas in Malaysia, as its framework is proven to be capable of preventing crime. As discussed in the literature review section earlier, under the bigger scope, the safety issue is always an essential element under the microscope of sustainable and resilient city planning. Thus, the study attempted to form a framework of the challenges faced, which is presented in Figure 5.

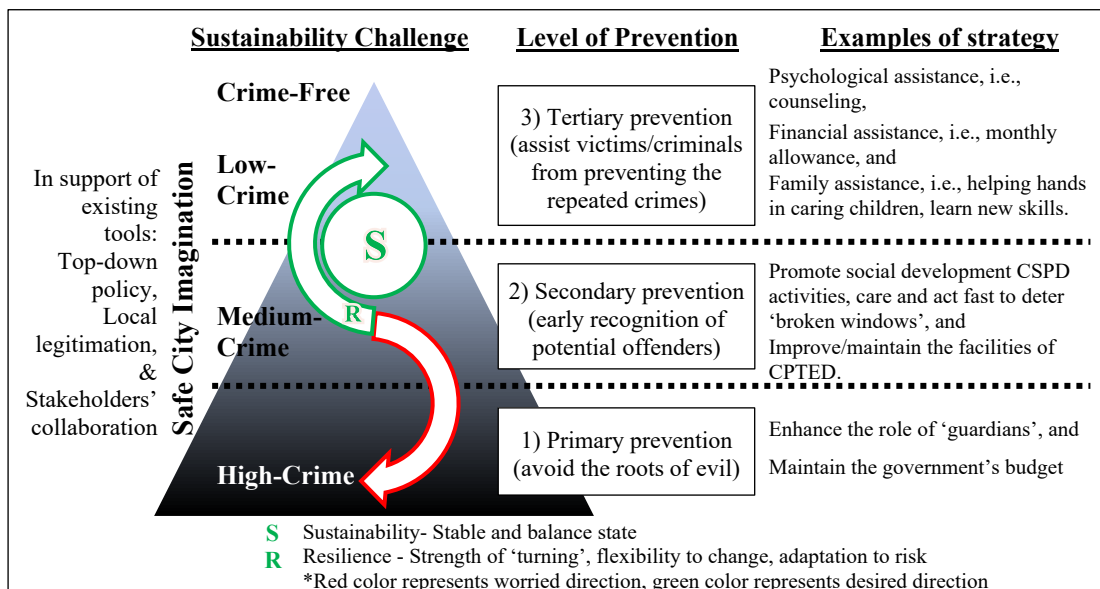


Figure 5: The framework of challenges facing the Safe City Programme in Malaysia

Based on the utopian safe city imagination, the existing city could be divided into a high-crime rate, medium-crime rate, low-crime rate, and utopian state of a crime-free city. In applying the safe city programme to achieve such conditions, the “sustainability” paradigm serves as the background challenge and “resilience” as the inner strength of “turning” and adaptation to risk (such as criminal acts). These “bounce back” ability challenges could be further detailed into three levels of crime prevention, namely primary, secondary, and tertiary levels (see Dobovšek, 2009). The primary and secondary levels of prevention are referred to as avoiding the roots of evil and early recognition of potential offenders. Insights from the informants showed that these two levels are implemented at acceptable levels. However, the gaps and most pressing challenges being faced now are on the tertiary level of prevention namely providing family, financial, and psychological counselling assistance, which is to

assist victims or criminals in preventing them from repeating their crimes in the future. Examples of the challenges turned strategies are drawn from the interview codes. With such synthesis in the minds of all the stakeholders, the challenges faced by the safe city programme will be put in a better perspective, thus making it easier to be improved.

CONCLUSION

This paper has contributed to assess the local players' views and the development of a framework on the challenges facing the safe city programme in KL. This developed framework provides an overview of the safe city tools, imagination, challenges, and levels of prevention. It may be applied in other urban areas in Malaysia. This is considered as a new insight for all the stakeholders to comprehend and practice. However, this study has some limitations. The informants' views are subjective and could be biased; thus, further quantitative studies are recommended to test the syntheses formed in this study. Finally, the lesson learnt from this study is that the assistance in family, financial, and psychological aspects of victims or criminals should be strengthened in ensuring the sustainability and resiliency of the safe city programmes.

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THE IMPACT OF PHYSICAL FEATURES AND ENVIRONMENT ON CRIME IN URBAN NEIGHBOURHOOD AREAS

Fazzami Othman¹, Zaharah Mohd Yusoff², Siti Aekbal Salleh³

*^{1,2,3} Faculty of Architecture, Planning and Surveying
UNIVERSITI TEKNOLOGI MARA (UiTM)*

Abstract

The physical design of features and environment will stimulate a safe and sustainable development of the neighbourhood. Despite possessing a proper form, a private space which does not control and keep could even raise fear and crime incident. Therefore, this study planned to analyse the fear, perception and potential feature that caused the crime event in neighbourhoods. Three years of burglary data got from the Royal Malaysia Police helped to explain the crime trend and pattern. Besides, a statistical analysis conducted to examine the fear level and perception towards crime incident using a set of questionnaires. Next, the potential features and visibility level examined in the unit of a house that has experienced the burglary event. The purpose is to find any element that can affect crime event. Results prove that actual crime data not associated with fear and perception of the crime. Besides, accessibility, visibility and crime pattern were the key elements to consider for crime prevention.

Keywords: Environmental design, fear of crime, security, urban space

¹ PhD candidate at UiTM. Email: fazzamiothman@gmail.com

INTRODUCTION

Security and urban design are connecting to form a sustainable and safe city. The outrageous demand of resident to settle in a safe place leaves to several initiatives by Malaysia's government to satisfy. In advance, a safe city program set up to promote public safety by enforcing a strategy of crime prevention through environmental design. The idea is to prevent and reduce the fear of crime from the practical design of the physical environment. Besides, it also rises with the quality of life and reduction of cost. According to Cozens and Love (2015), the efficiency of design by completing natural strategies can reduce costs and resources compared to the management and mechanical approaches to security. Through efficient design, safety can build up for recent development. This approach has put natural surveillance and visibility to form a splendid view from various angles, thus lessening the opportunity of a crime event. Space with reduced clarity and promotes obstruction can affect to the rising level of fear.

There is often a mismatch between levels of crime and the fear of turning into a victim of crime. A place might show an increase in crime and sometimes an odd level of the crime rate. The problem is that fear of crime persists unchanged, even though the crime rate is low. Fear of crime contributes to those who are more prosperous to defend themselves and their property. It depends on many factors, perhaps the most obvious being an actual crime. At a micro-level, it thought people who experience crime also encounter more fear and, at a macro-level, that location which has been a place for criminal activity also acknowledged being less secure and could be a potentiality of a repeated event. Previous analysis of the fear of crime has already shown significant outcomes. For instances, women and older people saw more insecure, poor people direct to turning into a victim, and that knowing some familiarity with the area felt more safe than unfamiliar.

The purpose of this study was to analyse the fear and perception with the environment factors towards crime in two case study in the public place. Several objectives set up to fulfil the study aim, such as, to analyse the crime trend and pattern in both neighbourhoods, to identify the fear level and perception towards crime event in the neighbourhood, and to examine the potential features and measure the visibility level that can affect burglary event. A set of questionnaire and site inventory produced based on several aspects include offence-specific fears, expected risk of victimisation, and preventive crime measure.

RESEARCH BACKGROUND

Designing a proper layout believed in cutting fear of crime. Any space with high visualisation and natural surveillance can raise a confidence level to survive. Public space needs to maximise visibility and natural surveillance for limiting the crime event. The statement emphasised in crime prevention through

environmental design (CPTED) while utilising it as one of the major components. The CPTED formed in the early 1970s as a response to an increase in crime and fear in urban areas (Marzbali, 2019). With extending the quality of the environment and life, CPTED based on design and physical environment that understand affecting human behaviour. It is a multidisciplinary approach to deterring criminal behaviour that concentrates on how space has placed, how it looks and feel. Several cities have applied to the concept of CPTED such as New York, Glasgow, Adelaide, Melbourne, Seoul and Singapore; and it has convinced to weaken the crime rate (JPBD, 2014).

Burglary and street crime in an area of South Los Angeles have shown a downer when thousands of people show up to the farmer market. According to Ryan (2014), CPTED works well in reduction by increasing the movement using a fence opening and public art in a crime hot spot. The purpose is to develop natural surveillance on open space, therefore reducing the opportunity of crime events. Consistent research on urban space against crime has conducted by several researchers (Piza et al., 2019; Kim et al., 2019; Rosser et al., 2017). The study utilised the principle of CPTED to diagnose the effectiveness of crime prevention and reduction. As a result, the visibility of space reduces the crime rate and fear of crime. Besides, an obscure vision of the surrounding area serves to a false interpretation of potential criminal; thus, stimulates the secure opportunity of being a victim. According to Patterson (2016), the barriers and access in the layout should control and maintain to avoid any disrupting phenomenon referred to the crime. The best way is to produce a visible space by encouraging natural surveillance. Likewise, in Malaysia, CPTED implementation guideline is one initiative taken by Town and Country Planning Peninsular Malaysia (PLANMalaysia) to control the layout design. Apart from encouraging an active social movement throughout the public space, this initiative also emphasises several development components, including layout design, by providing clear, maximised and unobstructed view of the area at short and long-distance. Massive pillars, fences that are not transparent, maintained shrubs and other obstacles in public space can create hideouts for criminals to threaten the public.

According to Summers and Johnson (2017), any potential movement, people, and space are one of the configuration characteristics related to the crime occurrence. The reason is that any enclosed space could remain a place for criminals to execute a crime so-called an opportunity. As asserted by Lis et al. (2019), walking with greater visibility, no hiding place and more accessibility in a public area perceived as less dangerous, less opportunity and more preferred. The findings suggest that the landscape have to shape, so it does not provide any place to hide, therefore feel safe. People wish to see and know what happens on in their environment. Physical feature and environment such as vegetation, building design and orientation, potential features (stairs, utility poles, trees or

grilles) may influence the visibility and increases opportunity. For example, with burglary, the chance to carry out crime exposed when there is easy access to entry at the back lane. Any potential features that located nearer to the dwelling can encourage criminal activity.

A study by Lee and Ha (2016), which identified the effect of visibility on fear of crime within elementary schools, urged capturing and consider the curvature of the surface, on the natural environment and human-made. The angle and distance of visibility are the essential elements that influenced the fear among student. A spotted area with many hiding places raises the fear level of most children in school. Besides, visibility associated fear of crime on human behaviours. The finding supported by Schroeder et al. (2015), where building height, facade or as the change in the surface's topography, would allow researchers to more significant in the study of urban space. It is because any curvature in design could limit the human visual, thus tricky to offer an unobstructed view either from or toward nodes of location. Besides, there is a long tradition of addressing crime in problem areas by removing vegetation for a better view of surveillance. Though, the landscape facilitates crime because it can hide the sight from view. This finding, supported by Du and law (2016), suggested that the tree canopy and crime index has correlated in waterloo, USA. As mention, most of the study agreed to promote the idea where excellent visibility increases the safety level and reduce the fear of crime, in the public area.

Crime events are more likely to happen when there is a suitable target, predicted the temporal activity of people, spatial and temporal confluence of motivated offenders and targets, along with no capable guardians (Bruinsma & Johnson, 2018). The travel patterns and routine activity on weekdays vary compared to the weekend (Brantingham & Brantingham, 2017). Previous research also shows crime concentrates in unique places on weekdays and weekends (Malleon & Andresen, 2015; Ceccato & Uittenbogaard, 2014). However, the studies proposed that several elements, such as land used, routine activity, and layout design, could be the cause. The sensible of a crime event have to match the actual crime data. The reason is that any potential of criminal opportunity is growing from the mismatch somehow produced the fear of crime.

RESEARCH METHOD

Scope of the Study

This study focuses on the relationship between fear and perception with the environment factors towards crime. The widespread distribution of burglary and varied property crime rate in the neighbourhood has led to considering the social aspect of perception and preventives action taken. Several elements discussed in literature adopted for the conceptual design of this study, as illustrated in Figure 1. It is essential to distinctions and organises the flow of work, so that achieved the aim. Primary elements such as criminal and target, the impact of the physical

environment and urban neighbourhood; clarified in the earlier study used to find the potential caused of fear towards crime. The relationship between these principles has delivered to several components that need to analyse.

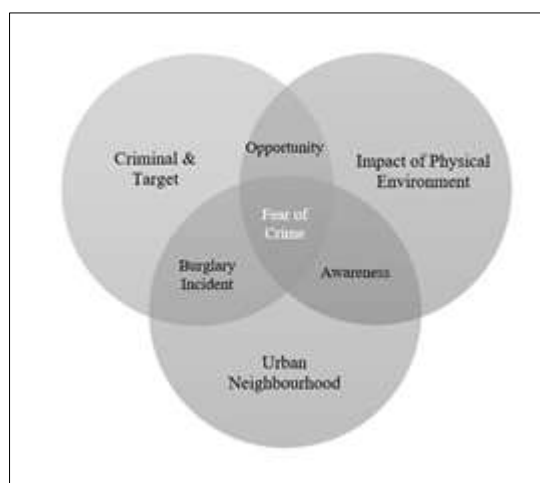


Figure 1: The conceptual design of the study

Several elements have examined by the inventory based on the profile, accessibility (to enter the house) and visibility of home. The inventory focused on the house that experienced the burglary event with an emphasis on the opportunity formed from the environment factor. The criteria of accessibilities, visibility, potential features and preventive measure verified on-site, based on the CPTED implementation guideline by PLAN Malaysia. Also, this study conducted a questionnaire survey for the evaluation of fear towards crime in each neighbourhood. The study reviewed the assessment based on the several aspects such as respondent background, security aspect, fear of being a victim, the comfort of the house, quality of life and security of the house. It then analyses crime data in the resident neighbourhood referred to the perception and fear of crime.

Case Study

Property crime considered being high risk in Malaysia while Kuala Lumpur reported the highest crime density based on the population. Fast development has raised the crime rate in a particular area in Damansara-Petaling municipal. Because of the top crime event on burglary, this study selected Taman Gembira and Taman OUG as a case study area. Burglary recorded 140 cases during three consecutive years of 2015 to 2017 in both neighbourhoods. The number does not cover the other crime which has stated in the same period—estimated around 4,000 households in compromise to be a victim if these criminal issues are yet in

doubt to prevent. Besides an occupied area, with placed and surrounded in by strategic land use, this neighbourhood gave better and outrageous demand for housing development. Figure 2 pictures the view of the study area in the Google satellite image.



Figure 2: The case study area at the Petaling municipality of Kuala Lumpur
Source: Google (2020)

Questionnaire Survey and Housing Inventory

Based on the Department of Statistic Malaysia, during 2019 the average household size in Malaysia recorded as 4.0. It is the multiple numbers used to calculate the sampling based on the verified housing unit. This study chose an equal amount of sampling based on probability sampling method, with 383 respondents recorded from Taman OUG and 369 from Taman Gembira. The on-ground questionnaire survey carried out amid 2019. A sequent number of questions asked based on the questionnaire form design in the cloud. According to Shamsudin et al. (2013), this technique is the overt way to measure the level of thinking, behaviour, emotions and individual behaviour. The actual fear of respondent towards the security and environment expressed by asking about what they feel, think, do and done, then complement to the purpose of this questionnaire survey. In specific, the study conducted to collect and understand the fear of being a victim in their neighbourhood. The sample covered both male and female, with various age groups and socio-economic background.

Besides, housing inventory has operated to investigate the potential cause of burglary event. Based on the burglary dataset that has gained from the

Royal Malaysia Police (RMP), 81 cases reported in Taman OUG while 60 cases in Taman Gembira. The burglary occurred in 85% on terrace houses from 2015 to 2017. Among the affected homes, around 76% (92 nos) of them chosen as an inventory, which carried out alongside a questionnaire survey. The sampling calculation based on $p = .05$ where the probability of committing a type I error is less than 5%, or $p < .05$. Purpose of the inventory is to explore and identify the potential feature that can cause an opportunity for the criminal to enter. Inventory form designed based on the respondents' perception and to comply with CPTED implementation guideline which focused on accessibility, visibility and security.

Method of Analysis and Interpretation

This study analysed the data using the frequencies, Pearson's chi-squared test, and cross-tabulation to investigate the level of fear, security and perception on crime. Besides, multi-response test of regression has used to determine the effectiveness of CPTED. The purpose is to understand the resident's perception of the actual crime event in their neighbourhood area. It also examines the relationship between visibility level with the environment factors towards crime. Meanwhile, the quantitative analysis conducted using the statistical test of descriptive because of the numeric and the data associated with accuracy.

THE RESULT AND FINDINGS

This study has started with connecting the respondent questionnaire and burglary data in hourly duration. The perception of burglary, event and level of fear was underlying data belief for analysing the respondent's perception in this study. Based on the result, midnight hours influenced most of the respondents' perception of the safety level in the neighbourhood. As stated in Table 1, 77% of respondent in Taman Gembira consider the higher risk of burglary arises from 1 am to 5 am. In contrast, most of the respondent feel safe during the evening when only 2% presume the burglary event to take action. This pattern was showing the same as the respondent in Taman OUG, where only 3% proposes the same result. Besides, 82% of respondent showed the burglary took action during midnight. Based on the crime data gained from RMP, most of the burglary event took place from 0800 to 1000 and late evening of 1800 to 2200. However, the figure produces a declined burglary rate during midnight for each neighbourhood, as shown in Figure 3.

Table 1: The expected interval of burglary event based on respondents' perception

Expected Duration	Taman Gembira	Percentage (%)	Taman OUG	Percentage (%)	Total
6 am to 10 am	44	12	31	8	75
11 am to 3 pm	4	1	11	3	15
4 pm to 8 pm	4	1	0	0	4
9 pm to 12 am	33	9	27	7	60
1 am to 5 am	284	77	314	82	598
Total	369	100	383	100	752

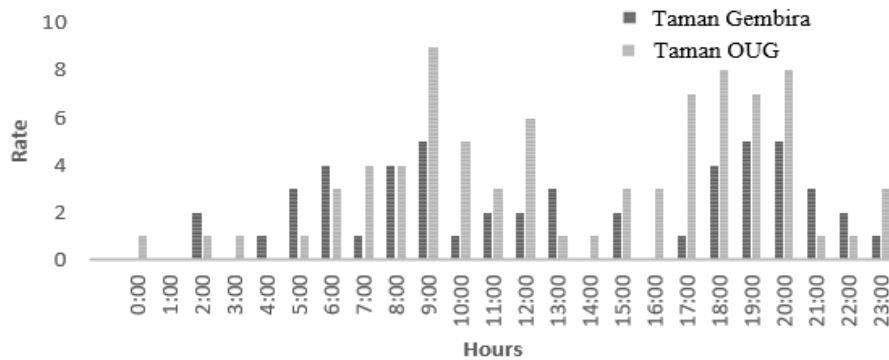


Figure 3: Hourly incidents of burglary for Taman Gembira (A) and Taman OUG (B)
Source: Royal Malaysia Police (2018)

Based on the hourly event of a burglary, there is an explicit assumption that the incident is taking place when there are no people inside the house. As the routine activity, people are working during the day while living at home during midnight. The offender intended to operate with no disruption and harmful them too. It supported by a statement released by Town and Country Planning of Peninsular Malaysia (PLANMalaysia) in a social medium through sources from Royal Malaysia Police, where the crime rate, including the residential burglary, has dropped during the Movement Control Order (MCO). There are 127 cases, recorded, dropped 68% from a usual total average of 395 cases (many crimes) per day. The dropped can explain the declination through some theories of the safe city such as rational choice, routine activity, and lifestyle approaches. Based on the crime concept, criminal select the potential target before any action made. Besides, from a criminal perspective, on getting a return, there is a higher risk of escaping and requires more effort to commit the crime. Criminal, also tricky to observe the potential target, as people have changed their forms of living by staying at home.

Despite having shown the same pattern in both neighbourhoods, but the respondent's perception towards actual burglary data, as shown in Figure 3, is wrong. The other elements that influence the wrong perception may nurture the fear level of the respondent. Thus, this study prepared scale level questions of fear figuring a better visualisation of the wrong perception towards a regular event and how safe they feel to live in that area. Based on the outcome, all respondent feels worried if the house has broken in within the next 12 months (Table 2). They show it that the burglary has influenced the level of fear across a unique background of people. It is because burglary not only affects the economy but can also disturb life.

Table 2: Level of Fear towards burglary event

Fear of Crime	Number of respondents				
	(1 = worried/unsafe; 5 = calm/safe)				
	1	2	3	4	5
Worried on having broken in within the next 12 months	744 (99%)	8 (1%)	nils	nils	nils
Worried when stranger approaching the house	301 (40%)	210 (28%)	158 (21%)	68 (9%)	15 (2%)
Feel safe when entering the house	60 (8%)	286 (38%)	353 (47%)	53 (7%)	Nil
Feel Safe staying alone	158 (21%)	263 (35%)	331 (44%)	nils	nils
Feel Safe staying during the day	38 (5%)	579 (77%)	98 (13%)	30 (4%)	8 (1%)
Feel Safe staying during the night	30 (4%)	83 (11%)	519 (69%)	120 (16%)	nils

Nowadays, people concerned if a stranger is approaching the house. As shown in Table 2, it affected the respondent feeling in both neighbourhoods, where 40% seem worried, followed by 28% of less worried and 21%, which is not either worried or calm. The scale indicators also used to determine the fear level either inside or outside of their occupied unit house. Based on the result, most of the respondent in both study area is feeling secure during at home, either staying alone or access in and out; however, period change (day and night) affects their level of fear. As shown in Table 2, almost 81% of respondent feel safe when staying during the day while 15% during the night. This result shows a solid pattern towards the perception of burglary event early. Perhaps, the mild and deeper environment during the night, which limit the viewpoint, caused the increase of fear level and caused to the incorrect perception against regular burglary cases.

The physical design of the environment may influence the fear of crime or the crime rate. In this study, the housing inventory executed on both neighbourhood areas with an emphasis on the affected units that have experienced burglary events. The purpose is to have the design's information thought to change the crime distribution. The inventory was prepared based on crime prevention through environmental design (CPTED) implementation guideline. Several prevention elements in CPTED implementation guideline that assigned to the housing unit got for the inventory test. The strategies are to investigate the incorporated element of surveillance, such as natural and mechanical surveillance. Natural surveillance facilitated through the design of space, provision of landscape, and housing orientation included window and doors. Besides, mechanical surveillance facilitated through the use of electronic and mechanical equipment such as lighting, CCTV, burglar alarm, and others. The inventory started by reviewing the mechanical surveillance and preventive measure applied to each unit of houses which had an experienced to the criminal event. The purpose is to examine the perception level by considering the initiatives taken to prevent burglary or any crime event. In CPTED, it encourages the security device to provide area or place without possible visualise space, a potential existing area that threatened to crime, and any entrapments area. Based on the result, as shown in Figure 4, at least one mechanical surveillance and preventive measure apply to each unit of the house as an effort to limiting the criminal event.

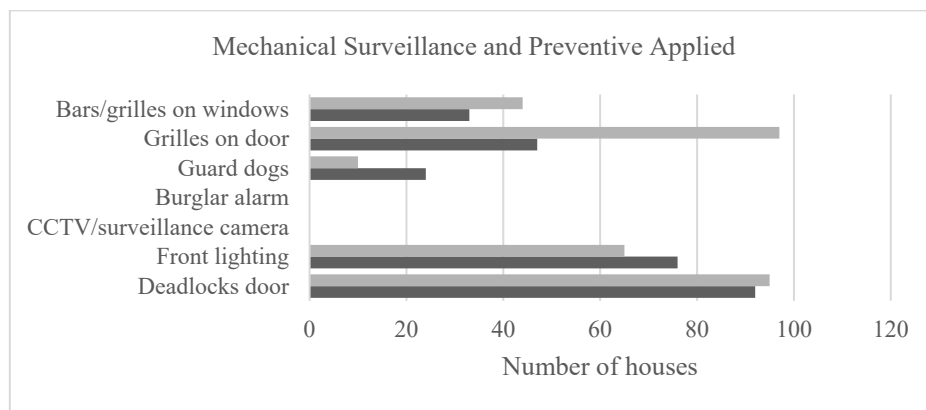


Figure 4: Mechanical surveillance and preventive applied in both neighbourhoods

Most of the housing units in both neighbourhoods provided deadlocks door and front lighting while Taman OUG more likely used grilles on the door as a protective measure compared to Taman Gembira. Also, 97 units have applied the additional preventive measure by a door's grilles for easy installation and higher security as entry-hardening. For the lighting, 70% of the unit has equipped,

while some depend on the street-lighting. The most affected target-hardening such as CCTV and burglar alarm not implemented as the household background is a middle-income earner. The cost of installation and maintenance, the reason for not being installed. There are yet lacks mechanical surveillance served by each unit. As shown, only half from the affected unit on both neighbourhoods applied bars or grilles on windows. Apart from doors, windows too could be the primary access for the criminal to infiltrate. It is a component made with an easy broken, breaks, and secure entry when the elevation allowed a criminal to pass over.

For the best crime prevention, mechanical and natural surveillance implemented in an integrated manner, with priority given to the natural surveillance at the early stage of environmental design to reduce the costs of rehabilitation of the area. Any space should be bright and avoid any entrapment area for crime prevention. It comprised the visibility and design of fence, wall, landscape and housing orientation. Any fencing and wall design should be transparent and caused challenging to mount so it can stimulate natural surveillance and defensible space. People can spot any suspicious movement if it is an access of a judge from the outside. It also enjoyed monitoring the neighbouring area if there is no entrapment space. Based on the findings, as revealed in Table 3, 60% of the house affected by crime before have a very transparent fence, while 20% is clear with little concealed. Besides, almost 20% show poor visibility with partially concealed. Higher visibility of fence not based on the transparency of design only but also height above the ground. The units comprise 40% fence with a height exceeding 5ft. Based on the CPTED implementation guide, any fence should design with not exceeding the limit (5 feet). The reason is to increase the visibility from different sightline to simplify monitoring and viewing by neighbour or residents. Reduced visibility of the fence could block any view of suspicious activity. A criminal can enter and have time to break either door or windows with no difficulty from the outside.

The visibility scale used on fence applied on the inventory's scale of the existent landscape to measures the quality of the view from the outside. As a result, over 43% of the involved unit has a highly transparent look, while 27% showed as transparent. Another 29% of units have shown the visibility with appearing gloomy, partially concealed, and heavily landscaped. In crime prevention, any element of the soft and hard landscape provided must not obscure the sightline. Comply with the guideline of the National Landscape Department; the suggested minimum height of smaller branches should be 2.0 meter (6ft) above ground. Besides, any small plant (shrub) should not be higher than 0.9 meters (3ft). The landscape which self-prepared inside the home and high dense with neglecting the guideline would also minimise the sightline thus risk bringing into a target.

Table 3: The element of visibility on each house

Housing Orientation		Quality of view from the outside (landscape)	
Facing each other	57 (50%)	Very transparent	49 (43%)
Facing detached/semi-Detached	17 (15%)	Transparent	31 (27%)
Facing open space	20 (18%)	Low-transparent	23 (20%)
Facing building side	19 (17%)	Opaque	10 (9%)
Total	113 (100%)	Total	113 (100%)

Fence Height		Fence Transparency	
Height exceeding 5ft	45 (40%)	Very transparent	68 (60%)
		Transparent	23 (20%)
Height lower than 5ft	68 (60%)	Low-transparent	11 (10%)
		Opaque	11 (10%)
Total	113 (100%)	Total	113 (100%)

The subsequent inventory carried out to identify the degree of inter-visibility based on the orientation of houses (Table 3). In this research, the gate entrance of the housing unit that is dealing with other considers having good inter-visibility while facing the open space and building side expected to have a low risk of crime. It is an approach to reducing the criminal's confidence to commit a crime when there are high monitoring and surveillance. Therefore, the orientation of the building can create housing to visualise. In crime prevention, any building design should provide space that is open, unhidden and with high visibility. The reason is the orientation of the building considered facilitating natural control and surveillance of the public (street user). People can identify any unusual circumstance in the territory while monitoring in many angles. Even though facing each other can aid the dweller by monitoring and surveillance, but the result shows contradiction. Based on the inventory, 65% of the affected houses placed facing each other while 35% dealing with open space and building side.

The disparities of findings should also consider the actual crime pattern. As to confirm, most of the crime event took part when there are low people available at home because of daily routine activity. The lack of people in the neighbourhood would lower the potential of monitoring, even if the housing comprises proper monitoring and surveillance system. Therefore, higher surveillance and visibility in building orientation is ineffective if the burglary activity took over when there are low numbers of people in the neighbourhood area.

Housing with higher visibility looks unsafe in these two neighbourhoods. It has not aligned with a CPTED proposition that crime can prevent with excellent visibility. However, a distinct crime and behaviour is something that needs to consider when studying crime and environmental design. As shown in the next analysis, most of the houses that comprise higher-visibility provide a high preventive measure, as shown in Table 4. In the analysis, the housing is allocating into a distinct group of visibility level. Any unit of the house which recorded fewer than 50% of visibility is considering low, while over 50% is high. Besides, based on the inventory, 30% of burglary happened at the low visibility of the house comprises low transparency, opaque and not facing each other (natural surveillance). This analysis used a statistical correlation to identify the substantial correlation between both variables (visibility and preventive measure). As a result, most of the units in Taman Gembira, which comprise high visibility having more initiative to increase the safety level by applied higher security on the primary access such as the deadlocks and grilles on the door.

Table 4: Security measures taken for crime prevention

Preventive Measures	Taman Gembira			Taman OUG		
	Total Available	Visibility Level		Total Available	Visibility Level	
		High	Low		High	Low
Deadlocks door	47	33	14	59	42	17
Front lighting	39	19	20	40	37	13
CCTV/surveillance camera	0	0	0	0	0	0
Burglar alarm	0	0	0	0	0	0
Guard dogs	12	2	10	6	2	4
Grilles on door	47	40	7	60	51	9
Bars/grilles on windows	33	15	18	27	13	14

Besides, in Taman OUG, the same preventive measure taken for high visibility in Taman Gembira, including the front lighting. In distinction, the

security measure chosen by the low visibility unit in Taman Gembira was the front lighting to enhance the visibility during midnight. Other than that, grilles on windows, deadlocks door and guard dogs were the various actions had for crime prevention. In Taman OUG, deadlocks door, grilles on the window and front lighting were the prevention actions that have applied while some seen to applied guard dogs and grilles on the door. Based on the statistical relationship between visibility and preventive measures taken, both Taman Gembira and Taman OUG shows a significant relationship with $R^2 = 0.88$, and $R^2 = 0.95$. In contrast, the variable test for the low visible unit and preventive measure registered value of $R^2 = 0.51$, and $R^2 = 0.68$ (Figure 5). To understand, most of the house comprise higher-visibility recorded more burglary incident; thus, taking more preventive measure for crime reduction.

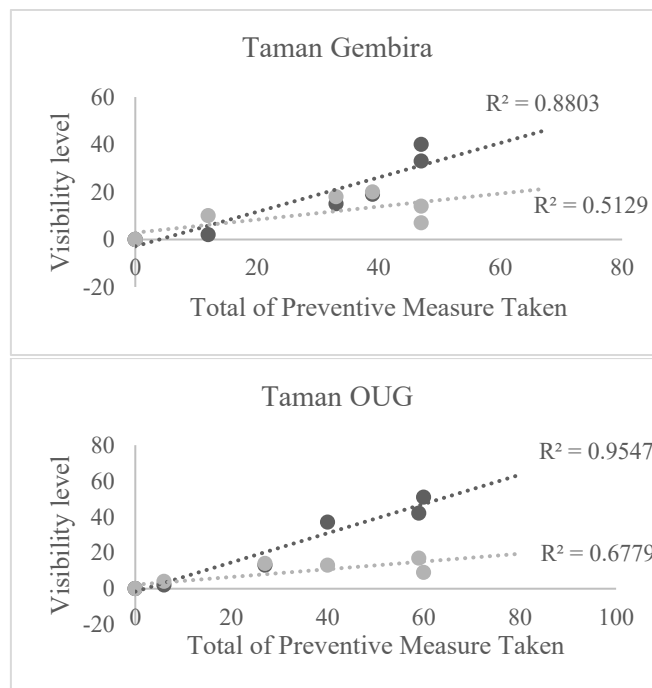


Figure 5: Relationship between visibility and preventive measure taken

Accessibility could be one component that can influence the burglary event in the neighbourhood. It would provide the opportunity for the criminals to break into the house if that feature went on with no consideration. Some potential feature found at the neighbouring dwelling such as stairs, utility poles, fence and trees. Criminal can use these tools that facilitate the criminal to produce illegal activity. In this study, as measured to both neighbourhood, most of the affected

house comprised stairs at the back lane (Figure 6). They created the features for usable at the back lane. Almost 39% unit of the house at Taman Gembira showed at least one stair, while 62% at Taman OUG (Table 5).

Table 5: Identification of features that invite crime

Potential Features	Taman Gembira	Taman OUG	Total
Stairs	20 (39%)	34 (62%)	54
Utility Poles	8 (16%)	13 (23%)	21
Trees	4 (8%)	1 (2%)	5
Grilles	19 (37%)	7 (13%)	26
Total	51	55	106

Other than that, grilles recorded many at Taman Gembira with 37% recorded compared to Taman OUG with 13%. As expected, this feature also identifies at the back lane where it attached to window and door at the back. Even though grilles help to enhance safety and prevention, somehow, that feature can use as a climbing tool to go on to the second floors (with the multi-storey house). When both features can extract by itself, one thing that places permanently is utility poles. Besides, utility poles (telecommunication poles) found at the back and side of the house (Figure 6). If the feature spotted with some distance, thus the opportunity would deteriorate. Besides, 8% of the affected unit in Taman Gembira comprise potential elements of trees while only 2% at Taman OUG. Almost 77 stairs and utility poles identified on the affected unit of a house in both neighbourhood areas. Most of the potential features that perform as an opportunity for criminal can discover at the back lane.



Figure 6: Stairs and utility poles become a tool for criminals to break into houses

CONCLUSION

This study has shown a level of fear and relationship between actual crime event with environmental design. The respondents' level of fear that changing over the period has supported the data released by the Australian Capital Territory, where the pattern of crime was a regular peak in the early morning and recorded low during midnight (Felson & Boba, 2010). Perhaps, the mild and deeper environment during the night, which limit the viewpoint, caused the increase of fear level and wrong perception against actual burglary data. The environment factors and mechanical prevention used could influence the level of fear and crime prevention. At least one mechanical surveillance and preventive measure applied to each house as an effort for crime prevention. The initiatives taken bring assumptions that they still fear for repeating as a victim.

In this study, the house with more transparency still affected by high burglary event. This finding reinforces the study by Piza (2019), Kim (2019), and Rosser (2017), which propose the visibility of space influenced the crime rate and fear of crime. As a result, it recommends considering the crime pattern that relates to routine activity when higher visibility is insufficient to prevent the burglary event. The higher crime events happened when there is a low number of people. It caused low monitoring even though higher-visibility comprises to each house. Another feature that can increase burglary incidents is the component of accessibility. Any potential features would present the opportunity for the criminals to break into the house. The study shows that stairs and utility poles at the back lane were the most likely feature that impressed crime in both neighbourhood areas. Thus, well controls and maintain that area by the owner and neighbourhood can reduce the rate and fear of crime. Perhaps, restrict access

at the back lane, and side lanes with the installation of the temporary bollards and CCTV can monitor the entrance.

In consequence, fear of crime and perception of risk from being a victim was essential to explore before any micro-level study on crime prevention conducted. In terms of social prevention of property crime, people should have an awareness of the crime pattern in the neighbourhood. No discrepancy between the fear and actual crime pattern, so that the reasonable opportunity to crime reduced. Enhance and controls the potential accessibility, avoid any upgraded features that could reduce the visibility and installing target-hardening was the perfect prevention in the brief terms. It applies to analyses the risk of a neighbourhood with consideration of safety to hold sustainable development. Thus, this research can help as a preliminary study towards better layout design.

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MODERATING EFFECT OF SERVICE QUALITY ON PUBLIC TRANSPORT TRAVEL BEHAVIOUR AND ANTECEDENTS

**Rohana Ngah¹, Lennora Putit², Azmi Mat³, Jamalunlaili Abdullah⁴,
Rohayu Ab Majid⁵**

*^{1,2,3,4,5}Faculty of Business and Management,
UNIVERSITI TEKNOLOGI MARA (UiTM)*

Abstract

Public transport infrastructure has been massively developed to encourage public transport usage in Kuala Lumpur. However, a low percentage of public transport ridership dampens the objectives to reduce traffic congestion and air pollution. This paper attempts to investigate the effect of travel intention and the moderating effect of general service quality of public transport on travel behaviour among commuters in Kuala Lumpur. A survey was carried out at LRT stations, and a total of 904 were usable. Most of the respondents are young adults between 20-29 years old, and the majority earned less than RM3,000 a month. Most of them possess a vehicle and driving license. Findings showed that travel intention has a significant effect on travel behaviour. Interestingly, service quality, in general, weakly moderates the relationship between travel intention and travel behaviour in a reverse direction. The findings would help relevant authorities to set strategies to encourage more private riders further to switch to public transport.

Keywords: Public transport, travel intention, travel behaviour, service quality

¹ Assoc. Professor at FBM, UiTM. E-mail: rohanangah@uitm.edu.my

INTRODUCTION

Transportation is a vital driver of cities' development by providing safe, efficient, and reliable transportation for people, goods, and services (Tai et al. 2016; Choi & Loh, 2013). When the population of urban cities increases rapidly, traffic problems in metropolitan areas such as lack of space and congestion, and poor air quality, also increase (Zhang and Baterman, 2014). Public transportation becomes a necessity to reduce traffic congestion, increase productivity, and reduce carbon emissions. Public transport is essential for people's movement and mobility (Mat et al., 2019). This situation expanded the need for motorized travel, thus increasing the travel demand. Despite a massive public transport infrastructure development have been carried out in Kuala Lumpur, however, the public transport ridership is only 20% (APAD, 2017; Gerber, 2018) compared to Singapore (50%) and Hong Kong (83%) (LTA, 2018). Few studies have been carried out on travel behaviour in Malaysia but still inconclusive. The application of the theory of planned behaviour posits that travel intention is an important precondition of travel behaviour (Ribeiro et al. 2017). Also, attitude and norming are a common predictor of intention. Many factors influence behavioural intentions and increase the probability that commuters will behave.

Meanwhile, urban transport development remains an important issue for public authorities as so assuring the service quality. For example, in the Malaysian context, public transport service is part of the underlying infrastructure and essential in the development of a country. Service quality is also one of the most important determinants of public travel demand (Polat, 2012). The increased relevance of end-users' needs and expectations is testified by the wealth of studies adopting a passenger's perspective when dealing with transit service quality issues (Eboli & Mazzulla, 2007). The authorities are responsible for transport policy and law providers for operators accountable for implementing it. Greater Kuala Lumpur has been given priority in public transport infrastructure development in Malaysia. This study aims to investigate the effect of travel intention and the moderating effect of general service quality of public transport on travel behaviour among commuters in Kuala Lumpur.

LITERATURE REVIEW

Over the past decade, extensive studies on assessments of public transport services have been well documented in much global literature. Most of these studies were aimed at providing explanations towards travel passengers' motives for travelling via different modes of transportation (Tri et al. 2016), improving users' satisfaction and becoming more market-oriented (Tri et al. 2016, Ari et al., 2014; Ji & Gao, 2010; Lai & Chen, 2011). In this study, the researchers attempt to examine the role of attitude, social norms and personal norms predictors in affecting passengers' travel behaviour. On the other hand, service quality is proposed to have a moderating effect on the relationship between these direct predictors and travel behaviour. Drawing from the Theory of Planned Behaviour

literature, this study discusses the predictive components of passengers' intention to use public transportation for travel purposes, followed by a discussion on service quality and its moderating influence on such behaviour.

TRAVEL BEHAVIOUR

Travel behaviour is a decision-making process of commuters in choosing their preferences for transportation (Arroyo et al., 2020). In understanding the commuters' choice of transport, travel behaviour has been used widely in transportation studies. Also, personal characteristics, social interaction, environment, and habits have shown a positive effect on commuters (Liang et al. 2018).

THEORY OF PLANNED BEHAVIOUR

Theory of Planned Behaviour (TPB) (Ajzen, 1985; 1991) was developed following an extension of the socio-psychological Theory of Reasoned Action or TRA (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) as a result of the original model's limitations in dealing with behaviours over which people have incomplete volitional control. According to TPB, both attitudes toward behaviour (Act) and subjective norms (SN) are immediate determinants of intention to perform the behaviour. The TPB further proposes that the intention to perform a behaviour is the direct cause of such behaviour. It represents motivational components, that is, the extent to which a person will exercise conscious effort in carrying out any intended behavioural actions.

In capturing non-volitional aspects of behaviour, the Theory of Planned Behaviour incorporates an additional variable that is not typically associated with traditional attitude-behavioural model (e.g., Fishbein & Ajzen, 1975). Specifically, it proposes that perceived behavioural control (PBC), in conjunction with attitude and subjective norms, is a direct predictor of behavioural intention. The TPB offers an excellent framework to explain mobility behaviour, to which it contains the central predictors to explain mobility behaviour. Also, the TPB is open to the inclusion of additional predictors to increase its predictive power (Madha et al. 2014) such as travel behavioural intention, attitude, social norm, and personal norm, and these are often examined (Martin et al., 2017; Ribeiro et al. 2017).

Attitude is a reflection of one's evaluation of performing any intended action (Ajzen, 2005). Attitude is the likelihood that a person will react with a particular response to a particular situation (Kim & Kwon, 2018). Shen et al. (2019) state that attitude, an essential concept rooted in social psychology, refers to an inclination to the social environment (Shen et al. 2019). Attitudes are a positive predictor of intentions to use public transportation (Şimşekoğlu et al. 2015).

Social and personal norms have been used widely in explaining intentions to choose eco-friendly travel options (Doran and Larsen, 2016). Under TPB, subjective norms (social norms) and personal norms significantly predicted the travel intention (Ajzen and Fishbein 2005).

BEHAVIOURAL INTENTION

Ajzen (1985, 1991) noted that behavioural intention is the cognitive representation of a person's readiness to perform a given behaviour, which is considered an immediate antecedent of actual behaviour. In the current context, the intention is broadly described as the passengers' propensity to adopt public transport travel behaviour within a progressive developing nation. It focuses on a one-dimensional behavioural intention: the tendency to use public transportation for travel purposes in terms of work or leisure. Travel intention has been widely discussed in recent literature. Travel intention describes how an individual is willing to adopt a behaviour (Rizky, 2017). Lai & Chen (2011) found that passengers' intentions to use public transport are partly determined by factors such as attitude social influences and service expectations. Other studies such as Araq & El Masry (2016), Zailani et al. (2016) and Simsekoglu et al. (2015) have also researched on the predictive nature of TPB and found significant effects of the psychological factors affecting travel intention.

MODERATING EFFECT OF SERVICE QUALITY

The French Association of Normalization defines service quality as a set of quality criteria and appropriate measures taken by public transport service providers (French Association of Normalization [FAN], 2002). The service quality of public transport relates to two levels of actors; the first level is authorities. The second level is service users that are the final customers (National Federation of Transport User Associations [NFTUA], 2013). As proposed by Gronroos (1984), the concept of service quality consists of two dimensions. Firstly, is technical quality, which reflects the levels of quality of delivery. Examples are the quality and effectiveness of transportation services for public transport. Secondly, a functional quality refers to how service is delivered, particularly the care and manners of the delivery personnel. In an attempt to achieve a high level of customer satisfaction, most researchers suggest that the service provider should deliver a high level of service quality as service quality is generally considered as an antecedent of customer satisfaction (Ona, Eboli & Forciniti, 2016; Elliot, Li & Choi, 2013). At the same time, service quality is also pertinent in ensuring that intention for a useful model of public transportation can be utilized by passengers effectively. In this study, perceived service quality is the evaluation of relational service (or customer services) and enabling service features (such as reliability, accessibility, fares, communication, comfort, safety,

and trip experience). Although service quality may have a significant impact on the propensity to use public transportation, it can be moderated by the fact that the passengers may not use it if the service provided is not found to be of their perceived expectations. Following the above, two main hypotheses are being developed and tested in this study. There are as follows:

H1: Travel Intention has a significant positive relationship to Travel Behaviour

H2: Service Quality significantly moderates the relationship between Travel Intention and Travel Behaviour

RESEARCH METHOD

Data collection was carried out through a face-to-face questionnaire survey at ten stations of Light-Rail Transport (LRT) in Kuala Lumpur. A total of 938 respondents have participated; however, only 904 responses were usable. The instruments of measurements were adapted from previous authors and studies (Javid et al. 2013; Lai and Chen, 2011). Table 1 shows a sample of items of instrument measurements. Partial least-square structural equation modelling (PLS-SEM) using the Smart PLS 3.0 software (Hair, Ringle & Sarstedt, 2017) was used to validate the measures developed and test the hypotheses. The analysis of the data is reported in two stages: measurement and structural model. The measurement model is to examine the relationship between latent variables using convergent validity and discriminant analysis. The structural model tests the inner model and the predictive relevance of the model and tests the hypotheses (Hair et al. 2017).

THE RESULTS AND FINDINGS

Females represented 53.6% of respondents. The majority are between 20-29 years old (61.7%), followed by below 20 years of age, 19%. Most of the respondents are single (78.2%), and only 19.4% are married. More than 50% of respondents possess a degree in terms of education level. The majority of respondents earn less than RM2999 a month (43.8%), and 54.4% spend less than RM200 a month for transportation costs. Tables 2 shown demographic profiling. In presenting the multivariate analysis results using PLS, two stages of analysis, measurement, and structural models were carried out:

Measurement Model

The measurement model or outer model presents the outer model results to examine the loadings, reliability, and validity of the measures used to represent each construct (Chin, 2010) and the approach of PLS threshold values as suggested by Hair, Ringle, and Sarstedt (2011). The outer loadings of each variable showed good loadings. Two items were deleted due to low loading (less

than 0.7); TA3 and PN2). As suggested by Hair et al. (2017), the factor loadings, composite reliability, and average variance extracted were used to assess convergence validity. The composite reliability values, as in Table 3, which depict the degree to which the construct indicators indicate the latent, exceeded the recommended value of 0.7 (Hair et al., 2010). The average variance extracted, which reflects the overall amount of variance in the indicators accounted for by the latent construct, exceeded the recommended value of 0.5 (Hair et al., 2011). Therefore, the measures of all the variables/constructs have proper levels of convergent validity. The heterotrait-monotrait ratio of correlations (HTMT) was used as it is proven to be robust in testing discriminant analysis (Henseler et al. (2015). Table 3 showed that all variables value is below 0.9; therefore, discriminant validity is established.

Table 1: Sample of Item of instrument measurement

Attitude	I like traveling by public transport Using public transport is convenient Using public transport is time-efficient
Social Norm	People who are important to me always encourage me to use public transport because it is safer/easier People who are important to me always encourage me to use public transport because it is cheaper People who are important to me always use public transport for their daily commuting trips
Personal Norm	Because of my values/principles, I feel an obligation to use public transportation for everyday trips I feel a responsibility to use public transport for every trip I feel morally responsible for contributing to the betterment of the urban environment and society
General Service Quality	The public transport services provide good network coverage The public transport services have operating hours convenient to all its customers The public transport services' staff attend to complaints efficiently The public transport services provide easy ticket purchasing system The public transport services offer updates and the latest public transport information Physical facilities at the public transport services are visually appealing and clean

Travel Behaviour	I like to travel by public transport because I can relax I want to travel by public transport because I feel safer from accident I like to travel by public transport because it is economical I prefer to travel using public transport to avoid traffic congestion
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Table 2: Demographic profiling

PROFILE N=904		FREQ	%
Gender	Female	484	53.6
	Male	420	46.4
Age	<20	172	19.0
	20-29	558	61.7
	30-39	109	12.1
	40-49	37	4.1
	50-59	21	2.3
	>60	7	.8
Marital Status	Single	707	78.2
	Married	175	19.4
Education	Others	22	2.4
	SPM/STPM	154	17.0
	Certificate/Diploma	217	24.0
	Degree	455	50.3
	Post-Grad	38	4.2
	Others	40	4.4
Employment status	Not Working	34	3.8
	Student	519	57.4
	Executive	120	13.3
	Manager	55	6.1
	Self-Employed	53	5.9
	Technical/labour Intensive	29	3.2
	Others	94	10.4
Income	Under RM2,999	273	43.8
	RM3,000-RM4,999	149	23.9
	RM5,000-RM9,999	128	20.5
	RM10,000-RM14,999	51	8.2
	Over RM15,000	22	3.5
Household Vehicle	Motorcycle	36	3.9
	Bicycle	150	16.6
	Cars	686	75.9

Table 3: Reliability and Discriminant Analysis

	CR	AVE	1	2	3	4
Attitude	0.864	0.760				
General Service Quality	0.958	0.657	0.751			
Personal Norms	0.879	0.645	0.966	0.704		
Social Norms	0.901	0.694	0.808	0.495	0.748	
Travel Behaviour	0.877	0.705	0.795	0.660	0.786	0.609

Structural Model

The structural model or inner model examines the hypothesized relationships among the constructs in the research model (Hair et al. 2017). A total of 47.7% of the variance (R^2) in travel behaviour showed a reliable predictive explanatory power of variance explained by antecedents of travel intention and general service quality of public transport, as shown in Figure 1. The general service quality significantly moderates the relationship between travel intention and travel behaviour, even though in a reverse direction. Travel intention has a significant effect on travel behaviour ($\beta = 0.460$ with a t-value of 12.491); therefore, H1 is supported. General Service quality has a significant impact on travel behaviour with path (β) coefficient of 0.263 and t-value of 7.611. The general service quality is significantly moderate the relationship between travel intention and travel behaviour, even though in a reverse direction ($\beta = -0.043$, $t=3.115$). Table 4 and Table 5 present the findings of the total effect and hypotheses of the study.

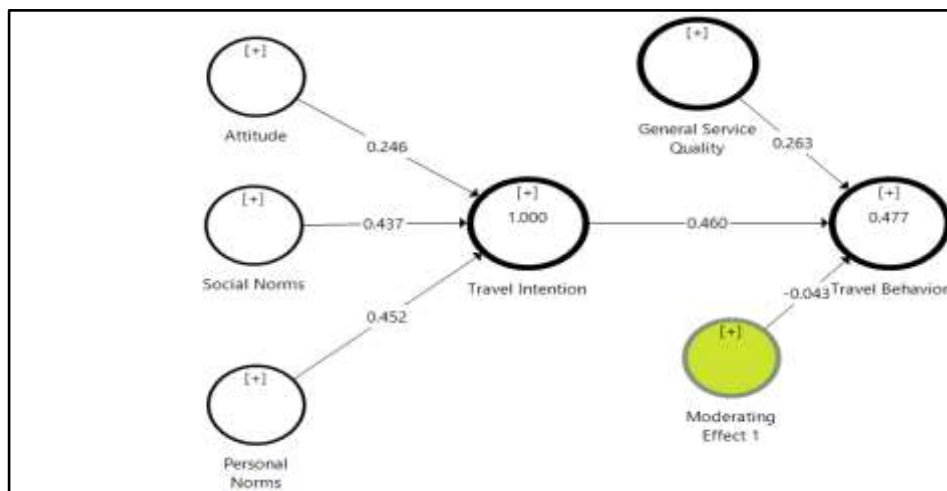


Figure 1: The Structural Model

Table 4: Total Effect

	β	SD	T-value	P
General Service Quality -> Travel Behaviour	0.263	0.035	7.611	0.000
Moderating Effect 1 -> Travel Behaviour	-0.043	0.014	3.115	0.002
Travel Intention -> Travel Behaviour	0.460	0.037	12.491	0.000

Table 5: Hypotheses Findings

	β	T-value	P	Remarks
H1: Travel Intention has a significant positive relationship to Travel Behaviour	0.460	12.491	0.000	Supported
H2: Service Quality significantly moderates the relationship between Travel Intention and Travel Behaviour	-0.043	3.115	0.002	Supported

DISCUSSION AND CONCLUSION

This paper aims to investigate the effect of travel intention and general service quality on travel behaviour of public transport in Kuala Lumpur. Travel intention comprises attitude, subjective norms, and personal norms, which showed a significant positive relationship to travel behaviour as supported by previous studies (Maduwanthi et al. 2015; Ng and Acker, 2018; Irtemih et al. 2018). This study showed that most public transport users were women, which is in line with a previous study by Kuhnimhof et al. (2006) that women use more PT for many reasons. It is also important to note that most of the respondents were young adults who earned less than RM3000 a month; thus, public transportation would be a transportation solution. The result is similar to previous studies that public transport decreases as age and income increase (Chowdhury and Ceder, 2016).

Therefore, this study adds another contribution to the body of knowledge. This study also examined the moderating effect of general service quality of transportation services ranging from staff to infrastructure. It showed a weak strength in the relationship between travel intention and behaviour. There is a possibility that commuters did not relate their intention to use public transport with the existing services given by the service provider. The reverse direction of the moderating effect of general service quality indicates that the more commuters intend to use, the less general service quality influences their travel behaviour. Caruanna et al. (1997) emphasized that service quality's reverse effect does not mean that service quality is not essential, but perhaps other things are more relevant to commuters. Travel behaviour does not depend on general service quality alone. The result is also similar to the study done by Minhans et al. (2015) that highlighted commuters' frustration relating to service quality of public transport. It is important to note that in this study, only general service quality is utilized. However, this study provides an excellent lead to pursue the

improvement and visibility of excellent service quality. This study is not without limitations. Firstly, the data was collected at stations; the commuters' willingness to participate is very challenging. Secondly, due to time constraint, some of the demographic section was not completed. Future research should explore the tangible and intangible elements of service quality to encourage higher public transport ridership.

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PUBLIC SPACES AND GENDER: TESTING THE RELATIONSHIP OF SPATIAL CONFIGURATION OF STREET NETWORKS

**Nurul Shakila Khalid¹, Raja Norashekin Raja Othman², and
Marlyana Azyyati Marzukhi³**

^{1,2,3}*Centre of Studies for Town and Regional Planning,
Faculty of Architecture, Planning and Surveying
UNIVERSITI TEKNOLOGI MARA, MALAYSIA*

Abstract

The purpose of this paper is to examine the spatial dominance in public spaces from a gendered and women perspectives and to analyse the relationship with the spatial configuration of street networks. In analysing the street networks in Space Syntax, the question arises; to what extent the movement and activity may explain street integration among gender-based pedestrians. The result found that there is a correlation between spatial configurative analyses and women present in the streets. In essence, the less integrated streets attract more women pedestrians and improve better quality of space. The research is relevant to spatial design interventions and policymaking to enhance gender-equal access to public space.

Keywords: Spatial Dominance, Gender, Space Syntax, Public Space

¹ Lecturer at UiTM. Email: shakilakhalid@uitm.edu.my

INTRODUCTION

A shared vision in the New Urban Agenda (NUA) for a sustainable future that emphasizing all people have equal rights, opportunities, and access to the benefits that cities can offer. In other words, the shared vision of NUA refers to the inclusivity. It ensures that all inhabitants, without discrimination of any kind, can produce safe, accessible, healthy, resilient, affordable, and sustainable cities and people to foster quality of life for all. Inclusivity or equality implies that women enjoy urban public life in the fullest dimension as men. Although the idea of the right to the city introduced by Henri Lefebvre is manifested by existing social inequalities of religion, race, ethnicity, or class, above all, equality is a layer of gender inequality. Economic, cultural, and social norms shape gender roles and said that women and men experience cities in different ways. It also undermines their right to public space; therefore, their right to the city can be understood where everyone has an equal right and access to the city and its public spaces (UNHabitat, 2010).

For the sake of diversity and spatial justice, it is essential that women feel safe, welcoming, and comfortable in public spaces as they provide great opportunities to engage in economic, physical, and social activities. Ever, street avoidance, safety or uneasiness, especially for women, become a concern especially female employment has increased in past decades that resulted in women have had a strong presence in public spaces and make them be a part of urban life (Mehta, 2013; Tandogan and Ilhan, 2016; Beebeejaun, 2017). Indeed, women have reported that they are likely to experience public hassles and incivilities and be in the streets or public spaces. These studies have found the similar findings that assess street use by gender have identified women are often not quite half the users, as eloquently quoted by Souza et al., (2018). Women feel unsafe and absent in public spaces because of several factors such as the perception of safety, poorly maintained buildings, society's behaviour, strangers, crime hotspots, poor streetscape, and economic discrepancy (Tandogan and Ilhan, 2016; Arjmand, 2016).

On the other hand, other scholars criticize the importance of putting the gender-specific needs and accommodating the needs of women in urban spaces. However, attending to the needs of women in the public space lends itself to an entirely different discourse within urban planning. This discourse is often shaped around a religious belief or an ideology to legitimize the segregation of the public space across the gender line. Mostly informed by traditional and cultural values, such arguments are usually enforced by concerns over the safety of women in the public space, maintaining the exalted position and dignified role of women to nurture the society (Doan, 2010) morally. In Islamic theocracy, the practice and implementation of gender-segregated public spaces is not the sole instance. It is perhaps the most contested one. On the notion of respecting the needs of women in public, the Sharia law is being utilized to institutionalize the urban policies

based on the segregation of sexes. Whereas gender segregation has always existed as part of the culture and belief in the Muslim context, the comprehensive effort to implement such a divide is a rather recent phenomenon.

Several feminist geographies have examined the complex ways that gender articulated through spatial practices in urban spaces. One of the spatial methods, movement across space, reflects the interrelation between available resources and social identities to construct gender identities (Beebeejaun, 2017). However, few studies examine the safety, needs, and activities that occur in urban public spaces related to the gender composition with space (Arjmand, 2016; Khalili et al., 2015; Souza et al., 2018). The current study addresses these limitations and fills a gap by counting women and men on streets that differ in space use (Beebeejaun, 2017 and Francis, 2016). As a result of this line of reasoning, two (2) questions were raised; (i) what the effects of gendered power relations to the women's rights to the city are? (ii) to what extent spatial configuration measures the success of the street as a public space for all. This study indeed contributes to the literature by offering insightful knowledge of how spatial configuration may affect the pedestrian's everyday experience, activity, commitment to the city they live in, and social interaction by analysing how they use the space effectively.

The paper begins by comparing the narratives of women and men living in the multi-ethnicity city, which helps expose the multi-layered nature of gendered belonging constructed in daily urban practices. It then analyses the spatial configuration of street networks and their relationship with equal access to public spaces. The discussion thus explains on gendered use in the street and the proportion of pedestrians by gender. Lastly, the paper discussed the importance of spatial design and policymaking in urban spaces for all and the practicality of the right to the city and in solving user needs and aspirations in public spaces.

REVIEW OF RELATED LITERATURE

Why gender matter? Gender is a set of societal expectations for behaviour, not an essential quality or a fixed role (UN Habitat, 2010). Gender policies began to be integrated into public policies following the World Conference on Women in Beijing in 1995 and strengthened with the Treaty of Amsterdam in 1999. Later, the Handbook for Gender-Inclusive Urban Planning and Design promotes planning and design with a gender perspective that actively incorporates the voice of women, sexual, and gender minorities. With pioneered strategies to plan and build cities for women since the early 1990s, Vienna required each of its agencies to introduce strategic plans and initiatives to support the explicit inclusion of needs and lived experiences of women to shape more equitable policy outcomes people regardless of genders. The issue began when the researchers found that 75% of the park usage are the boys. It happened because the park designed only

for the boys, and they dominated park areas like basketball courts and playground equipment, leave the girls behind. Also, a study at public housing in Kuala Lumpur found that female respondents were physical less active in carryout exercise as compared to male (Ling et al., 2018). The scenario thus supported by Sassen (1996), an urbanist that said, the practice of urban planning and design and its outcomes are not gender neutral. Inequality is spatially reinforced by design, from the systems down to individual public spaces. Female's needs are different than male especially in the issue of security. For instance, a study at Petaling Jaya found that female is more easily affected by the feeling of unsecured and threatened by the presence of foreign immigrants in their residential area (Ling et al., 2017).

In explaining the relationship between spatial configuration and gendered-space for women pedestrian, the literature provides an understanding of gender-based accessibility to public spaces as the social and political structures of society (Mehta, 2013). In the western world, historically, public spaces were designed predominantly to serve white, working men, while private spaces were associated with women. A spatial dichotomy based on a differentiation of female and male and their functions in the public space has served as the underpinning of the spatial arrangement of modern cities today. The city accurately embodies, among other things, the historical gender division of labour within a normative society structure. Gender relations are implicated in our culturally constructed identity, where it is sanctioned that man should dominate space, and women's assigned place is in the house (Goodsell, 2003). This supports by Arjmand (2016) that the status differential between women and men creates specific urban spatial configurations related to the patriarchal spatial institutions that reinforce the dominance of men. He adds that the social system in place, through institutions of socialization, provides advantages to men that are denied to women. When spatial institutions are conceptualized and controlled by men, the space within which they operate can be unfair in their favour and against women, making them effectively gendered (Doan, 2010). Hence, women's lives in urban spaces are shaped by the visible and invisible boundaries created by social structures. According to Beebeejaun (2017), discrimination toward women who do transgress the spatial binary and enter public spaces must contend with an internalized fear of male violence. Women who come male-dominated public spaces may be subject to a wide range of verbal and physical harassment for transgressing the established boundary. Furthermore, other individuals whose identities reflect marginalized categories, such as race or sexual identities, also encounter this highly gendered spatial system and may feel exceptionally constrained in the ways that they may express themselves in public spaces controlled by the dominant command of power (Beebeejaun (2017).



Figure 1: The notion of gendered space in understanding their needs and behaviour has been concern in urban planning since 1940s.

(Source: Arjmand, 2016)

BACKGROUND OF STUDY AREA

Petaling Street and Kasturi Walk were performing the role of a pedestrian shopping street among locals and tourists. When one thinks of the colourful street and cultural street, Petaling Street come to mind before others. Petaling Street or also known as Chee Cheong Kai means Starch Factory Street in Cantonese, referring to its history as the centre for the production of tapioca flour back then. Petaling Street was established and active since the mid-19th century Petaling Street was paved with red tiles and covered with a dragon-like canopy that keeps out the sun. With a wet market in the early morning, Petaling Street is one of the most famous imitations of "branded" items, selling various traditional foods, vegetables, trade, and presenting the public life in Kuala Lumpur. While Kasturi Walk is a covered and open-air flea market set along Jalan Kasturi, a street along with Kuala Lumpur Central Market, a historical craft centre. There are over 20 wooden kiosks with coconut leaves (to enhance the feeling of being in a kampung), and food stalls sell traditional Malaysian mouth-watering sweets and traditional food.

The reason for choosing these two streets is because they reflect contrasting images and symbolism of different ethnics whereas Kuala Lumpur is a city for people of diverse identities, especially in the light of its image for Muslims, Chinese, and Indians. Besides, this is the only pedestrianisation street in Kuala Lumpur, a car-free street to create more space for pedestrians and indulgences by the co-presence of the attractors, such as the street malls and buskers, street vendors, cultural performance, and wide pathways. This would contribute to the research idea to examine the space dominant in public spaces.

for street's inclusivity. Through describing and exploring the activity patterns, and experience among women and men pedestrians, this research, therefore, employs qualitative and quantitative data collection as empirical evidence; the snapshot observations, activity mapping and the application of space syntax to measure the relationship between street networks and how different gender experience and interact within the spaces. Recently, space syntax is used as a powerful analytical tool in architecture and urban planning. Space syntax is best described as a research program that investigates the relationship between humans and space from diverse forms such as buildings, settlements, cities, and landscapes (Bafna, 2003).

The space syntax theories have described the dynamism of social life and movement within spaces, and this is achieved through the axial map. The axial map is initially constructed to describe the urban areas in which the structure of its street network could be explained as a discrete spatial configuration (see Figure 3). The longest lines passing down streets are considered as nodes and their intersections as links in the graph. This is characterised in space syntax as the level of integration. The relationship of each axial line and integration values examined to measure the connectivity of each line in an axial map. Integration is an indicator of how easily one can reach a specific line of the axial map (Hillier et al., 1993; 2007). Integration measures the mean depth of every axial line. For this study, the researcher employed two parameters in space syntax; local integration (micro-level) and global integration (the entire streets system). For the global integration of analysis, space syntax takes into consideration every possible relationship in the system – from anywhere to anywhere, while local integration analysis measures a particular local catchment area as three steps from the primary line. To achieve the research aim, analysis of two shopping streets was done within a 3km radius for vehicle and pedestrian.



Figure 3: The Axial map consists of 2,437 street segments that were audited in the DepthMap software

The snapshot observation records and measures individual and stationary activities such as talking, eating, shopping, taking a photo, walking, smoking, and participating in social activities and the number of pedestrians in Petaling Street and Kasturi Walk. This direct observation organized by recording where and how people occupy and use public spaces through field notes, photographing, and mapping.

The observation was scheduled for typically busy daylight times spread out on weekdays and weekends (weekdays 8.00 am to 8.15 am, 1.00 pm to 1.15 pm and 5.00 pm to 5.15 pm; weekends 12 pm to 12.15 pm and 5.00 pm to 5.15 pm). The observations included (i) tracking number of people, (ii) duration of stay, and (iii) social activities engaged in the streets. Each observation was 15 minutes long to address the problem of observer fatigue. The literature studies of human activities and behaviour in public spaces showed that the duration of activities recorded in five-minute intervals. During the observation, the

researcher acted as a participant-observer using the businesses and street space in the study areas. The researcher stands in the intersection in the centreline of the streets to record the social activities and count the number of pedestrians encountered using field notes. Besides, the research also applied photographs to record pedestrian behaviour patterns and to verify the data collected. Pedestrians communicating with each other or engaged in everyday activities indicated as a group.

ANALYSIS AND FINDINGS

Analysis of spatial configuration

Spatial configuration was analysed using space syntax by assigning syntactic values to every street segment in the system and produced the axial map. The axial map is a network of intersecting axial lines. The axial map is represented by the longest lines of sight and the fewest to characterize every street segment in Kuala Lumpur. Two (2) analyses conducted to read the pattern of activities and movement among women and men pedestrians in Petaling Street and Kasturi Walk – to observe how people use and move within space (Hillier and Hanson, 1989). The first analysis was a global measurement (R_n), which helped observe the relationship between each axis and all other axes, and to show the degree of integration. The secondary analysis was a local measurement (R_3), which helped identify an axis's relationship with its connected axes (up to three steps away). Local integration is the default indicator for human movement, as Hillier stated that people tend to take paths that minimize trip length or maximize trip effectively. This paper refers to space/spatial as street and pedestrian paths of Kuala Lumpur (see Figure 3). The axial map developed to represent the spatial configuration of the street and pedestrian pathway network. The pedestrian network includes all alleys, paths, and pedestrian-only lane.

The spatial layout pattern within the 3km radius shows that almost 80% of the area consists of a higher density of streets, which refers to the vehicular movement in urban areas. For example, Jalan Tun Tan Cheng Lock, Leboh Pasar Baru, Leboh Pudu, and Jalan Hang Lekir dominated by vehicles that largely contributed to the traffic congestion. The concentration or integration cores can be traced easily by looking at the street network, whereas the nucleus centre happened along the major road in the city centre (Hajrasouliha and Yin, 2015). The layout patterns of Kuala Lumpur are semi-regular grid to very gridiron a non-uniform of distribution of land uses ever since 1896 when Kuala Lumpur became the capital of Malaysia after Selangor. Historically, the British were the most influential western colonialists and adapted the urban gridiron patterns when colonized *Tanah Melayu* circa the 1800s. It can be seen that the urban morphology of Kuala Lumpur was according to geographical condition and developed along the river as the primary sources of life-transportation and sanitation.

Integration has analysed to measure the accessibility of the spatial layout pattern, from the very grid with mainly linear through streets to the fewer grids and form a deformed grid at a larger scale. The integration values in space syntax represent global and local integration value of Petaling Streets and Kasturi Walk, as represents in Table 1. Street integration can be calculated by considering all other streets in the network (global) or by limiting the calculations to streets within a certain distance (local).

Table 1: Syntactical values of Petaling Street and Kasturi Walk for pedestrian path networks compared to other streets.

	Global Integration (R_n)	Local Integration (R₃)	Connectivity
Petaling Street	0.823	2.891	9
Kasturi Walk	0.898	2.697	6
Jalan Benteng	0.875	1.666	5
Jalan Tun Tan Cheng Lock	0.823	2.833	16
Jalan Hang Lekir	0.825	2.938	11
Jalan Sultan	0.735	2.799	18
Leboh Pasar Besar	0.986	2.636	18
Jalan Tun Tan Siew Win	0.911	2.469	11
Jalan Tun Perak	1.141	3.098	22
Jan Tun HS Lee	1.022	2.402	13

According to Table 1, the streets can have a high local but low global integration value and vice versa, such as Jalan Benteng and Jalan Tun HS Lee. Jalan Benteng is a fully pedestrianized street, whereas Jalan Tun HS Lee, 4-lanes road primarily dense with the vehicles. Petaling Street and Kasturi Walk scored 0.823 and 0.898 for the global integration value – average integration value at the city scale as the semi-open street space. Principally, the higher the integration value of a street, the lower the number of axial lines needed to reach that street, and the high number of pedestrians and car movements. The highest global integration streets are Jalan Tun Perak (1.141), Jalan Tun HS Lee (1.022) followed by Leboh Pasar Besar (0.986) and Jalan Tun Tan Siew Sin (0.911), which the streets cater to more movements of vehicles and add to the higher street density (see Figure 4). Jalan Tun Perak specifically is a long-stretched street of 810 m with 23m of width that attached to Jalan Pudu and highly visual connected to other adjacent streets such as Jalan Tunku Abdul Rahman, the infamous shopping street among locals. Leboh Pasar Besar and Jalan Tun Tan Siew Sin also move the vehicles and the buses, which may be accessed with the least number of turns from all other lines. These streets are accessible to pedestrians,

but due to the poor pathway infrastructures, complex connectivity to the transit stops, and higher traffic volume, pedestrian attempts to avoid using the streets. Although the higher integration of the streets indicates the success of space, it doesn't happen to the streets due to adopted of the car-centric street design as the case in Malaysian cities.

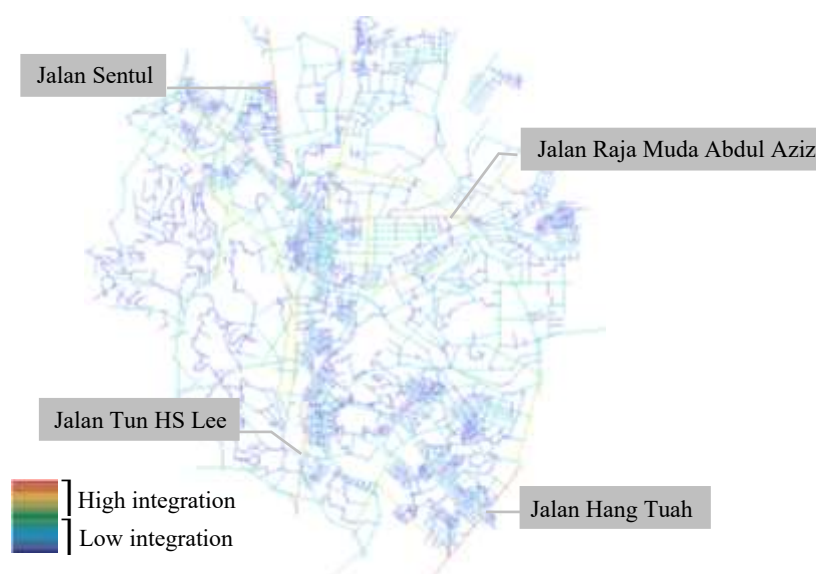


Figure 4: The red lines show the four streets with highest global integration values

The results of local integration displayed a range of colours from the red lines as the most integrated streets through to the blue lines as less integrated streets. The axial lines with the highest local integration value are the lines that are accessible with the least number of connections from other lines in its surrounding. The most integrated locally is Jalan Tun Perak (3.098), followed by Jalan Hang Lekir (2.938) and Petaling Street (2.891), while the lowest integration value is Jalan Benteng (1.666) and Jalan Tun Tun HS Lee (2.402). The more integrated streets require fewer turns to reach the segment from other streets and are considered to be more accessible. According to the space syntax principle, streets that had low integration values were safer and accessible by the pedestrian as it has proved that Jalan Benteng is fully accessible by pedestrian-only as the street is closed from the car to access and thus improved the quality of space for people to use the space. While the local integration values for Petaling Street and Kasturi Walk are average amongst the other streets intersect-segregated, it can be said that both streets are pedestrianized-attracting the presence of pedestrians because of the presence of commercial activities along with them.

Connectivity gives the number of lines that are directly connected to a specific line. According to Figure 6, the high levels of connectivity are Jalan Tun Perak (22), Jalan Sultan (18) and Leboh Pasar Basar (18). While Petaling Street (9) and Kasturi Walk (8) along with Jalan Benteng (5) are low connectivity compared to other streets with 300m and 220m of the street length. The low street connectivity shows the streets have low exposure to the traffic and more likely to walk, proven by how integrated the streets locally. The findings also indicate that low-connected streets can reduce walking distances and accessibility.

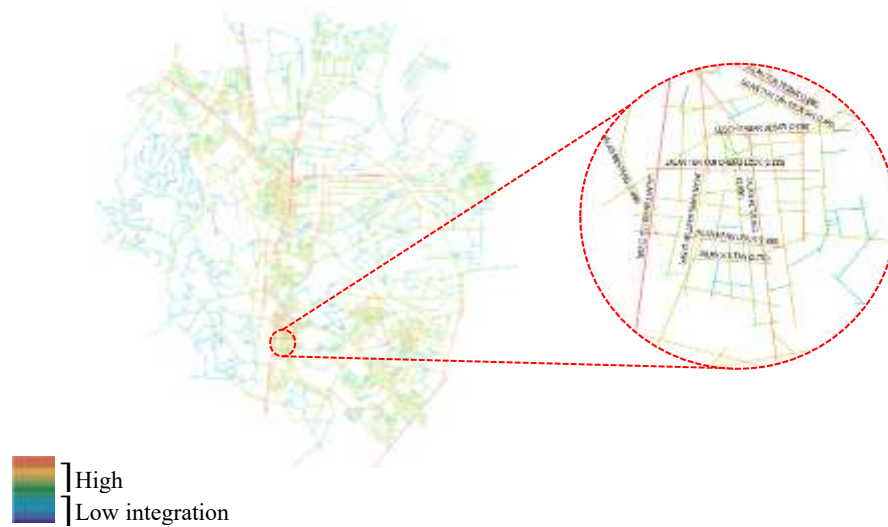


Figure 5: The shorter and fewer axial lines confirm the very distinct morphology of each.



Figure 6: The higher connectivity values are Jalan Tun Perak, Jalan Sultan and Leboh Pasar Besar.

Gendered pedestrians' proportions

Table 2 present the proportions of total pedestrian, women, and men and how confidence intervals compare between women and men to identify the space uses between genders. The study applied the standard error because interested in the variability of sample means, and the mean is in the centre of the confidence interval. 95% confidence intervals contain the actual means. If the interval is small, the sample mean must be very close to the true mean. If the confidence interval is extensive, then the sample mean could be very different from the true mean, indicating an inadequate representation of the population.

The result shows that women pedestrians made up proportion 0.35 of weekday users (SE 0.01, 95% CI [0.39, 0.45]) and 0.38 of weekend users (SE 0.02, 95% CI [0.55, 0.63]) in Kasturi Walk. Compare to the men pedestrians which score highest mean 0.46 of weekday users (SE 0.02, 95% CI [0.25, 0.29]) and 0.57 of weekend users (SE 0.02, 95% CI [0.45, 0.53]). To be observed, the proportion of women pedestrians was slightly similar between weekdays and weekends, but the proportion of men was largely the difference between weekdays and weekends in Kasturi Walk. It observed that men avoid being in public space during the weekdays compare to women who play a role as a head of household, other than full-time workers.

The differences in proportions of women and men in Petaling Street as weekday and weekend users differed significantly. On weekday, the mean score for women pedestrian is 0.40 (SE 0.01, 95% CI [0.70, 0.83]) and increased to 0.44 (SE 0.02, 95% CI [0.77, 0.85]) on weekdays. While men pedestrian recorded

the mean score 0.51 (SE 0.02, 95% CI [0.66, 0.72]) and increased to 0.66 (SE 0.02, 95% CI [0.71, 0.82]) on weekend. In detail, the differences in proportions of women and males were largely significant in Petaling Street. It was clear that men use public space very differently than women. Moving around in urban public spaces is a collective experience for women and men where different genders have different socio-economic and household roles. Above all, Petaling Street and Kasturi Walk score for integration values are less integrated and highly accessible for pedestrians, which resulted that less integrated streets are attracting more pedestrians.

Table 2: Estimates of the proportion of total pedestrian, women and men by the streets

	Weekdays			Weekends		
	Mean	SE	95% CI	Mean	SE	95% CI
Total pedestrian						
• Kasturi Walk	0.18	0.02	0.24, 0.38	0.31	0.02	0.69, 0.57
• Petaling Street	0.27	0.02	0.77, 0.62	0.36	0.01	0.57, 0.62
Total women pedestrian						
• Kasturi Walk	0.35	0.01	0.39, 0.45	0.38	0.02	0.55, 0.63
• Petaling Street	0.40	0.01	0.70, 0.83	0.44	0.02	0.77, 0.85
Total men pedestrian						
• Kasturi Walk	0.46	0.02	0.25, 0.29	0.57	0.02	0.45, 0.53
• Petaling Street	0.51	0.02	0.66, 0.72	0.66	0.02	0.71, 0.82

Gendered usage in streets

The highest number of pedestrians has a significant relationship with the duration of stay, whereas the co-presence of attractors in the street offers a variety of goods and businesses that meet the needs of locals and tourists in a convenient environment. It observed that women pedestrians engaged in social activities such as bargaining, shopping, and eating by spending 7 to more than 10 minutes and enabling them to engage with the city freely. Observations in Kasturi Walk discovered on weekdays and weekends highlighted the difference in their duration of stay. On weekdays, pedestrian stayed there for a short length of less than 1-minute compare to in Petaling Street. Conversely, during the weekend, the length of stay increased from less than 1 minute to 5 minutes as the most significant pedestrians among locals and tourists enjoy the sightseeing, lingering, eating, shopping, and appreciating the decorations in Kasturi Walk by taking the photo. Most of them spent more time (in less than 5 minutes) in food stalls compared to the souvenirs shops that sell the key chains, clothing, toys, handcraft, and accessories. They prefer to be in the Central Market due to the scorching hot weather the outside. The narrow space gives the inconvenience for women

pedestrians to stroll with the infant in the stroller. Besides, there is no seating area or benches provided along Kasturi Walk except the seating for the food stalls. The snapshot observation suggests that women and men pedestrians spend 7 to 10 minutes in Kasturi Walk. However, the majority of them are only passing by the street to the LRT station to the next buildings. Rarely to see the local pedestrians spend minimum time to shop compared to tourists. During the weekday's morning, the number of pedestrians is slightly low because the shops and street vendors are only open at 9.00 am (see Figure 7b). During the lunch hour at 1.00 – 1.15 pm (see Figure 7c), the pedestrians' concentration is towards Leboh Pasar Besar and more on the left side (beside Central Market), which locates the street vendors and outdoor café. Observation at 5.00 – 5.15 pm resulted in a similar pattern of pedestrian usage in the morning except for the substantial increasing number of pedestrians (see Figure 7d). The local pedestrians are mostly passing by the street as the office workers started to leave the office, while the tourist pedestrians were strolling along the streets and spending little time to glance.

Table 3: Gender distribution of demographic profiles

	Women (%)	Men (%)
Age		
– 30	31.5	28.5
– 40	33.0	22.1
41 – 50	20.7	24.5
> 51	14.8	24.9
Ethnicity		
Malay	34.5	24.1
Chinese	32.8	40.4
Indian	15.6	10.0
Others	17.1	25.5
Employment status		
Employer	14.1	25.1
Government employer	6.5	3.3
Private employer	25.4	16.5
Self-employed	21.0	26.0
Skilled	22.5	11.2
Unskilled	10.5	18.0
Nationality		
Malaysian	52.0	40.5
Non-Malaysian	48.0	59.5

The mapping also shows the majority of women pedestrian in Kasturi Walk using this space by herself. They comfortable in being alone, and this category of women pedestrians are usually a passer-by pedestrian who use the

space daily, and very familiar with the surroundings. Likewise, to a leisure-pedestrian, either local woman or tourist at the age of 15 to 40, they always accompanied by partners, friends, or family and spending more time in the space.

On weekday's evening, Petaling Street shows the different patterns of pedestrian usage space, as shown in Figure 7a. The pedestrian's space usage pattern is intense at the intersection of Jalan Hang Lekir, which connects pedestrians to Jalan Tun HS Lee and Jalan Sultan and at the entrance of Petaling Street. Additionally, all the famous local foods and drinks such as soya bean milk, *tau-fu-fah*, and fresh fruits and vegetables are available in the market until 6 pm every day, makes it convenient for the daily life of urban residents.

Petaling Street is also known for its pickpocket and security issues. This street is infamous for the numbers of aggressive between groups of overseeing the territorial, homeless and beggars. These factors have resulted in constant surveillance through CCTV, and Police and enforcement officers patrolling. Women are not seen using the space by themselves, especially in the early mornings or late evenings, as there are fewer people around. Most of the business except the market is open at 10.00 am. Besides, most of the shop owners of imitation items and storekeepers are Chinese men and foreign workers-contribute to the unpleasant experience among women pedestrians.

The women pedestrians who walk alone in Petaling Street, especially on weekdays averagely, are elderly (the 40s and above) due to the familiarity with the area compared to women pedestrians in Kasturi Walk, who are mostly working (see Figure 8). Other than elder women pedestrians, large clusters of youth in pairs and groups (average aged below 30) dominated this space on weekends. The foods and the "branded items" are the major attractions for families and youth to come to Petaling Street.

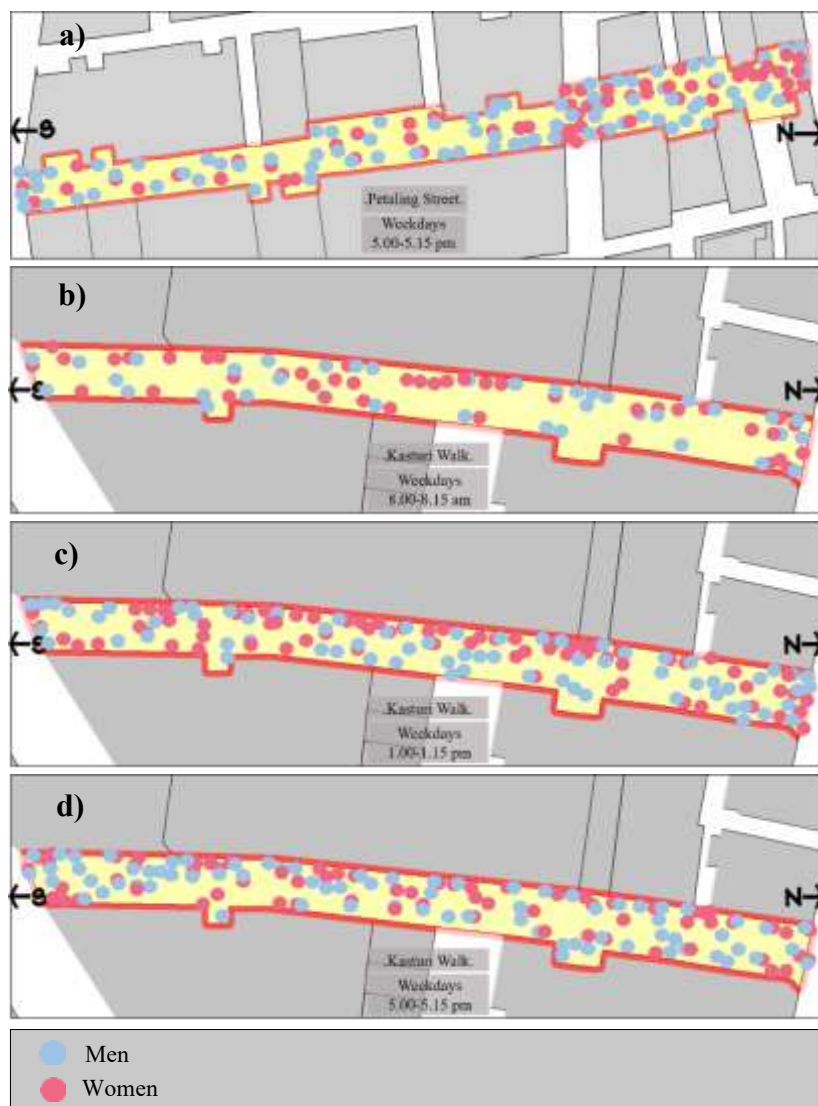


Figure 7: Gendered use space in Petaling Street and Kasturi Walk on weekdays.

By attaching configurational measurements to each street segment in the study areas, the relationship between pedestrian behaviours among men and women, and those measurements of integrations can be examined. The evidence to date has focused mainly on the presence of activity on the streets, finding that high local integration streets have a higher number of pedestrians and provide a better quality of space.

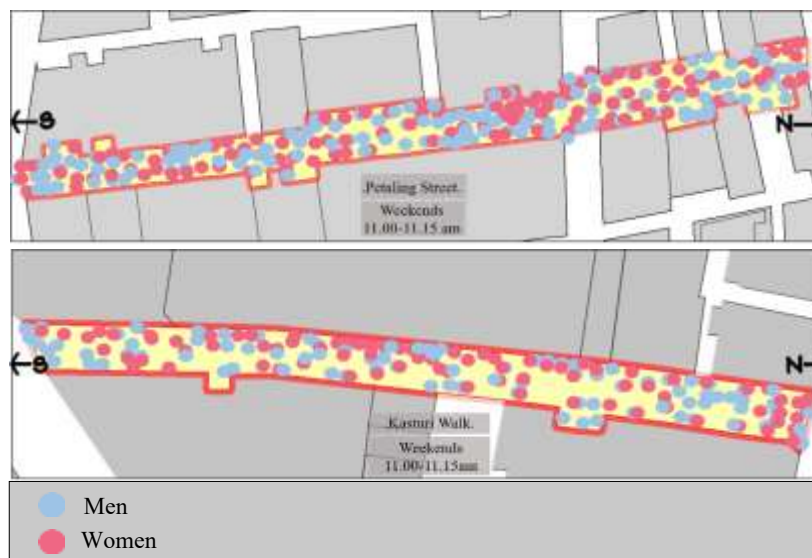


Figure 8: Gendered use space in Petaling Street and Kasturi Walk on weekends.

DISCUSSION

The measures of street integration-global and local provide significant relationships with pedestrian movement and activity within the space. The findings found that the local integration associated with the number of pedestrians and duration of stay while global integration was correlated with vehicle movement. In this research, the integrated street draws more people and enhance more trips. The local integration value of the Kasturi Walk is slightly lower compared to the integration of Petaling Street. More pedestrians make walking trips to Petaling Street and spend a long time carrying various social activities. Most of the social activity occurred in the intersections of Jalan Hang Lekir, where there has a morning market.

The proportion of men and women pedestrians also shows a similar number, but different age background. More local integrated streets such as Petaling Street is accessible for pedestrians from other streets likely to attract more women pedestrians. The vibrant activity in Petaling Street also becomes the attractor to the pedestrian in everyday urban life. However, several factors, such as safety and men dominant space, contribute to the unpleasant experience unless the women pedestrians accompanied by partners, friends, or family, or walk in a group. The feeling of unsafe or inconvenient in the crowded space may influence by the presence of many people, patrolling by the police, and the small-scale commercial activity along the streets. The feeling thus creates an experience of

how women in that space. The findings show that women's experience in public spaces is different from men's, mainly when men dominate the area.

In contrast to the pedestrian patterns in Kasturi Walk, which is scored slightly higher global integration value than Petaling Street, it shows fewer pedestrians, especially among women and they only use space in a row of street vendors and outdoor cafes (besides the Central Market) rather than the row in front of the old shophouses in Jalan Hang Kasturi. The roles of the Kasturi Walk can be argued. The transformation of enhancing the image of Kasturi Walk for passing-by street to Central Market or other adjacent streets, a place for shade with proper ventilation, or it is for tourists only when it failed to attract the local pedestrians? The less integrated street encourages fewer people to present in a shorter duration of stay.

The results of the proportion between women and men in uses of public spaces show that many factors influence the presence of women; a variety of goods and services, a group of users, accessibility and walkability, and convenient. Besides, their presence much depends on their purpose to come to the streets-women, and men likely have different purposes, such as for leisure, sightseeing, eating, and buy groceries. However, most of the shop owners and shop assistants in Petaling Street are men. To compare the range of activities and goods in both streets, Petaling Street is the preferable place to visit by women. When the street offers a variety of products, it will consequently encourage social engagement and social exchange. The pattern of activities taking place in the streets justifies that people intuitively re-configures the space for their best uses.



Figure 9: Documenting a photograph in Petaling Street and Kasturi Walk enable the researcher to interpret the pedestrian’s experience in the streets.

CONCLUSION AND RECOMMENDATIONS

Public spaces should be genuinely ‘public’ and democratic. They must be accessible to everyone throughout the day. To emphasize public space terms, this means that the right to the city of every population regardless of gender, ethnicity, nor religion must be protected. A successful public space is one where users of different backgrounds can coexist without one group dominating another. The city or public space can belong to women when it pertains to everyone. In this sense, space syntax is useful to provide a better understanding of the role of the street network in supporting public life because it deals with both spatial and functional aspects of street space. This research suggests the further research to understand the street network patterns; the structured observation that carried in this research could not answer the vital question about how democratic and equitable the streets are, of who might benefit most, who “own” space, or who will avoid the street and why. Besides, the research findings are expecting to help city managers, and urban designers to actively constructing ideas of what it means to embrace the visibility of women in public space.

The application of space syntax in examining the spatial configuration of the pedestrian in a city makes it as a baseline study. The integration value allows two propose interventions; (i) to identify potential streets to transform regarding accessibility, and (ii) to design spatial interventions where the street associated with the present low integration values. If the values are increasing, the attraction to public spaces will be increasing.

ACKNOWLEDGEMENTS

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PUBLIC AWARENESS AND ACCEPTANCE TOWARDS TRANSPORTATION LOW CARBON CITY PROGRAMME. A COMPARISON STUDY OF MBSA AND DBKL

**Na'asah Nasrudin¹, Ainatul Isnoriza George², Yusfida Ayu Abdullah³,
Marlyana Azyyati Marzukhi⁴, Oliver Hoon Leh Ling⁵, Kushairi Rashid⁶**

*^{1,2,3,4,5,6}Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA (UiTM)*

Abstract

This paper examines public awareness and acceptance towards Transportation Low Carbon City's (LCC) programme by two local authorities: Kuala Lumpur City Hall (DBKL) and Shah Alam City Council (MBSA). This paper also will measure the residents' satisfaction level on the LCC programme initiatives prepared by both authorities. The data were gathered through a survey conducted randomly from 202 respondents who represented the residents of Kuala Lumpur city and 122 respondents who represented the residents of Shah Alam city. The findings suggested that the awareness of the respondents about the Transportation LCC's programme was more positive in Kuala Lumpur as compared to Shah Alam. This was because almost 90 per cent of Kuala Lumpur respondents were aware of the programme. For feedback of willingness to change to non-motorised transportation as a support to Transportation LCC programme, Kuala Lumpur had a bright hope to fully achieve the successfulness of the LCC's programme as compared to Shah Alam. With regards to implementation of public transportation, the majority of the both respondents' groups agreed that the available public transportation was reliable, well-connected and reachable for their desired destination. This comparison study is essential to know how well the local authority manages their LCC programme. It is hoped that the two local authorities can learn and cooperate in future to make this programme a success.

Keywords: Low Carbon City, non-motorised transportation, public awareness and acceptance

¹ Senior lecturer. E-mail: naasa717@uitm.edu.my

INTRODUCTION

Over the last five years, it has shown that a growing trend of climate change and global warming has impacted the well-being of human beings and also, living things on the Earth. To address this issue, Malaysian Ministry of Energy, Green Technology and Water (2011) introduces Low Carbon City Framework to lead the reducing of the carbon emission from the main contributors which are greenhouse gases that consist of carbon dioxide (CO₂). One of the biggest sources of human-caused greenhouse gas emissions responsible for a whopping 73 per cent worldwide, includes transportation sector.

Malaysia created Low Carbon Cities Framework (LCCF) in 2011 to guide Local Authorities in Malaysia, High Institute of Education and other regions in Malaysia to transform their cities into more greener cities, thus, making them popularly known as low carbon cities. The primary indicators of carbon emission, which are 'Urban Environment', 'Urban Infrastructure', 'Urban Transportation', and 'Buildings' are addressed in LCCF. Local Authorities are urged to implement LCCF and those who use it will successfully achieve low carbon city in their places. Most Local Authorities who implement LCCF usually look for local solution suppliers to satisfy their low carbon criteria and ambitions. LCCF is gradually implemented by Local Authorities. Those who have already adopted LCCF begin to work on more comprehensive and realistic strategies making the market demand for local approaches to grow. This will further boost the green local economy and speed up the transition to low carbon communities.

LITERATURE REVIEW

Public Perception, Awareness and Acceptance

Public perception is a process of “the detection of information” (Michaels, 2000). The discrepancy between an absolute truth based on facts and a composite narrative formed by popular opinions, media coverage and credibility can be seen as a social phenomenon. Rao and Narayan (1998) defined perception as “a process, in which people select, organise, and interpret sensory stimulations into meaningful information about their work environment”. Rao and Narayan (1998) elucidated that interpretation is the primary determinant of human behaviour, stating that “there can be no behaviour without perception.” This can be inferred based on the concept specified that public perception is the process which defines human perceptions based on surrounding factors.

However, Dourish (1992) interpreted that awareness is “an understanding of the activities of others, which provides a context for your activity”. Evidence has shown that the provision of awareness-raising resources increases the efficacy of how knowledge is distributed through populations (Gross, Stary, & Totter, 2005) and also, significantly, impacts social interactions in those societies (Loevstrands, 1991). Ausserer and Risser (2005) also provided their thought that acceptance is ‘a phenomenon that reflects how far potential

users are willing to use a certain system'. For Chirmsmar and Wiley-Patton (2002), they stated that acceptance is an 'intention to adopt an application'. From all the definitions given, it can be inferred that public acceptance meets the need for the approval of something.

Low Carbon City Programme in Shah Alam and Kuala Lumpur

Low Carbon Cities 2030 Challenge (LCC2030C) sponsored by the Ministry of Energy, Science, Technology, Environment, and Climate Change (MESTECC), as well as GreenTech Malaysia is a new initiative aimed at promoting the transformation of our cities into low carbon cities. GreenTech Malaysia will work with Local Authorities to create low-carbon zones in the state capital and major urban areas across the country to ensure that the initiative achieves its objectives. Shah Alam City Council (MBSA) is a body responsible for managing Shah Alam Low Carbon City Programme. MBSA has successfully developed the 2030 Action Plan for Shah Alam Low Carbon City. This achievement symbolises the most influential contribution of the entire MBSA committee in its continuing efforts to maintain a green climate and comfortable atmosphere in Shah Alam as a Local Authority is concerned. 2030 Action Plan for Shah Alam Low Carbon City is designed to achieve the MBSA's goal of 'making Shah Alam a vibrant, green and productive city with an atmosphere that forms a society of environmental values. MBSA Low Carbon City 2030 Action Plan has outlined various actions in relation to transportation and mobility to ensure that Shah Alam achieves Low Carbon Transportation. MBSA establishes efficient transportation and mobility service, such as electric cars, e-parking, community buses, free bus service (Smart Selangor), preparation of cycling tracks, EV (electric vehicle) chargers in the area of Shah Alam, and free car days for all citizens of Shah Alam. MBSA also provides parking located in the area far from the city centre to encourage walking around the centre of the city, as well as to upgrade disabled-friendly walkways and covered pedestrian walkways.

In the meantime, Kuala Lumpur City Hall (DBKL) is the authority that is charge of LCC's programme in Kuala Lumpur (KL). It successfully produces Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) as an initiative to take part in Low Carbon Cities 2030 Challenge (LCC2030C) launched on July 23, 2019. Dewan Bandaraya Kuala Lumpur (DBKL) aims to reduce the city's carbon emissions intensity of Gross Domestic Products (GDP) by 70 per cent in 2030 (based on the 2010 level) without compromising its vision and economic growth targets. One of the initiatives is to reduce private vehicles entering the city centre of Kuala Lumpur during peak hours. DBKL also enhances the use of effective variable message signs in delivering green information to the public. For example, with slogans of "Kuala Lumpur towards a Low Carbon City" and "Reduce Congestion; Together, We Use Public Transportation", DBKL tries to remind Kuala Lumpur residents every day about the importance

to reduce private car usage. This is done to show support to Transport Low Carbon City programme. 'Free Bus Rides within Downtown KL' during peak hours is also a good measure to encourage public transportation usage. On the weekends, DBKL has run 'Kuala Lumpur Car Free Morning Programme' to support the LCC initiatives. DBKL also creates dedicated cycle lanes in the downtown area of Kuala Lumpur to encourage Kuala Lumpur residents to use non-motorised transportation. Besides that, air-conditioned elevated walkways are run by solar energy to reduce carbon emission.

Free Bus-initiaves of Transportation LCC Programme in Shah Alam and Kuala Lumpur

Both cities, Shah Alam and Kuala Lumpur have implemented the free bus programme. For Shah Alam residents, Selangor Smart Bus (SSB) is operated by Selangor, Malaysia Berhad. The residents can have the bus service at a frequency of 15 minutes a stop from six in the morning to nine at night. Selangor Smart Bus has a total coverage of four routes (Shah Alam Commuter Station – Section 7, Nearest City Centre – Batu Tiga Commuter Station, Shah Alam Commuter Station – Sections 18-24, and Shah Alam Commuter Station – Sections 19-20) and a proposed new route (Terminal Section 17 – Section 7). In Kuala Lumpur, the free bus service is owned by Suruhanjaya Perkhidmatan Awam Malaysia (SPAD), and the operators are Transnational and Rapid Bus Consortia. This free service has been in place since August 31, 2012 and has expanded from two routes to four separate circular routes. These four separate circular routes can be identified by the colour of routes like Green, Purple, Red, and Blue. In early of 2019, the Orange and Pink routes were added. The Turquoise route was later added in October 2019. These free buses are open to residents and tourists, as well as the service can be used at the official bus stop of Go KL City Bus. Many bus stops are close to tourist attractions, major shopping centres, as well as easy accessibility by rail transit systems, like KTM Commuter, Rapid KL and Express Rail Link Sdn. Bhd. (ERL).

RESEARCH METHOD

This study tried to make a comparison in terms of public awareness and acceptance towards the Transportation LCC programme held by MBSA and DBKL. The residents' satisfaction level on the LCC programme initiatives prepared by both authorities was also measured in this study. LCC programme was introduced since 2011. There were various programmes conducted by Local Authority in Shah Alam and Kuala Lumpur, but some questions were raised, such as, "Is the system linked to society?" and "Does the system really include all the residents?" From the public's response, the authorities would consider his or her concerns, as well as recommendations in gaining his or her cooperation and involvement to ensure that the programme worked and benefited others.

The method used was questionnaire to obtain the data from Shah Alam and Kuala Lumpur. One hundred and twenty-two respondents had taken part to answer the questionnaire distributed in Shah Alam, as well as two hundred and two respondents had taken part to answer the questionnaire distributed in Kuala Lumpur. The questionnaire was in a form of paper-based survey with several sub-items. It was distributed to the respondents to gauge their understanding, interpretations and approval about the Shah Alam Low Carbon Transportation system. The sub-items asked the respondents to evaluate the programme interest, support and anticipation.

Details about background information of the respondents (such as age and gender), public transportation usage, walk and cycle among respondents, low carbon in own vehicle uses, and respondents' opinion on Transportation LCC programme were compared and highlighted. Scale of data measurement was reported in percentage and rating scale comparison.

THE RESULTS AND FINDINGS

i. Comparison of the Awareness about LCC Programme by MBSA and DBKL

The survey that was conducted on 122 respondents in Shah Alam showed that 55 per cent of the respondents were not aware of the LCC programme, while only 45 per cent of them were aware of the programme. Based on cross-tabulation analysis for comparing the awareness between the gender, it displayed that females (71%) were more likely to be aware of the LCC programme than men (29%). Nevertheless, it had been noticed that in Kuala Lumpur, only 17 per cent of the respondents were not aware of the LCC programme, while 83 per cent of the respondents were mindful of the effort to the LCC programme. The findings from a comparison analysis between the gender in Kuala Lumpur exhibited that the male respondents were more aware (64%) than the female respondents (36%). The comparison of the data could be seen in Table 1.0.

Table 1.0: The awareness of LCC programme comparison according to gender in Shah Alam and Kuala Lumpur respondents

Gender	LCCP Awareness							Total Respondents			%	
	Shah Alam				Kuala Lumpur			%	SA	KL	SA	KL
	Aware	%	Not aware	%	Aware	%	Not Aware					
Male	16	29	26	39	108	64	4	11	42	112	34	55
Female	39	71	41	61	60	36	30	89	80	90	66	45

Awareness Percentage	55 (45%)	67 (55%)	168 (83%)	34 (17%)	122	202	100	100
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i. Comparison of the Awareness about the Provision of Public Transportation in Shah Alam and Kuala Lumpur

a. Awareness of Free Bus in Shah Alam and Kuala Lumpur According to Age Group

Table 1.1 demonstrates the residents' awareness about the availability of free bus according to their age group. The majority of the age range between 20 to 40 years in Shah Alam and Kuala Lumpur were aware of the free bus service provided in their places. It could be said that the residents in these age groups had the potential to use the bus as their primary mode of transportation.

Table 1.1: Awareness of the Shah Alam and Kuala Lumpur Free Bus Service According to Age

Age group	Shah Alam Free Bus Awareness		Total	%
	Aware	Not Aware		
15-19 years	5	1	6	5
20-29 years	48	5	53	43
30-39 years	38	0	38	31
40-49 years	10	0	10	8
50-59 years	10	0	10	8
60-64 years	2	0	2	2
65 above	0	3	3	2
Percentage of awareness	113 (93%)	9 (7%)	122	100
Age Group	Kuala Lumpur Free Bus Awareness		Total	%
	Aware	Not Aware		
15-20 years	1	0	1	1
21-30 years	54	3	57	28
31-40 years	61	5	66	33
41-50 years	26	21	47	23
51-60 years	23	0	23	11
61-70 years	7	1	8	4
Percentage of awareness	172 (85%)	30 (15%)	202	100

b. Level of Convenience

The study also collected data from the respondents of Shah Alam and Kuala Lumpur on the level of convenience and time they took to walk to the nearest station. This was done to determine the suitability of the bus station placement. From Table 1.2, it could be seen that 42 per cent of Shah Alam respondents stated that the time taken to walk to the nearest station was moderately convenient. In contrast, 32 per cent stated that it was 'not convenient' to walk to the nearest station, while 26 per cent stated that it was 'convenient' to walk to the nearest station. The data were then cross-tabulated with the time taken to walk to the station to observe whether the station was within walking distance for the respondents. It was found that the longest time taken to go to the nearest station was in a maximum time range of 11 to 15 minutes. This showed that the station was still within walking distance and it was still convenient to walk to the nearest public bus station. Meanwhile, for Kuala Lumpur, 62 per cent of the respondents said that the time taken to walk to the nearest bus station was also 'moderately convenient', while 16 per cent stated that it was 'not convenient' to walk to the nearest station. For the category of 'convenient' to walk to the nearest station, 22 per cent responded to that. From the cross-tabulation between the time taken and level convenience, the result indicated that although the time range of 10 to 20 minutes of walking was classified as the longest time to walk, Kuala Lumpur respondents still felt that it was moderately convenient for them to walk to the nearest bus station.

Table 1.2: Convenience Level and Walking Duration to the Nearest Bus Station among Shah Alam Respondents and Kuala Lumpur Respondents

Walking Duration to Nearest station	Shah Alam			Total	%
	Convenient	Moderately Convenient	Not Convenient		
1-5 minutes	9	4	4	17	14
6-10 minutes	15	12	5	32	26
11-15 minutes	8	14	14	36	30
16-30 minutes	0	10	15	25	20
30 minutes above	0	11	1	12	10
Total	32 (26%)	51 (42%)	39 (32%)	122	100
Walking Duration to Nearest station	Kuala Lumpur			Total	%
	Convenient	Moderately Convenient	Not Convenient		
3- 5 minutes	4	39	8	51	25
5-10 minutes	17	8	0	25	12

10-20 minutes	24	62	12	98	49
20-30 minutes	0	16	12	28	14
Total	45 (22%)	125 (62%)	32 (16)	202	100

ii. Comparison of the Awareness about the Provision of Cycling Tracks in Shah Alam and Kuala Lumpur

MBSA had prepared a cycling track, which is two kilometres long and ten feet wide. The cycling track has a premix finishing and is located in a green area in Section 4 on the edge of a residential area. The amenities provided together with the bicycle track are two gazebos, ten outdoor gym equipment units, three bridges, information signs, safety signs, signboards, and safety railings. The cycling track in Section 4 is designed around the neighbourhood. Some of the cycling tracks are designed to pass through the alleys and the back lanes of houses. They are complete with safety railings to protect cyclists from vehicle road users. In Kuala Lumpur, DBKL had provided the cycle lanes at Southwest Dedicated Bicycle Highway, in which the first motorcycle route was officially open for a new Cycling Kuala Lumpur programme. They are two more official cycle lanes in Kuala Lumpur are located at Taman Tun Dr Ismail and Wangsa Maju. The cycle lanes in Kuala Lumpur are not well connected to any residential areas to allow people to commute from their homes.

Table 1.3: Awareness on Provision of Cycling Lanes According to Bike Ownership

Bicycle Ownership	Awareness on Provision of Cycle Lanes in Shah Alam		Total Respondents	%
	Aware	Not Aware		
Owned bicycle	37	21	58	48
Did not own bicycle	36	28	64	52
Percentage of awareness	73 (59%)	49 (41%)	122	100
Bicycle Ownership	Awareness on Provision of Cycle Lanes in Kuala Lumpur		Total Respondents	%
	Aware	Not Aware		
Owned bicycle	45	17	62	31
Did not own bicycle	80	60	140	69
Percentage of awareness	125 (62%)	77 (38%)	202	100

As shown in Table 1.3, majority of the respondents in Shah Alam and Kuala Lumpur were aware of the provision of cycle lanes in their cities. Nonetheless, with regards to bicycle ownership, only 31 per cent of the respondents who owned a bicycle in Kuala Lumpur and Shah Alam gained a higher number of bicycle ownership which was 48 per cent. The difference was not so much significant, and it could be said that the status of bike ownership did not balance the preparation of the cycling track by the respondents. In other words, the existence of the cycling track was not good enough to encourage people to own a bicycle and use the facilities.

iii. Comparison of the Spreading Medium for the Promotion of LCC Programme in Shah Alam and Kuala Lumpur

In terms of the method to promote and spread the medium of the LCC programme by MBSA and DBKL, there was a huge difference. This was because MBSA gained more attention by using social media, while DBKL gained more attention by using flyers. Figure 1.0 shows the percentage of the type of spreading medium identified between the respondents from Shah Alam and Kuala Lumpur about the LCC programme. For Shah Alam, the highest rate of 65.6 per cent was through social media, followed by 34.4 per cent through flyers, 21.9 per cent through friends and family, as well as 15.6 per cent through newspapers, while the remaining was only 3.1 per cent through other medias. In Kuala Lumpur, flyers exhibited the highest percentage of 50 per cent, followed by newspapers with 21 per cent, friends and family with 10 per cent, social media with 5 per cent, and other spreading mediums with 4 per cent.

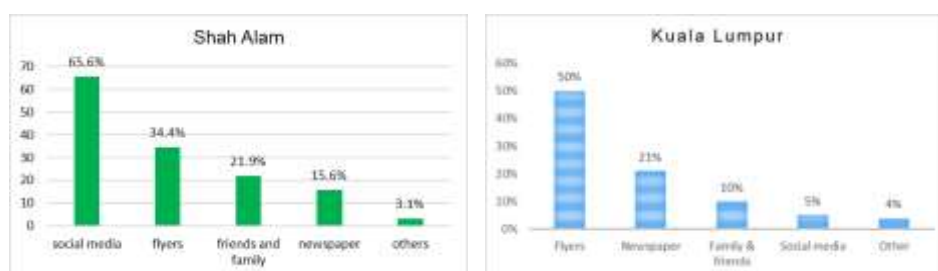


Figure 1.1: LCC's Program Promotion and Spreading Medium between MBSA (Shah Alam) and DBKL (Kuala Lumpur)

iv. Comparison of the Policy Suggested by Respondents in Reducing Private Car Usage in Shah Alam and Kuala Lumpur

In encouraging the residents in Shah Alam and Kuala Lumpur to support and be involved in the LCC programme, the respondents were asked to select a policy that could encourage them to reduce private car usage. Table 1.4 shows the policies chosen by the respondents from both of the cities. The policy of subsidising electric car had the highest percentage as chosen by the respondents, followed by the policy of subsidising public transportation fee and the policy of increasing parking charge. The policy that had the lowest frequency as chosen by the respondents was the policy to increase the fuel price.

Table 1.4: Policy Suggested by Respondents in Reducing Private Car Usage between Shah Alam and Kuala Lumpur Residents

Policy	Shah Alam	%	Kuala Lumpur	%
Subsidising electric car	62	51	116	57
Subsidising public transportation fee	35	29	56	28
Increasing parking charge	21	17	20	10
Increasing fuel price	4	3	10	5
Total	122	100	202	100

v. Comparison of the Mode Change Acceptance for Non- Motorised Transportation in Shah Alam and Kuala Lumpur

Table 1.5 displays that the differences were quite significant for the readiness to change to non-motorised transportation between Shah Alam and Kuala Lumpur respondents. There were 40 per cent of the respondents who were ‘ready’ to switch to non-motorised in Shah Alam, and there were 60 per cent of the respondents who were not prepared to change. Different than in Kuala Lumpur, 45 per cent of the respondents were ‘ready’ to change to non-motorised followed by 37 per cent of the respondents who responded ‘maybe’ with the chance of readiness to change. Lastly, 18 per cent of Kuala Lumpur respondents stated that they were ‘not ready’ to change to non-motorised transportation. This showed that the respondents in Kuala Lumpur were readier to transform to non-motorised transportation than the respondents in Shah Alam.

Table 1.5: Mode Change Acceptance for Non-Motorised Transportation between Shah Alam and Kuala Lumpur Respondents

Readiness	Shah Alam	
	Frequency	Percentage (%)
Ready	49	40
Not Ready	73	60
Total	122	100

Readiness	Kuala Lumpur	
	Frequency	Percentage (%)
Ready	90	45
Maybe	75	37
Not Ready	37	18
Total	202	100

vi. Comparison of the Feedback Regarding LCC Programme in Shah Alam and Kuala Lumpur

Based on Table 1.6, the respondents were asked about three elements concerning the MBSA and DBKL programmes, namely, the approach, the implementation and the participation. From the ratings, it could be seen that all three elements had an average rate based on the feedback from the respondents. It could also be seen that the number of participations in the LCC programme in Kuala Lumpur was low, with 58 respondents as compared to the number of participations in Shah Alam. Therefore, DBKL must work harder in encouraging people to participate in its programme.

Table 1.6: Feedback Regarding Transport LCC Programme in Shah Alam and Kuala Lumpur

Elements	Shah Alam		
	Good	Average	Poor
Approach	55	55	12
Implementation	30	66	26
Participation	49	63	10
Elements	Kuala Lumpur		
	Good	Average	Poor
Approach	65	97	1
Implementation	55	107	2
Participation	51	76	58

vii. Comparison of the Support for Upcoming Programme by Age Group in Shah Alam and Kuala Lumpur

From Table 1.7, 74 per cent of the respondents were willing to support the upcoming LCC programme in Shah Alam. Table 1.7 indicates that 38 per cent of the respondents who were willing to support the forthcoming programme were from the age group of 20 to 29 years old. For Kuala Lumpur, 50 per cent of the respondents supported the programme, and 50 per cent of the respondents might support the programme. The highest percentage of supporting this programme (42%) was shown by the age group of 21 to 30 years old. A similar scenario was also seen in Shah Alam as the highest percentage of supporting this programme

(38%) was shown by the age group of 20 to 29 years old. Thus, it could be concluded that the young adults with the age range of 20 to 30 years old were willing to support the upcoming LCC programme in Shah Alam and Kuala Lumpur.

Table 1.7: Support for Upcoming Programme by Age Group between Shah Alam and Kuala Lumpur

Age Group (Years)	Upcoming Programme Support in Shah Alam							
	Support	%	Maybe	%	Not Support	%	Total	%
15-19	5	6	-	-	1	100	6	5
20-29	34	38	19	61	-	-	53	43
30-39	28	31	10	32	-	-	38	31
40-49	9	10	1	3	-	-	10	8
50-59	10	11	-	-	-	-	10	8
60-64	2	2	-	-	-	-	2	2
65 above	-	-	3	10	-	-	3	2
Total	90 (74%)		31 (25%)		1 (1%)		122	100
Age Group (Years)	Upcoming Programme Support in Kuala Lumpur							
	Support	%	Maybe	%	Not Support	%	Total	%
15-20	1	1	0	0	-	-	1	1
21-30	42	42	15	15	-	-	57	28
31-40	23	23	43	43	-	-	66	33
41-50	22	22	25	25	-	-	47	23
51-60	7	7	16	16	-	-	23	11
61-70	6	6	2	2	-	-	8	4
Total	101 (50%)		101 (50%)		-		202	100

SUMMARY AND CONCLUSION

The findings from survey indicated that 55 per cent of the Shah Alam respondents were not aware of the LCC programme, while only 45 per cent of them were aware of the programme. Although LCC programme had been noticed in Kuala Lumpur, 17 per cent of the respondents were not aware of the LCC programme, while 83 per cent of the respondents were mindful of the effort to the LCC programme.

With regards to provision of transportation facilities to support the LCC programme, the majority of the residents in Shah Alam and Kuala Lumpur were aware of the provision of free bus service in their places. The survey showed that the residents in the age group of 20 to 40 years old had the potential to use the bus as their primary mode of transportation. The results were also similar for awareness on the provision of cycle lanes. Conversely, for bicycle ownership, only a few of them owned a bicycle. This implied that the status of bike ownership

did not balance with the preparation of the cycling tracks. It could be observed that the existence of the cycling track was not good enough to encourage people to own a bicycle and use the facilities.

In encouraging the residents in Shah Alam and Kuala Lumpur to support and be involved in the LCC programme, the respondents were asked to select the policy that could encourage them to reduce private car usage. The findings showed that the respondents had a high preference on the policy of subsidising electric car, followed by the policy of subsidising public transportation fee and the policy of increasing parking charge. The policy that had the lowest preference by the respondents was the policy to increase the fuel price.

Pertaining to readiness to change to non-motorised transportation, Kuala Lumpur respondents were prepared to transform to non-motorised transportation as compared to the Shah Alam respondents. On a contrary, 74 per cent of the Shah Alam respondents were willing to support the upcoming LCC programme. From respondents' opinions about the LCC programme approach, the implementation and the participation of Transportation LCC Programme from both authorities, it was found that all three elements had an average rate based on the feedback from the respondents. Therefore, a few strategies need to be developed to ensure the success of the Transportation LCC programme implemented by both Local Authorities, namely, MBSA and DBKL.

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ASSESSING CYCLE LANES USING THE BICYCLE COMPATIBILITY INDEX (BCI) IN SHAH ALAM, SELANGOR, MALAYSIA

**Yusfida Ayu Abdullah¹, Syifa'Azwa Ahmad Razi², Na'asah Nasrudin³,
Zulkifli Ahmad Zaki⁴**

^{1,2,3,4}*Faculty of Architecture, Planning and Surveying,
^{1,3,4}Responsive Environmental Development (RED) Research Group,
UNIVERSITI TEKNOLOGI MARA (UiTM)*

Abstract

The evolution of bicycles is tremendous. Humans recognized its function, importance, and value this non-motorized vehicle as an important part of their daily life. In Malaysia, most urban roads are designed for the motor vehicle therefore cycling is not a greater option for commuting to workplaces. This study aims at assessing the compatibility level of cycle lanes. Section 14, Shah Alam, Malaysia was selected as the case study, and a questionnaire survey utilizing the Simple Random Sampling technique was conducted involving 133 samples. The Bicycle Compatibility Index (BCI) was applied to calculate the capability of bicycle lanes. Results demonstrated the weaknesses of bike path infrastructure and its compliance to guidelines. The compatibility level of cycle lanes is still low, therefore, suggesting an enhanced approach to the planning and development of cycle lanes. The outcome of this study can be a guide to the local authority yet applicable to other urban areas.

Keywords: Bicycle; Cycle Lanes; Bicycle Compatibility Index; Capability

¹ Assoc. Professor at Universiti Teknologi Mara (UiTM). Email: ayunazeri@gmail.com

RESEARCH BACKGROUND

Bicycles were first made popular in the 18th century with the creation of a larger wheel drive model and had evolved ever since to respond to consumers' demand. In 1885, an English man John Kemp Starley invented the first bicycle with safety measures. That invention is praised as one of the most significant moments of bicycle design because of the network that connects pedals to the rear wheels and the removable of front wheels. Thereafter, the Golden Age of Bicycles was shaped.

Bicycles are not only intended as a mode of transportation but also used for recreational and leisure purposes. Bikes are claimed as the number-one mode of transportation around the world. Sibilski (2015) estimates that there are over 2 billion bikes in use throughout the globe and predicts that the number would increase to five billion in 2050. He thinks that more than 50 percent of the world population knows how to ride. The Netherlands holds the highest record of users with 99% of its population are cyclists (Kenny, 2015). In fact, in Amsterdam itself, there are over 500km of bicycle lanes exist throughout the city (Gaada.com, 2015).

Private transportation is thought to be easier for individuals to move from one place to another. The demand for private vehicles has been increasing even though the capacity of roads is becoming alarming. To encourage more cyclists, bicycle facilities and the provision of dedicated lanes for cyclists have been introduced. This, in turn, would at least reduce traffic congestion in some urban areas which seems to be a great challenge in major cities in Malaysia. Cycling is deemed environmentally friendly because it does not produce emission and quiet too. Not only that but cycling also promotes good health and may reduce cardiovascular disease and other health issues (Theja Phutta, 2019). Cycling can help weight management, promotes good mental and physical health, and prevents or manages medical conditions (Cronkleton, 2020). However, currently, only 40% Malaysians adopted healthy lifestyle by making sports (such as cycling) as a culture (Ling et al., 2018). Furthermore, in Malaysia, cycling as a medium of transport to the workplace is said to receive little attention. A motor vehicle is more prevalent considering the weather and the distance from home to the workplace. Nevertheless, bicycles are gaining popularity for school children and teenagers to commute to school and are commonly known as a form of exercise among the public.

The main purpose of creating designated cycle lanes is to ensure a safe path for cyclists. Bike speed is usually much lower that of motor vehicles. Bicycles are light vehicles relative to other vehicles, which may result in injuries in the event of an accident.

Preliminary investigation for this study suggested that bicycle facilities are not effectively utilized and therefore demonstrating for lack of acceptance among the residents of Section 14, Shah Alam. Section 14, in Shah Alam which

is situated in the State of Selangor, is densely developed with commercial buildings and activities. Part of Section 14 has a recreational area, but the provision of cycle lanes is not in total. The fact that the area is commercially focused, the area has increased road capacity which in turn affected bicycle lanes. An early investigation revealed that motorists tend to park their vehicles on cycle lanes which disrupt the efficiency of cyclists' movement (Figure 1). This invasion is inevitable as it requires constants inspection by the local authority enforcement unit.



Figure 1: Invasion of Motorists on Cycle Lane
Source: Author

Also, the route and placement of bicycle lanes can affect the use of bicycles in an area. The design and route of bicycle paths often consider the connectivity and link from one trail to another. However, some routes tend to be isolated and hidden from vicinity which to some extent influences the cyclist's sense of security and safety (Figure 2). Therefore, cycling is not the main option. The surroundings of bicycle lanes play an important role in affecting one's confidence in feeling or safety assurance. Location is also said to play a big role in walking and cycling decisions (Nasrudin et.al., 2014).



Figure 2: Cycle Lanes tend to be 'out of sight '
Source: Author

The early investigation suggested that the local authority for Shah Alam, i.e. the Shah Alam City Council (known as MBSA) had focused its 2019 budget more on operating expenses rather than development (Yeen and Muthiah, 2019; Michael, 2018; The Sun Daily, 2018). The budget was focusing more on other development and little was mentioned about cycling paths even though the state government had launched its bicycle lanes (Low and Rajendra, 2019). The Shah Alam City Council had aspired to encourage the reduction of carbon footprint in its city. The Shah Alam Local Plan 2020 targets the city as a low carbon city where it aims at reducing the capacity of private vehicles by encouraging the use of bicycles as a mode of transport (Selangor Town and Country Planning Department, 2014). The Low Carbon Action Plan was outlined for the year 2030 and targeted to achieve a reduction of 60% of CO₂ emission by 2030 (Lin, 2017). Part of the self-evaluation results from the project was to incorporate pedestrian pavements and bicycle roads to elevate the efforts in achieving a low carbon city (Lin, 2017). Based on this study and Shah Alam's aspiration, it cannot be denied that provision and facilities for cyclists should gain more attention. Also, this ambition can be transpired through the support of the public, and therefore, more initiatives should be executed to convey the government's intention. In 2017, a study in Shah Alam revealed that there was a reduction of 12,173 vehicles based on the 2015 baseline (Green Tech Malaysia, 2019). This positive achievement inevitably becomes a challenge to the local authority to accomplish more and be a reference to other local authorities in Malaysia which had adopted the Low Carbon City Framework (LCCF).

This study, therefore, aimed at assessing cycling lanes in an urban area in Malaysia, by employing the measuring tool named as the Bicycle Compatibility Index (BCI). The intention was to evaluate the capability of bicycle lanes (LOS) and the users' perception with regards to the provision and facilities for cyclists. The outcome of this study was expected to increase the level of accessibility for cyclists and accommodate the local authority's future planning, as well as be guidance to other stakeholders involved in the design and provision of cycle lanes or cycle paths.

LITERATURE REVIEW

Bicycle Lanes

Bicycles lanes or cycle paths are pathways or special paved lanes, or spaces dedicated for cyclists only. Cycle lanes can either be shared with pedestrians known as urban bike networks (Figure 3 (a)) or designed for cyclist usage only. However, shared lanes require a bigger space (Figure 3 (b)). There are also bicycle lanes adjoining the road for motor vehicles but are separated through designated markings like colour or markings. This type of cycle lanes joins with the road within the boundaries of the roads' laneway. Therefore, the roads are normally with wider shoulders (Figure 3 (c)). Otherwise, cycle lanes are

controlled lanes where bollards, fences, or soft landscapes become the barrier or partition to detach between the road and the cycle lanes Figure 3 (d)) (Jsoulliere, 2017).

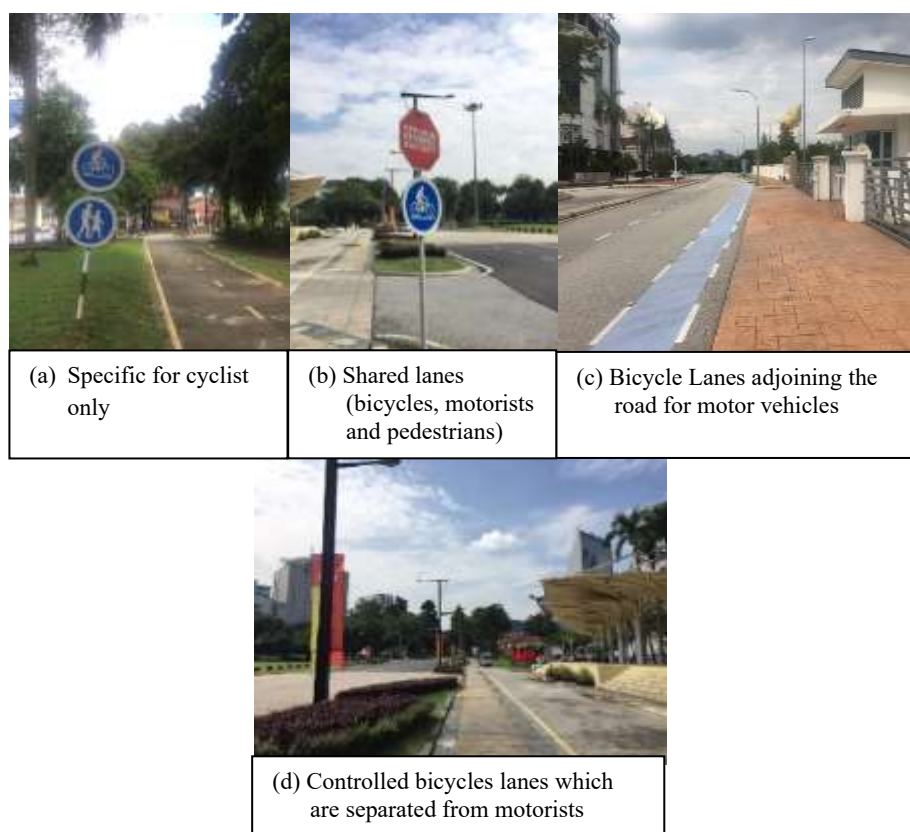


Figure 3: The types of cycle lanes
 Source: Author

Planning and Guidelines of Bicycle Lanes in Malaysia

In Malaysia, guidance on the design of laneways which incorporates bicycle lanes was first addressed in 2012 in the Green Neighbourhood Guideline (PLANMalaysia, 2012). However, the principles of design were brief. But in 2013, PLANMalaysia (formerly known as the Department of Town and Country Planning Peninsular Malaysia) had produced its explicit manual for bicycle lane which is devoted to bicycle planning, design, and development (PLANMalaysia, 2013). The manual is comprehensive and furnished with principles of planning and supported by illustrations in terms of design aspects (Figure 4). The standards for bicycle lane provision are divided into three (3) categories, namely; for non-

residential, residential, and for the public-focused area. For non-residential areas, components of design must encourage pedestrian access by emphasizing sidewalks, pedestrian lanes, and transit stops. Part of the design elements for the green neighbourhood was addressed as "routes through parks, open spaces and connect to the local street network while storage in secure and protected areas" (PLANMalaysia, 2017). The rule-of-thumb was to ensure that the cycle lane network should be interconnected with residential areas, neighbourhoods, commercial areas, and transit facilities for accessibility of all groups of the public (PLANMalaysia, 2013).

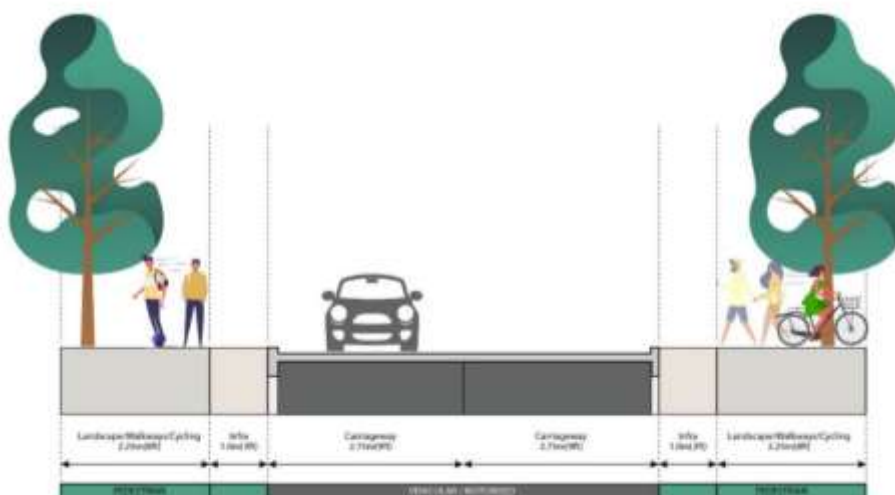


Figure 4: A cross-section of a 12-metre width road provision with an allocation of 1.53 metres of cycle lane for each side or 2.25metres including the street furniture
Source: Redrawn from PLANMalaysia, 2013

Bicycle Compatibility Index (BCI)

The Bicycle Compatibility Index (BCI) evaluates the capability of urban and suburban roadway sections to accommodate both motorists and cyclists (Harkey et.al, 1998). It is also applied to examine cycle lane facilities in urban areas to determine the geometric and operational requirements for improvement (Eren et.al, 2019).

The approach to the BCI model is by capturing users' perceptions and evaluate the comfort level of a cyclist (Illie et.al, 2016). To attract more cyclists, the element of comfort and safety are essential (Kwigizile, Oh and Lyimo, 2019). However, the BCI is adapted for mid-road segment use only, or roads with traffic. Therefore, any major intersection of the roadway facing traffic stops or traffic congestion will not be considered as part of the Level of Service (LOS)

assessment. According to BCI, LOS is examined from the user's perceptions of qualitative measures based on the operational conditions of the road.

METHODOLOGY

The study uses Section 14, the city centre of Shah Alam, situated in the State of Selangor, in Malaysia as a case study (Figure 5). Shah Alam City Council is known for its efforts in developing cycle lanes which spent almost RM5million on bicycle infrastructure around its city including Section 14. The bicycle infrastructure was launched in July 2013. Section 14 is highly developed with commercial and administrative buildings. A simple random sampling method was applied to gain user's perception to assess the LOS from the application of the BCI. 133 samples or cyclists were picked randomly at the site to represent the population size of 157,210.

The survey was conducted during weekdays and weekends (7 days in a week) to reach a total of 133 (100%) respondents based on sampling calculation. Each day, the survey was performed in the morning (7.00 am-10.00 pm) and in the evening (4.00 pm-7.00 pm) targeting the peak hours and the common hours for traveling and recreational purposes. The survey was not carried out in the afternoon based on the result from the early investigation. Since Malaysia experiences hot temperatures in the afternoon, therefore, it is not a usual practice to cycle in the hot weather.

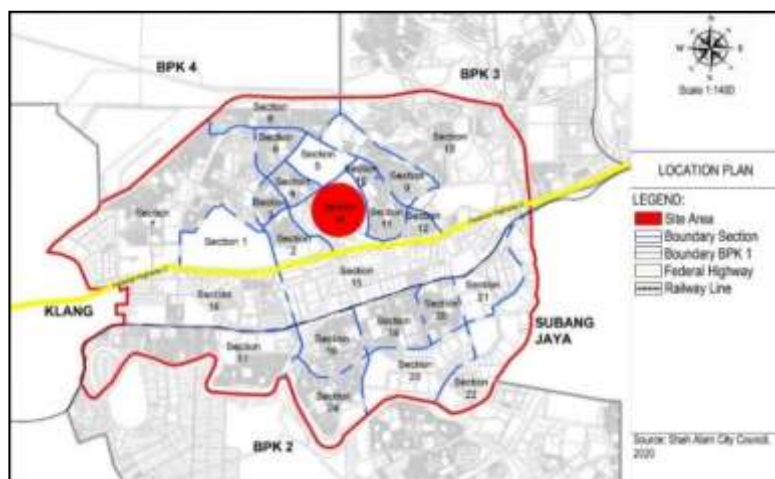


Figure 5: Location Plan of the Study Area
Source: Shah Alam City Council, 2020

12 segments of cycle lanes were selected in Section 14 and each segment was evaluated using the BCI Index using the equation and Table 1 below (Harkey et.al, 1998):

$$\text{Equation: } \mathbf{BCI = 3.67 - 0.966BL - 0.410BLW - 0.498CLW + 0.002CLV + 0.0004OLV + 0.022SPD + 0.506 PKG - 0.264 AREA + AF}$$

Table 1: Variable Definitions for Bicycle Compatibility Index (BCI)

BL=	presence of a bicycle lane or paved shoulder ≥ 0.9 m no = 0 yes =1	PKG=	presence of a parking lane with more than 30 percent occupancy no = 0 yes = 1
BLW=	bicycle lane for paved laneway curb m (to the nearest tenth)	AREA=	type of roadside development residential = 1 other type = 0
CLW=	curb lane width m (to the nearest tenth)	AF=	$f_t + f_p + f_n$ Where:
CLV=	curb lane volume vph in one direction		f_t Adjustment factor for truck volumes (see below)
OLV=	other lane(s) volume – same direction vph		f_p Adjustment factor for parking turnover (see below)
SPD=	85 th percentile speed of traffic km/h		f_n Adjustment factor for right-turn volumes (see below)

Adjustment Factors			
Hourly Curb Lane Large Truck Volume	f_t	Parking Time Limit (min)	f_p
≥ 120	0.5	≤ 15	0.6
60 – 119	0.4	16 – 30	0.5
30 – 59	0.3	31 – 60	0.4
20 – 29	0.2	61 – 120	0.3
10 – 19	0.1	121 – 240	0.2
<10	0.0	241 – 480	0.1
		>480	0.0
Hourly truck turn volume	f_n		
≥ 270	0.1		
<270	0.0		

Source: Harkey et.al, 1998

Figure 6 below shows the cycling lanes of the study area. The selected bikeways were mostly the lanes accompanied by commercial buildings.

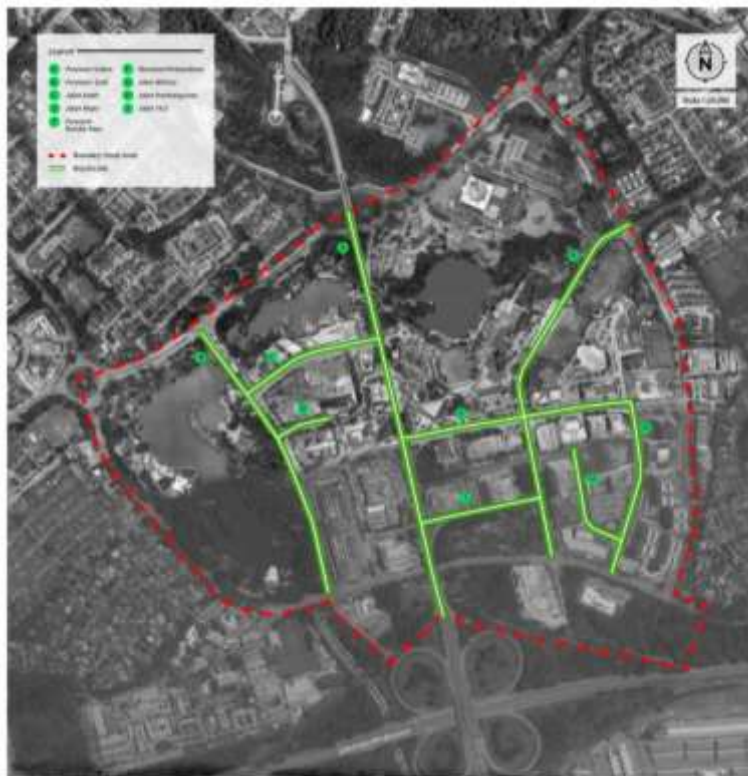


Figure 6: Bike Paths marked in ‘green lines’ in the Study Area
 Source: Google Maps, 2020

Meanwhile, the Level of Service (LOS) was applied to evaluate the operational aspect, which identifies the most appropriate routes and determine the poor links. Also, LOS examines the design of roadways to assess the compatibility of bicycle usage (Liu, Homma and Iki, 2019). Otherwise, it can examine the planning aspect which can be a reference for future planning and improvement. Table 2 below shows the designations of LOS and compatibility level qualifiers.

Table 2: BCI Associated with LOS Designations and Compatibility Level Qualifiers

LOS	BCI Range	Compatibility Level
A	<1.50	Extremely High
B	1.51 – 2.30	Very High
C	2.31 – 3.40	Moderately High
D	3.41 – 4.40	Moderately Low
E	4.41 – 5.30	Very Low
F	>5.30	Extremely Low

Source: Research Development and Technology (1999)

RESULTS AND DISCUSSION

Results from Users' Perceptions

Based on the survey, the study revealed that from 133 respondents, 34.2% cycle in the morning. This figure does make sense because most of the cyclists (40.5%) work in the private sector and office hour for private sector normally starts at 9.00 am. However, only 3.8% of the total respondents ride every day as a form of exercise and this figure represents most male cyclists. However, the majority (34.2%) only ride once a month. The researchers felt that this frequency is a challenge for the local authority in envisaging the city as a low carbon city. The study showed that only 15.2% cycle at least 5 times a week.

Most cyclists (82%) ride for recreational purposes. Only 5% think that cycling avoids traffic congestion, while 2% understood the importance of protecting the environment from fuel combustion. This situation shows that the public has yet to become aware of the preservation of the environment. Bike paths or cycle lanes are part of environmental protection efforts; therefore, the Shah Alam City Council needs to diversify its initiatives with the community to raise awareness of the vulnerabilities and effects of too many private vehicles on the road. However, it cannot be denied that the weather and distance of one's home and workplace do play a significant role in whether to cycle or to drive. Several obstacles were highlighted by the respondents which hinder them from cycling. A high percentage of cyclists (46%) claimed that the weather condition influences their choice for mode of transport. The hot afternoon weather and the frequent rain made them uncomfortable to cycle. Furthermore, the cycle lanes in Section 14 are not covered and a cyclist is not protected against hot weather and heavy rain. The other obvious reason was the safety aspect. Cyclists (39%), felt that without any barriers or partitions from the road, they feel unsafe while cycling because motorists often do not compromise with the 50km/h speed limit which creates an unsafe cycling experience.

Motorists' Behaviour Vs. Cyclists' Right

Site observations were carried out several times which includes two observations for the pilot observation study, i.e. once on a weekday and once on a weekend; and twice for the actual observation study, also on a weekday and a weekend. During the pilot study, site observations were performed in the morning, afternoon, and evening. But the actual observation study only took place in the morning (7.00 am-10.00 am) and evening (4.00 pm-7.00 pm). Results revealed that some motorists were not observing the cycle lane. Several vehicles were seen parked on cycle lanes. This behaviour inescapably blocks the cycle lanes and cyclists will need to cycle on the road (for motorists) to escape the vehicle. Part of the motorists' actions may be caused by escaping to park further from the

building or avoiding the drop-off bay, or inadequate parking space. Unfortunately, cyclists must deal with such an attitude, but this action is likely to happen even on weekend (Figure 7).



Figure 7: Motorists are Denying the Right of Cyclists

Source: Author

The Reality

The study discovered that the main issue of cycle lanes in Section 14 Shah Alam was the width of cycle lanes. Most of the cycle routes are below the ideal standard directed by PLAN Malaysia (2013) which requires a dedicated cycle lane of 1.53meters in width (not for shared lane). In Section 14, most lanes are only 1.1meter (see example in Figure 8).



Figure 8: Cycle lane is narrow

Source: Author

The volume of motor vehicles during peak hours is high causing the cyclists to be uncomfortable and unsafe. Moreover, at most of the roadways, the speed limit for motor vehicles is 50km/h. This condition also affects the sense of comfort for the users. Respondents complained that motorists tend to drive on cycle lanes because there are no barriers to segregate between the cycle lanes and the road, making it unsafe for the cyclists. Also, the fact that most cyclists only ride for recreational purposes and mostly cycle once a month makes it difficult to achieve the city council's endeavour to achieve as a low carbon city and persuades its residents to commute by bicycle. What's more, only 2% believe that cycling will reduce transportation costs and just a 1% cycle because it is the only option the person has.

Results from Bicycle Compatibility Index (BCI) and LOS Assessment

Using the equation of the Bicycle Compatibility Index (BCI), 12 segments of cycle lanes in Section 14 were calculated to derive its LOS. The elements of the BCI had contributed to determining the level of comfort of cyclists in the study area. The analysis revealed that the design, surrounding land uses, traffic operation, as well as parking area have a significant impact on determining the index value. Basically, out of 12 segments of cycle lanes, a segment positioned at Persiaran Sultan was calculated as ‘extremely low’ in terms of its LOS. 6 segments of cycle lanes received the BCI level as ‘very low’ LOS, which means that these lanes are not comfortable for cyclists. Otherwise, the LOS for the other 4 segments of cycle lanes was determined as ‘moderately high’ and the remaining segment resulted in ‘moderately low’ (Table 3) (Figure 9).

Table 3: LOS for 12 Segments of Cycle Lanes in Section 14, Shah Alam

Road	BCI	Level of Service (LOS)	Bicycle Compatibility Level
Persiaran Tasik	4.54	E	Very Low
Jalan Indah	2.66	C	Moderately High
Jalan Majlis	2.96	C	Moderately High
Persiaran Sultan	10.25	F	Extremely Low
Persiaran Perbandaran (a)	4.66	E	Very Low
Persiaran Perbandaran (b)	4.48	E	Very Low
Jalan 14/2	2.80	E	Very Low
Persiaran Bandaraya (a)	4.82	E	Very Low
Persiaran Bandaraya (b)	4.67	E	Very Low
Persiaran Bandaraya (c)	4.03	D	Moderately Low
Jalan Ikhtisas	3.23	C	Moderately High
Jalan Pembangunan	2.67	C	Moderately High

Source: Author

The results from the BCI calculation was paralleled with the respondents’ views. The majority argued that the design of the cycle lanes is narrow, and cyclists are not comfortable with the width. Similarly, the researchers felt that the width of cycle lanes is not in compliance with the ideal width suggested in the manual by PLANMalaysia (2013). Other than that, the majority (46.6%) felt the distraction from other vehicles which cause them to be uncomfortable on cycle lanes.

for motor vehicles. Many cyclists are still commuting by motor vehicles and bicycles are used for recreational purposes. Only a few cyclists ride daily while most cyclists ride once a month in Section 14. Cycling is still far from becoming a preference to commute to the workplace due to hot weather and frequent rain. Motorists also contributed to the unsafe feeling from the illegal parking on cycle lanes. The Shah Alam City Council needs to monitor and record these behaviours continuously which in turn can provide ideas for future improvement or new cycle lanes. This study had shown that a bicycle is still not an option or approach to adopt to achieve a low carbon city status. Perhaps the city council would conduct a detailed study on this matter. Other future research may include the need for additional cycle routes and lanes in Section 14 or anywhere in Shah Alam which has linkages from one section to another. The researchers believe that the outcome of this study can be a reference to the local authority.

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AN ANALYSIS OF THE NEEDS OF ELDERLY-FRIENDLY NEIGHBOURHOOD IN MALAYSIA: PERSPECTIVES OF OLDER AND YOUNGER GROUPS

**Husna Ahmad Khalid¹, Oliver Ling Hoon Leh², Nur Iklil Rifhan Jalil³,
Marlyana Azyyati Marzuki⁴, Na'asah Nasrudin⁵**

*^{1,2,3,4,5}Environmental and Social Health Research Group (ESH),
Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA (UiTM)*

Abstract

The increase of the elderly population in Malaysia can be one of the main challenges to planners, architects and policy makers. This indicates that provision of a suitable neighbourhood design for a population of different ages is necessary. The elderly group requires specific design standards in neighbourhood planning to ensure a comfortable, conducive and safe living environment. It is a known fact that health issues are part and parcel in elderly care. Having a proper neighbourhood design will likely contribute to an increase in health care services and safety of the elderly. This study analysed the people's perspective on the needs of elderly-friendly neighbourhood in Malaysia and the elements that should be taken into consideration to fulfil the needs. This study aimed to observe the opinion of the elderly, as well as young people for future planning. Data were collected from the residents in the study areas which were Kajang and Sungai Chua. These study areas are located in Hulu Langat district, in which a high percentage of the elderly population was available. The respondents were chosen to participate in a survey in a form of questionnaire that was administered in the study areas. The questionnaire survey did not specifically focus only on older people, but also towards the young people. These young people will either become a caretaker of their elderly or an elderly in the future. Results of this study concluded that elderly-friendly neighbourhood was indeed important and the most suitable type of house for the elderly was single-storey. The elderly-friendly neighbourhood should also be equipped with elements that prioritised the physical activity of the residents. This study provides insights in order to promote the elderly-friendly neighbourhood concept.

Keywords: Ageing, elderly-friendly, health care, nursing, safe, service

² Corresponding author. Assoc Prof at UiTM Selangor. E-mail: oliverling.my@gmail.com

INTRODUCTION

This research focuses on the neighbourhood of “elderly-friendly” which is not commonly adopted in Malaysia. Malaysia is expected to experience a population ageing in 2020 with an estimated 10.7 per cent of the population of those who are of 60 years and above, or 7.0 per cent of the population of those who are above 65 years old (DOS, 2020; Mafauzy, 2000). Changes in social characteristics with increase of urbanisation and modernisation have also brought a huge difference in the increase of demand for this type of neighbourhood (Aini et al., 2016, Ong et al., 2009, Oswald et al., 2010). One of the recent studies in Segamat, Johor, Malaysia (Norhaslina & Tan, 2017) found that most of the elderly respondents (96%) preferred a retirement neighbourhood than a nursing home. A study by Marsa et al. (2020) found that the overall mean level of Demoralisation Syndrome in the residents of nursing homes (69.60 ± 17.41) was higher as compared to community dwellers (45.40 ± 21.47), and those receiving daycare services from the rehabilitation centres (31.90 ± 17.59). This difference was significant ($P \leq 0.05$).

Thus, there is a need to provide an elderly-friendly neighbourhood instead of nursing home for elderly. The retirement neighbourhood or elderly-friendly neighbourhood is a new concept of retirement lifestyle (Norhaslina & Tan, 2017). However, there is no clear housing policy for the elderly, and communities must meet the different needs of the elderly for active ageing to maintain their quality of life. Thus, the suitable type of houses and the characteristics which are the necessities of the elderly are explored in this study.

LITERATURE REVIEW

The elderly-friendly neighbourhood concept is designed to support advanced old age people. It is positioned to provide support and services easily. The neighbourhood has to meet the needs of the disadvantaged older people which include physical and psychological health issues, mobility limitations, as well as security issues. In other words, it is simply explained as any neighbourhood and homes with supporting features that are more supportive in terms of services physically, as well as socially for elderly (Elsawahli, 2013). Such concepts include enriching communities, delivering community services, creating all-age neighbourhoods, building purpose-built, designing small-scale intergenerational models, investing in mobility, distribution, and communication technologies (Elsawahli, 2013).

The elderly-friendly neighbourhood can be designed purely for the elderly group or designed universally to meet the needs of the elderly, as well as younger residents. Nevertheless, current development of accommodation for the elderly focuses more on “retirement home”. It is a concept more towards age-segregated with a planned and low density, and it is constructed by a private capital, offering extensive recreational services and relatively low-cost housing

for the elderly (Norhaslina & Tan, 2017). To simplify the idea of an elderly-friendly (or ageing-friendly) community, it is the neighbourhood that encourages elderly-oriented growth. For example, it recognises the importance of promoting physical activity, as well as enhancing social cohesion for physical and mental health of older people (Elsawahli, 2013).

Key Principles for Elderly-friendly Neighbourhood

Reports by Hirschmann (2019) have shown that there is still a lack of awareness among many designers and architects about the concept of universal design and its application, as well as the particular housing that caters the needs of the elderly and disabled. Elderly-friendly home's concept provides the elderly with a comfortable housing environment. Mohd Tobi, Fathi and Amaratunga (2017), as well as Norhaslina and Tan (2017) elucidate that there are four (4) key areas of housing or neighbourhood for the elderly:

- i. Elderly-friendly or ageing-friendly houses
- ii. Healthcare services
- iii. Facilities and services, especially the recreational services
- iv. Social aspects

For the elderly-friendly houses, based on previous research (Norhaslina et al., 2019), most of the older people favoured small houses for better management and handling. The placement of houses should be close to the market for easy shopping. A study in Singapore (Lane et al., 2020) displayed that older people, particularly females, who lived in closer proximity to a wet market, were found to be self-reported to have a better social health. Other preferable features encompass sufficient facilities, safety and security, friendly disability, provision of public transportations, space for religious activities, encouraging social and spiritual activities, mobile cleaning services, enlarging entrance size, good lighting, preferable single storey house, as well as others (Norhaslina et al., 2019; Siti Uzairiah et al., 2018).

Existing Provision of Homes for the Elderly in Malaysia

The provision of homes for the elderly people in Malaysia is not considered part of the housing programme or policy. It is considered a different social policy or programme under the community and family development allocation. Pertaining to governance, the Ministry of Housing and Local Government (MHLG) manages a formal and informal housing system in Malaysia, while the Ministry of Women, Family and Community Development (MWFCD) oversees the provision of homes for the elderly. For the state level, the management of elderly people in Malaysia is organised by the Department of Social Welfare (DSW) (Sulaiman et al., 2005; see Figure 1). In Malaysia, most related special accommodations for the elderly are governed in compliance with Care Centres

Act 1993 (Act 506), which covers “residential care centre” and “daycare centre” for the elderly (Malaysia, 1993). For the provisions of Act 506, a resident in the care centre is defined as a person obtained for the Care Centre (Elsawahli, 2013). Figure 1 shows the special accommodations for elderly as provided by DSW, non-profit organisations (NGOs) and private provider.

Furthermore, the demand for medical care, care centre and nursing homes for elderly is highlighted by Human Rights Commission of Malaysia (SUHAKAM) (2013) to promote and protect the rights of older persons. For SUHAKAM, elderly is under the category of “persons with disability”. Thus, the elderly is also a part of the vulnerable people who require more care from society. Vulnerable groups include women, children, persons with disabilities and indigenous people (SUHAKAM, 2013). Currently, there is still not many neighbourhoods with elderly-friendly facilities and design that allow the elderly to stay together with younger people.

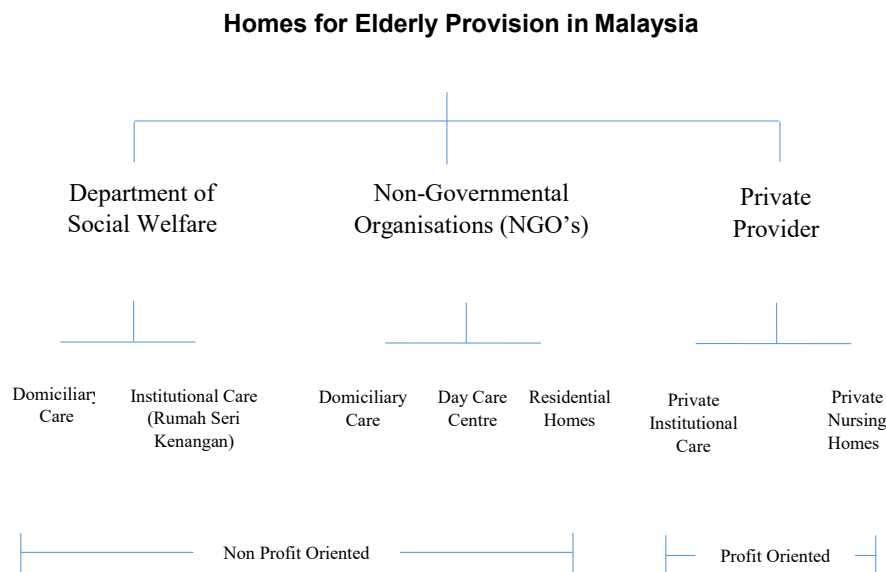


Figure 1: Homes for Elderly Provision in Malaysia
Sources: Sulaiman et al. (2005)

RESEARCH METHOD

Scope of the Study

This study of the needs for elderly-friendly neighbourhood covers the following topics:

- a. Building and outdoor space

Housing type and the space will be able to cater to the needs of the ageing people.

b. Accessibility and environment

Provided facilities will be easily accessible for the elderly with greater consideration on mobility, security and activity.

c. Security

Prioritising secure design is done to achieve the objective of providing a safe environment for the elderly.

d. Community support and health services

Health or nursing care and other services are given to ensure the convenience of the elderly.

e. Public facility

Providing sufficient resources and necessary elements is conducted to ensure the convenience of the elderly to stay within the area.

Case Study

Chosen study areas were Kajang town and Sungai Chua. They are located at Mukim Kajang in Hulu Langat district (see Figure 2). These areas were chosen because the population of elderly (65 years old and above) was high. The population is 19.5 per cent from the total population (DOS, 2010) as compared to Malaysia's figure of only 7.0 per cent in 2020 (as mentioned in the introduction).

Questionnaire Survey and Sampling of Respondents

This study aims to analyse the perspectives of local people (including the youngsters and older people) on the importance of having an elderly-friendly neighbourhood in Malaysia and the features that should be taken into consideration to create one. This study is different than previous research carried out in Malaysia, in which the respondents were only elderly (Norhaslina & Tan, 2017; Norhaslina et al., 2019). The opinions of young generations in the elderly-friendly neighbourhood is also important. This is because the young generations might also influence decision making by the elderly in choosing a suitable home or neighbourhood.

In total, 110 of respondents were chosen to answer the questionnaire forms which consisted of items about demographic background, respondents' perspectives on the needs of the elderly-friendly neighbourhood and the importance of certain elements in elderly-friendly neighbourhood design. Respondents were chosen from the age group of "20 years old and below" to "60 years old and above" by using a convenience sampling method. The sample size was determined with a confidence level of 90%.

Based on Table 1, female respondents were the majority of respondents who participated in this research. Besides that, most of the respondents were Malays. In the aspect of employment, the highest number of respondents were among those working in public sector.

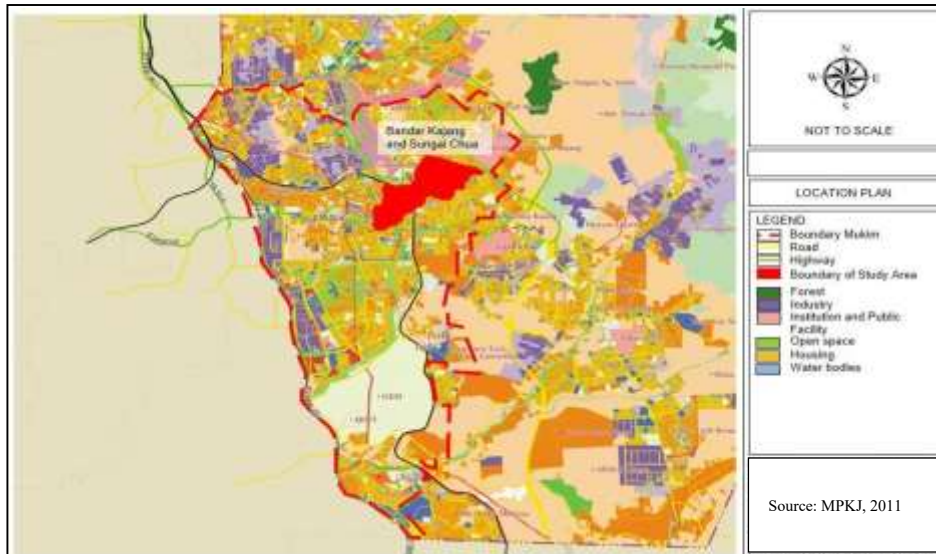


Figure 2: Location of study areas (Kajang and Sungai Chua)

Table 1: Demographic background of respondents

Demographics	Total sample	%
Gender		
Male	48	43.6
Female	62	56.4
Age		
< 20	4	3.6
20 – 29	34	30.9
30 – 39	36	32.7
40 – 49	18	16.4
50 – 59	12	10.9
60 and above	6	5.5
Ethnic		
Malay	100	90.9
Chinese	5	4.5
Indian	5	4.5
Occupation		
Public sector	50	45.5
Private sector	20	18.2
Self-employed	15	13.6
Unemployed	5	4.5
Students	18	16.4
Retired	2	1.8
Marital Status		
Single	44	40.0
Married	60	55.0
Widow	3	2.7
Others	3	2.7

Method of Analysis

The data was analysed using the Frequency and Cross-tabulation tests as provided in the IBM SPSS Statistics software. The purpose of the analysis was to examine respondents' perspectives on the needs of the elderly-friendly neighbourhood and the importance of the elements in the elderly-friendly neighbourhood design.

THE RESULTS AND FINDINGS

People's Perspective on the Needs of Elderly-friendly Neighbourhood

The research discovered that there were still fewer people who were aware of an elderly-friendly neighbourhood project in Malaysia as shown in Table 2. This was because the project was still not broadly practised and promoted in Malaysia as compared to the project abroad. The countries that actively develop housing which is elderly-friendly are Panama, Costa Rica and Mexico, while the recent developments of retirement homes or elderly-friendly housing in Malaysia are Ara Greens Residence in Ara Damansara, Green Acres in Meru, Ipoh and The Green Leaf in Sepang.

Table 2: Cross-tabulation between gender and people's awareness of the elderly-friendly neighbourhood

Gender	Aware	%	Unaware	%	Total (%)
Male	18	37.5	30	62.5	100.0
Female	32	51.6	30	48.4	100.0

While the level of awareness on the elderly-friendly neighbourhood or projects was relatively low, most of the respondents felt that the elderly-friendly neighbourhood was, in fact, necessary for the elderly (see Table 3). Most of the respondents responded "Yes" (necessary or needed) which made up to 62% out of the total respondents.

Table 3: Cross-tabulation between gender and the needs of elderly-friendly neighbourhood in Malaysia

Gender	Needed	%	Unneeded	%	Total
Male	46	95.8	2	4.2	48 (100%)
Female	62	100.0	0	0.0	62 (100%)

Age of respondents also played a vital role in determining the respondents' opinions about the needs of the elderly-friendly neighbourhood. From Table 4, 98% of the respondents from different age group agreed to the needs of the elderly-friendly neighbourhood in Malaysia. Only a small number of young adults (30-39 years old) said that they did not need a specially-designed

housing for the elderly. Table 4 shows that majority of the respondents were eager to see more neighbourhood that prioritised senior citizen in the future.

Table 4: Cross-tabulation between the age of respondents and the needs of the elderly-friendly neighbourhood in Malaysia

Age	Number of respondents		
	Needed	Unneeded	Total
<20	4	0	4
20 – 29	34	0	34
30 – 39	34	2	36
40 – 49	18	0	18
50 – 59	12	0	12
60 and above	6	0	6
Total	108	2	110

Moreover, marital status of respondents contributed to level of different opinions about the needs of the elderly-friendly neighbourhood. Based on Table 5, all widowers felt that a specially-designed housing for the elderly was necessary, while a small number of single and married respondents opined that housing for the elderly was unnecessary. It could be shown that widowers felt they required this type of neighbourhood more because they preferred a companion to get through the ageing process.

Table 5: Cross-tabulation between marital status of respondents and the needs of the elderly-friendly neighbourhood

Marital Status	Number of respondents		
	Needed	Unneeded	Total
Single	43	1	44
Married	59	1	60
Widower	3	0	3
Others	3	0	3
Total	108	2	110

Furthermore, different occupation sectors of respondents contributed to a variety of opinions as shown in Table 6. There was only a small number of respondents who felt that they were not in need of an elderly-friendly neighbourhood. They worked in the public or private sectors. On the contrary, all of the self-employed and unemployed, students and the retired groups believed that a specially-designed housing for the elderly was pertinent for them.

Table 6: Cross-tabulation between the employment of respondents and the needs of the elderly-friendly neighbourhood in Malaysia

Occupation Sector	Number of respondents		
	Needed	Unneeded	Total
Public	49	1	50
Private	19	1	20
Self-employed	15	0	15
Unemployed	5	0	5
Students	18	0	18
Retired	2	0	2
Total	108	2	110

People Perspective on Suitable Type of House for Elderly

The main purpose of this analysis was to evaluate the type of house that was suitable for the elderly based on the opinions of respondents. Table 7 shows that most of the respondents (82.6%) of the age below 50 years old chose single storey landed house as a suitable type of house for the elderly. Meanwhile, all the respondents from the group above 50 years old selected a single storey house as a suitable type of house for the elderly.

Study showed that people preferred to have a single storey landed house for the elderly people's convenience as they were not strong enough to be on their feet for a long period. This also raised concern with stairs climbing which was even more prevalent among the elderly. This finding of the study is in line with the research by Siti Uzairiah et al. (2018), in which the finding displayed that the elderly preferred single storey house. Perhaps, Malaysian young generations also preferred to stay at landed housing based on previous research conducted by Ling et al. (2016).

Table 7: Cross-tabulation between the age and the type of house suitable for elderly people

Age	Single Storey landed		Double Storey Landed		Multiple Storey	
	No.	%	No.	%	No.	%
< 20	3	75.0	1	25.0	0	0.0
20 – 29	33	97.1	1	2.9	0	0.0
30 - 39	34	97.1	1	2.9	1	0.9
40 - 49	16	88.9	2	11.1	0	0.0
50 - 59	12	100.0	0	0.0	0	0.0
60 and above	6	100.0	0	0.0	0	0.0
Total	104	100.0	5	100.0	1	100.0

Table 8: Cross-tabulation between marital status of respondents and the type of house suitable for elderly people

Marital Status	Number of respondents			
	Single Storey landed	Double Storey landed	Multiple Storey	Total
Single	42	1	1	44
Married	56	4	0	60
Widower	3	0	0	3
Others	3	0	0	3
Total	104	5	1	110

Based on the marital status, only a respondent, who was single and of the age between 30 to 39, felt that multi-storey housing was suitable for the elderly (see Tables 7 and 8). This could be possible if the elderly lived with a caretaker or a close family member who could provide assistance and care.

The Importance of Ageing-friendly Elements in the Elderly-friendly Neighbourhood

The elements of study involved in this section were the elements of a building and outdoor space, accessibility and environment, community supports and health services, sense of security, as well as sports facility and recreations (see Table 9).

As shown in Table 9, building and outdoor space, as well as all its elements were ranked as important elements to be implemented in an elderly-friendly neighbourhood by the respondents. The elements of accessibility and environment were categorised as very important by the respondents. Apart from that, in regards to community support and health services, the elements of affordable physiotherapy, home nursing and housekeeping services were categorised as important, while elements of affordable medical services were categorised as very important. The respondents ranked sense of security element as a very important element. For elements of dancing area, walking track and passive recreational area, they were categorised as important elements to be included in the elderly-friendly neighbourhood. In contrast, the only element categorised as moderate important was sports facility. No element was categorised as unimportant or very unimportant by the respondents.

Nonetheless, among all the ageing-friendly elements for the neighbourhood, the aspect of sports facility and recreational area exhibited the lowest score (see Table 9). This illustrated that there was a group of respondents who regarded this aspect as not important for the ageing-friendly neighbourhood. Hence, the mean score for sports facility and recreational area was lower than the other elements (building and outdoor space, accessibility and environment,

community support and health services, as well as sense of security). A crosstabulation analysis was carried out to identify the specific group of respondents who remarked that sports facility and recreational area was not important for the elderly (see Table 10).

Table 9: Ageing-friendly elements for neighbourhood

ELEMENTS	MEAN SCORE*	AVERAGE MEAN	RANK
1. Building & outdoor space			
- Wide-paved walkway	4.07	4.03	Important
- Traffic signals	4.06		Important
- Leisure space	3.96		Important
2. Accessibility & environment			
- Accessibility and convenience of toilet	4.22	4.25	Very Important
- Public transportation	4.29		Very Important
- Pollution-free neighbourhood	4.25		Very Important
3. Community support & health services			
- Affordable physiotherapy	4.07	4.02	Important
- Affordable medical care services	4.28		Very Important
- Home nursing	3.94		Important
- Housekeeping services	3.79		Important
4. Sense of security			
- Secure environment for social activity	4.27	4.27	Very Important
5. Sports facility & recreational area			
- Sports facility (badminton/tennis)	3.17	3.65	Moderate
- Dancing area	3.40		Important
- Walking track	3.98		Important
- Passive recreational area	4.04		Important

*Score = 1: Very unimportant, 2: Unimportant, 3: Natural, 4: Important, 5: Very important

From Table 10, the number of respondents in the age group of less than 59 years old who chose the recreational area as important and very important was higher as compared to the respondents' age of 60 and above who chose mostly neutral. This could be because the youngsters thought that the elderly could gain more benefits from recreational facilities. Conversely, the elderly did not have the same view as the youngsters.

Table 10: Cross-tabulation between age and the importance of recreational area

Age	Number of respondents			Total
	Neutral	Important	Very Important	
<20	1	1	2	4
20 - 29	10	13	11	34
30 - 39	9	13	14	36
40 - 49	9	8	1	18
50 - 59	5	3	4	12
60 and above	4	0	2	6
Total	38	38	34	110

From Table 11, a higher number of younger respondents (<50 years old) thought that sports facilities, such as tennis and badminton court were important for the elderly. However, most of the elderly (aged 60 and above) believed that sports facilities were not important to them. This could be because most youngsters or caretaker would always want the best facilities for their elderly, but the elderly did not feel like it was a necessity to have a sports facility in their neighbourhood.

Table 11: Cross-tabulations between age and the importance of sports facilities (tennis and badminton court)

Age	Number of respondents				
	Very Unimportant	Unimportant	Neutral	Important	Very Important
<20	0	0	4	0	0
20 - 29	1	7	12	12	2
30 - 39	1	3	21	8	3
40 - 49	0	2	9	7	0
50 - 59	0	0	12	0	0
60 and above	0	4	0	2	0
Total	2	16	58	29	5

SUMMARY AND CONCLUDING REMARKS

In the research, the findings focused on the priorities to achieve a neighbourhood that the elderly needed. This study allowed the researcher to gain more knowledge in the aspect of an elderly-friendly neighbourhood by conducting a literature review and a questionnaire survey. By reviewing the literature, it helped

in identifying the challenges faced by the elderly people and increasing the comprehension about the importance of the elderly-friendly neighbourhood concept and the principle or elements of planning that should given emphasis to the elderly. This was essential to ensure comfortable living of residents in the neighbourhood.

Based on the opinions of young and elderly respondents, it was found that most of the respondents (from both young and elderly) felt that the elderly-friendly neighbourhood was important. The most suitable type of house was the single-storey landed house. All the ageing-friendly housing elements were either important or very important for the majority of respondents, except sports facilities, such as tennis or badminton. These sports facilities had been categorised by the respondents as moderately important in general. In other words, an elderly-friendly neighbourhood should be friendly for the elderly people to stay and enjoy their lives with activities, such as dancing, walking, interacting or socialising with friends, and other passive activities. The neighbourhood should be less polluted, with safe-paved walkway, with safe and convenient toilet, with good public transportations, with affordable physiotherapy, medical care services and home nursing, as well as with housekeeping services.

The findings can be a good input to government, developers, planners, and architects in providing a universal or specific neighbourhood which is friendly to the elderly. Future studies could be carried out to study the detailed design elements for the elderly-friendly neighbourhood.

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RELATIONSHIP BETWEEN QUALITY OF URBAN PARKS AND PHYSICAL ACTIVITY: A CASE STUDY IN CHANGKAT PUBLIC PARK, BATU GAJAH, PERAK

Shamirah Rosli¹, Oliver Ling Hoon Leh², Nurhazlin Amira Mohd Adzmi³, Marlyana Azyyati Marzukhi⁴

*^{1,2,3,4}Environmental and Social Health Research Group (ESH Group),
Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA (UiTM)*

Abstract

Nowadays, people, especially urban dwellers were not active. Physical inactivity will lead to an unhealthy body. Previous research found that physical activity will contribute to a healthy life. Based on the previous research, high-quality recreation areas, including urban parks and playgrounds can provide a wide variety of opportunities for physical activity and have the potential to help community in leading a more active lifestyle. However, the statistical relationship between the quality of urban parks and physical activity is yet to be examined, especially for Malaysia. Due to the gap, a study was conducted in Changkat Public Park (*Taman Awam Changkat*), Batu Gajah, Perak Darul Ridzuan with the aim to examine the statistical relationship between quality of the urban park and physical activity. The park quality was evaluated based on five (5) aspects which were facilities and amenities, accessibility, informative (signage), safety, as well as attraction. Pertaining to physical activity, this study focussed on time allocation, as well as frequency and type of activity of the park visitors. Data were obtained through a questionnaire survey among visitors. The relationship between urban park quality and physical activity in the study area was analysed using a correlation test. The study found that the quality of the park was moderately corrected to the active level of the respondents. As an implication, urban parks require serious concern by the designers and managers to uphold the quality for visitors.

Keywords: Correlation, lifestyle, physical activity, quality, urban park

² Corresponding author: Assoc. Prof. at UiTM, Puncak Alam, Selangor. E-mail: oliverling.my@gmail.com

INTRODUCTION

Due to the process of urbanisation, cities are under pressure for development due to the high concentrations of population in urban areas (Siti Nur Afiqah et al., 2015). Urbanisation with a higher density development will reduce the percentage of open land and vegetation areas (Mohd Azhar et al., 2017). The development with less care on sustainability of urban environment puts pressure on the healthiness of the urban environment and its residents. Generally, there are three causes of illness and deaths: (i) communicable, maternal, neonatal, and nutritional conditions or diseases, (ii) non-communicable diseases (NCD), and (iii) injuries (WHO, 2018). However, NCD contributes most of global deaths which are 41 million people each year (71 per cent of the total deaths). The four main types of NCD are cardiovascular diseases (like heart attacks and stroke), cancer, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma), and diabetes (WHO, 2018).

Based on Malaysian National Health and Morbidity Survey (NHMS) 2015, the alarming rise of NCDs in the country is largely due to poor lifestyle choices which are unhealthy food behaviours, physical activity, sleep, and peace of mind (Thavarajah, 2016). According to Bernama (2016), Youth and Sports Minister, Khairy Jamaluddin stated that only 40 per cent of Malaysians adopted a healthy lifestyle by making sport as a culture. He also stated that obesity which leads to heart diseases, hypertension and diabetes among Malaysians is getting more serious due to the unhealthy lifestyle and lack of participation in the sports. Furthermore, a study in Kuala Lumpur (Ling, et al., 2018) found that most of the respondents practised a less healthy lifestyle, for example, less active in carrying out physical exercise. The study also discovered that most of them liked to spend their free time watching television and accessing the Internet (Ling, et al., 2018).

Mansor and Harun (2014) stated that to fight NCD, living an active lifestyle will upkeep the physical and mental health of urban residents and prevent them from chronic disease. Hence, practice of a good diet, exercise, sleep, and relaxation are greatly useful in reducing the prevalence of health problems, which are mainly caused by inactive lifestyle, unhealthy food consumption and mental stress. Although there is still a controversy regarding the idea that green spaces trigger physical activity or that active individuals are inclined to select places with more green space, many cities have incorporated the idea of increasing greenness in neighbourhoods to encourage physical activity or exercise (Church et al., 2014; Wolf and Wohlfart, 2014). For research, the role of urban parks in improving public health has been analysed in the context of urban design in developed countries but has seldom been considered in developing countries, such as China and Malaysia. Moreover, Mansor and Harun (2014) stated that green space in a built environment is a significant health promotion agenda that improves the urban quality of life.

Nevertheless, there is a lack of research that focuses on the relationship between the quality of parks and physical activity (active lifestyle) among visitors in Malaysia. Thus, this study is carried out to investigate the relationship between quality of the urban park and physical activity of the visitors in a public park (Taman Awam Changkat) at Batu Gajah town in the state of Perak.

LITERATURE REVIEW

An urban park is a place with natural environment surrounded by an urban setting. An urban park that is also located near the housing area is less than 5 to 10 kilometres. Moreover, it as an activity centre for the urban dwellers. Urban parks provide a place for recreation, meditation, tourist attractions, places to gather with family and friends, places to enjoy the beauty of nature, and many others (Razak, Othman, & Nazir, 2016). The quality of parks is found to be relevant to peoples' life satisfaction, while the quality of health is correlated (Nurul Shakila et al., 2018).

The role of different types of urban green spaces (parks) in promoting active lifestyles has been studied in developed countries. Green spaces promote physical activity by providing free and readily accessible locations for active pastimes. Several studies suggested that people who live in greener neighbourhoods undertake more (and sometimes, more vigorous) physical activity, such as cycling and walking (Andersen et al., 2015; Liu et al., 2017; Shanahan et al., 2015a). This helps to reduce the risk of poor health (Ling et al., 2015).

Previous studies (Fraser & Lock, 2011; Owen et al., 2004; Su et al., 2014) have discovered positive correlations between parks, as well as residents' physical activity and health status. For instance, Liu et al. (2017) conducted a questionnaire survey to investigate respondents' physical activity status and its relationship with urban parks. The study discovered that the impact of different activities engaged in the urban park on health benefits was identified. In Siti Nur Afiqah et al.'s (2015) study, it was mentioned that human health, especially NCD was related to the human lifestyle, including physical activities. The physical activity was affected by land use and urban area design (Siti Nur Afiqah et al., 2015).

According to Masana et al. (2017), a healthy lifestyle is an important factor in the prevention of cardiovascular disease (CVD). Risk factors, such as high blood pressure, diabetes mellitus and dyslipidaemias, including high total cholesterol can be modified by lifestyle changes. Lifestyle factors, such as tobacco smoking, lack of physical activity and dietary habits are also modifiable. These factors can reduce the need for drug interventions if changes are successfully made (Masana et al., 2017). Physical activity and healthy eating are vital factors in contributing to a healthy lifestyle.

Most of the researchers (Lv et al., 2017; Macovei, Tufan, & Vulpe 2014) used physical activity as an indicator to measure a healthy lifestyle. As mentioned by Gadais et al. (2018), one of the major components for health consists of physical activity and nutrition. Physical activity is defined as any bodily movement produced by a contraction of skeletal muscles that increases energy expenditure above a basal level (Barton, 2009). For a study on physical activity in relation to the urban planning conducted by Ling et al. (2020), physical activeness was measured by the duration, as well as the frequency of physical exercise activities as carried out by the respondents. Definition of physical activity by Barton (2009) also includes:

- a. Everyday home or work activities: walking, carrying, cleaning, and climbing stairs
- b. Children's active play, running, gambolling, skipping, and skateboarding
- c. Activities in specific places: gardening, dancing, gym exercise, and swimming
- d. Sports, such as football, rugby, tennis, and hockey
- e. Active travel to get to places: walking and cycling

RESEARCH METHOD

Scope of the Study

This study focuses on the examination of the respondents' satisfaction on urban park quality and level of physical activity in Changkat Public Park, Batu Gajah, Perak Darul Ridzuan. Five aspects have been used to measure the quality of the park, such as park facilities and amenities, park accessibility, park signage (informative), park safety, and park attraction. In regards with physical activity level among visitors (respondents), type of activity, time allocation and frequency of physical activities are recorded.

Case Study

The study area, Changkat Public Park is situated at Mukim Sungai Terap, Kinta District in the state of Perak Darul Ridzuan. The park has been developed and is situated in the centre of the Batu Gajah town, in the convergence area of the local community. For details, the study area can be accessed via Jalan Bemban, Jalan Changkat, Jalan Ilmu, Jalan Haji Abdul Wahab, and Jalan Gopeng. The study area is strategically located in the town centre with a size of 4.6 acres (or 1.9 hectares). Moreover, the park is located near to residential areas and becomes one of the main focus areas for the surrounding community in the town of Batu Gajah.

Table 1, Figure 1 and Figure 2 show the basic profile and location of the study area (the park).

Table 1: Background profile of the study area

Description	Details
Name	Changkat Public Park (<i>Taman Awam Changkat</i>)
District	Kinta District, Perak
Local Authority	Batu Gajah District Council (MDBG)
Planning Block	Blok Perancangan 1 (BP1), Mukim Sungai Terap
Total Land Area	4.6 Acres (1.9 Hectares)

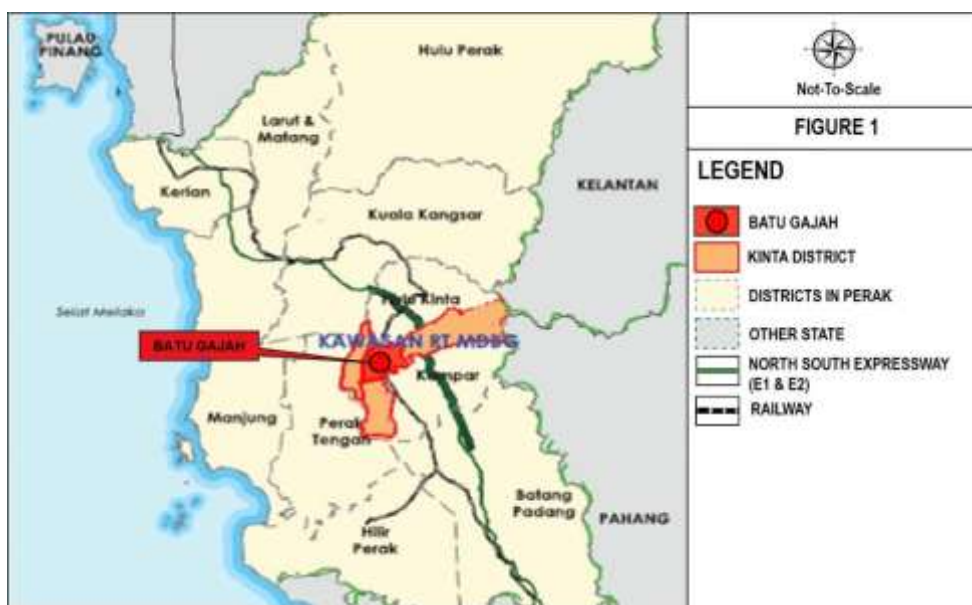


Figure 1: The location of the study area in Kinta District



Figure 2: The location of the study area in Batu Gajah town

Questionnaire Survey and Sampling of Respondents

The physical activity and the quality of the urban park were identified through a questionnaire survey. A non-probability sampling technique that was convenience sampling was applied for this questionnaire survey. Based on G-Power (Heinrich-Heine-Universität Düsseldorf, 2018), the required sample size for correlation analysis comprised 111 samples. This model (G-Power) had been used due to the unknown numbers of visitors for the study area (the park). Thus, the required sample size was defined by the method of analysis. However, a total of 100 respondents were successfully interviewed for this survey.

The sampling of respondents was focussed on the park visitors who were also the residents adjacent to the park within the Batu Gajah town area with various socio-economic backgrounds. Table 2 shows the background of respondents of gender, race, marital status, age group, educational level, employment, and income level. The questionnaire survey was carried out during weekdays and weekends in the morning and evening. The study area (park) was mostly visited by the surrounding residents in the morning and evening for either active activities or passive activities.

Table 2: Background of the respondents

Variables	Percentage (%)
Gender	
Male	54

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Female	46
Race	
Malay	53
Chinese	27
Indian	20
Marital status	
Married	62
Divorced	2
Widow	1
Single	35
Age group	
Youth (<40 years old)	58
Adult (40-59 years old)	35
Elderly (>60 years old)	7
Educational level	
Primary school	1
Secondary school	58
University/ college	40
Employment	
Government sector	24
Private sector	23
Self- employed	23
Unemployed	2
Retired	4
Housewife	5
Students	19
Income level	
< RM 1,500	29
RM1,500 – RM2,999	17
RM3,000 – RM4,999	24
RM5,000 – RM9,999	6
RM 10,000 and above	0
No income	24

Method of Analysis

The data were analysed using frequency, cross-tabulation and correlation tests as available in the IBM SPSS Statistics software. The purpose of the analysis was to determine the quality level of urban park and level of physical activities among respondents. The relationship between the quality level of urban park and level of physical activities was also analysed. The results and findings of the analysis were explained in the next section.

THE RESULTS AND FINDINGS

The Quality of Park

i. Quality of park facilities and amenities

Most of the respondents were satisfied with four of the 10 elements of park facilities and amenities (see Table 3). These satisfactory elements included adequate parking facility, foot reflexology facility, tiered seats, as well as provision of exercise equipment and information board. On the contrary, most of the respondents were not satisfied with other elements of facilities, such as jogging track, playground and the condition of the facilities (see Table 3, Photo 1 and Photo 2). These dissatisfactory elements might discourage the respondents to use the facilities of the park for physical activity. For instance, the jogging track was pertinent for active activity among adults, and the playground was pertinent for kids to carry out their active activities.

Table 3: Satisfaction of the respondents on park facilities and amenities

Park Facilities and Amenities	Frequency (%)		
	Not Satisfied	Satisfied	Very Satisfied
Facilities friendly to disabled and elderly	79	20	1
Jogging track in good condition and connected	78	21	1
Enough gazebo and benches in good condition	86	12	1
Space for picnic and leisure activity	73	23	3
Playground well-maintained for kids	78	13	9
All facilities are convenient and well-maintained	64	32	4
Adequate parking facility	38	39	23
Foot reflexology facility provided near water fountain	17	40	43
Tiered seats provided in good condition	11	54	34
Provision of exercise equipment and information board	6	37	57



Photo 1: The poor condition of children playground



Photo 2: The poor condition of jogging track

ii. Quality of park accessibility

Based on Table 4, most of the respondents were satisfied with four of the five elements of park accessibility (see Table 4). The satisfactory elements included pedestrian walkways in the park that were linked to surrounding residential area, good designed and maintained surrounding roads, vehicle accessibility, and strategic location near to the residential area. Nonetheless, most of the respondents were not satisfied with the bicycle lane in the park (see Table 4). These unsatisfactory elements might discourage the respondents to do a physical activity, such as cycling. Based on Statista Research Department (2018), cycling was the third most regular sport participated by Malaysians.

Table 4: Satisfaction of the respondents on park accessibility

Park Accessibility	Frequency (%)		
	Not Satisfied	Satisfied	Very Satisfied
Bicycle lane in the park	71	25	4
Pedestrian walkways in the park that were linked to surrounding residential area	41	50	9
Good designed and maintained surrounding roads	3	58	39
Accessible by vehicles	1	36	63
Strategic location – near to residential area	2	6	92

iii. Quality of park signage (informative)

Based on the questionnaire survey, most of the respondents (82%) were not satisfied with the signage for direction purpose (see Table 5). In other words, visitors were not well guided when they were moving in the park. Conversely,

the other signages for the warning or usage of facilities showed that the respondents were mostly satisfied (67%).

Table 5: Satisfaction of the respondents on signage (informative)

Signage	Frequency (%)		
	Not Satisfied	Satisfied	Very Satisfied
Enough signage for direction	82	14	4
Other signages <i>e.g.</i> for warning, and use of facilities	16	67	17

iv. Quality of park safety element

Most respondents were satisfied with all of the five elements of park safety (see Table 6). These five elements were overall safety features, secure feeling of going alone to the park, park lighting and safety during the night, as well as satisfaction with the signage for anti-vandalism. On the other hand, more respondents felt that the park was safer at day time with 98% of satisfaction as compared to night time (see Table 6).

Table 6: Satisfaction of the respondents on parking safety

Park Safety	Frequency (%)		
	Not Satisfied	Satisfied	Very Satisfied
Overall safety features	14	79	7
Feeling secure going alone	14	66	20
Park lighting & safety during night time	12	35	53
Parking has shown sign of anti-vandalism	4	33	63
Safety in day time	2	33	65

v. Quality of park attraction

Most of the respondents were satisfied with all of the four elements of park attraction. These four elements were a good design (esthetical), a good landscape in general, water fountain, as well as natural and soft-landscape elements (Table 6). However, natural and soft-landscape elements contributed the highest percentage (96% of respondents) for the satisfaction of the park attraction. The highest percentage in natural and soft-landscape elements displayed that people love nature.

Table 7: Satisfaction of the respondents on park attraction

Park Attraction	Frequency (%)		
	Not Satisfied	Satisfied	Very Satisfied
Good design (esthetical)	11	65	24
Good landscape in general	9	65	26
Water fountain	16	49	35
Natural and soft-landscape elements	4	28	68

Level of Physical Activity (Active Lifestyle)

According to the questionnaire survey, 30% of respondents visited the park at least twice a week (see Table 8). They were considered as active visitors to the park. Meanwhile, 43% of respondents only visited the park once in a while only. The results illustrated that most of the respondents were not active in visiting the park.

However, as referred to the time allocation for physical activity, most of the respondents (89%) were active with more than 30 minutes (per visit) spent for physical activities in the park (see Table 9). There were only 11% of respondents who visited the park for less than 30 minutes per visit.

For the type of physical activity, there were 55.4% of respondents in total who participated in active activities at the park (see Table 10). Among the active activities, most of the respondents engaged with jogging, using exercise equipment, Tai-Chi, and foot reflexology (see Table 10). For the passive activities, most of the respondents spent their time with sightseeing, breathing exercise and relaxing (see Table 10). To conclude the analysis for physical activity, most of the respondents actively carried out physical activities in the park.

Table 8: Frequency of visit to the park by the respondents

Frequency	No. of respondents (%)
Everyday	15
More than three times a week	2
Twice a week	13
Once a week	27
Sometimes only	43
Total	100

Table 9: Time allocation for physical activity by the respondents

Time allocation	Frequency (%)	
	Active activity	Passive activity
Less than 30 min	5	6
30 min to 1 hour	47	24
1 hour to 2 hour	8	10
Total	60	40

Table 10: Frequency of the respondents by type of activity

Types of Activities		Frequency	Percentage (%)
Active Activity	Jogging	45	17.4
	Cycling	6	2.3
	Using exercise equipment	29	11.2
	Foot reflexology	23	8.9
	Aerobic exercise	12	4.7
	Yoga	0	0.0
	Tai-chi	28	10.9
	Sub-total	143	55.4
Passive activity	Picnic	1	0.4
	Sightseeing	41	15.9
	Relaxing	27	10.5
	Enjoying the view	14	5.4
	Breathing exercise	32	12.4
	Sub-total	115	44.6
Total		258	100

Note: respondents can choose more than one activity

Relationship between Urban Park Quality and Physical Activity

Among the five aspects of urban park quality, only four aspects showed a significant correlation (relationship) with the level of physical activity (time allocation for activity and frequency of activity) of respondents. This showed that the quality of facilities and amenities, safety, signage (informative), as well as park attraction were significantly related to the level of physical activity among respondents (see Table 11). However, some of the elements (adequate parking area and feeling safe in the day time) showed a positive relationship, while other elements (provision of exercise equipment, foot reflexology, convenience of all facilities, lighting, anti-vandalism, signage for direction, warning and use of facilities, as well as good design) showed a negative relationship.

Table 11: Correlation between duration (time allocation) and frequency of activity with the selected elements of park quality

Park quality	Time allocation for activity		Frequency of activity	
	Coefficient (r) value	Significant (p) value	Coefficient (r) value	Significant (p) value

Facilities and amenities

Adequate parking area	0.197	0.050*	-0.200	0.046*
Provision of exercise equipment	-0.325	0.001**	0.189	0.060
Foot reflexology	-0.252	0.011*	0.086	0.395
Convenience of all facilities	-0.205	0.040*	-0.161	0.111

Safety

Lighting	-0.212	0.034*	0.121	0.231
Feeling safe in the day time	0.236	0.018*	-0.115	0.255
Anti-vandalism	-0.004	0.966	0.197	0.050*

Signage (informative)

Signage for direction, warning and use of facilities	-0.198	0.048*	0.106	0.292
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Park attraction

Good design	-0.322	0.001*	-0.099	0.329
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Notes:

* Significant value shows a significant level at 0.05 level

** Significant value showing a significant level at 0.01 level

The results indicated that the satisfactory park quality increased the physical activity level among respondents. At the same time, after a long time of visits, there would be a possibility that the respondents would feeling dissatisfied about some quality aspects. For instance, for those who visited the park more frequently or in a longer period, they would feel that the park was not attractive.

CONCLUSION

In conclusion, respondents were moderately satisfied with the park quality. There were some aspects of park accessibility, park safety and park attraction that are satisfactory for most of the respondents. Meanwhile, aspects of park facilities and amenities, as well as park signages were not of satisfactory level for most of the respondents. Generally, most of the respondents (55.4%) engaged with the active physical activity. Furthermore, 30% of respondents visited the park at least twice a week. From the correlation analysis, it was found that most of the aspects of park quality are significantly correlated to the level of physical activity among respondents. This implied that the park quality affected the physical activity level (active lifestyle) of most of the respondents (visitors). It is hoped that through this study, park managers and designers will put more concern including budget to improve and maintain the quality of parks. This will help to improve the physical activity of people for a better health.

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THE INFLUENCE OF URBAN PLANNING ON MENTAL HEALTH. CASE STUDY: FEDERAL TERRITORY OF KUALA LUMPUR

**Marlyana Azyyati Marzukhi¹, Nur Masyitah Ghazali², Oliver Ling Hoon Leh³,
Nurul Shakila Khalid⁴, Siti Mazwin Kamaruddin⁵, Muhammad Farid Azizul⁶**

*¹⁻⁵Center of Studies for Town and Regional Planning,
Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA,*

*⁶Department of Landscape Architecture,
Faculty of Built Environment,
UNIVERSITI TEKNOLOGI MALAYSIA*

Abstract

The health impacts of the development and environment have been widely assessed, but little is known about the impact of physical characteristics of urban planning on people's mental well-being. Thus, this research is crucial to understand the mental health challenges of urban population in Malaysia. The objective of this research is to examine the influence of urban planning on mental health, particularly the attributes of urban planning, density and land use, as well as their potential relation to psychological stress, depression and anxiety. The study was carried out at low-cost flats at Pantai Dalam in Federal Territory of Kuala Lumpur. Besides the secondary data collection and site observation, a survey in a form of questionnaire that used Depression Anxiety Stress Scale (DASS-21) was distributed. The findings showed that density and land use contributed to mental disorders. The research findings can be applied by government agencies, professionals and private sectors to plan healthier urban physical environment. This research will add to the growing literature that suggests the importance of the built environment in shaping mental health.

Keywords: Anxiety, built environment, density, depression, land use, mental disorders, stress.

¹ Senior Lecturer at UiTM, Puncak Alam, Selangor. Email: marlyana@uitm.edu.my

INTRODUCTION

According to United Nations (UN) Habitat (2017), almost 60 per cent of the world's population predicted to live in urban areas by 2030. Srivasta (2009) remarked that urbanisation is defined as an increase in the number of cities and urban populations, which includes changes in demographic movement, as well as social, economic and psychological aspects. The level of urbanisation changes the economic structure and causes the rural population to migrate to the urban area. This condition creates overpopulated areas, and thus, demand housing will increase, as well as a higher density housing scheme will be built. Hence, this causes a low quality of housing and inadequate provision of facilities, including the green area and public spaces. This rapid urbanisation exerts pressure on the environment and health of the urban population, including Malaysia. In fact, Evans (2003) claimed that built environments, which have the characteristics of housing, crowding, noise, indoor air quality, and light can affect mental health directly and indirectly.

In this sense, urban planning and mental health are interdependent in many ways. However, there is rarely any attempt to try to understand the broader origins, implications and possibilities to develop strategies or framework coordinating the relationship between urban environment and mental health (Adli et al., 2017). Understanding on how urban planning influences mental health is central as "health extends far beyond medical care" (Schema, 2018). Therefore, this research is important to achieve the objectives: to examine the influence of urban planning on mental health and to analyse the spatial relationship of the urban physical environment on mental disorders.

LITERATURE REVIEW

Urbanisation is transforming the fabric of cities. By 2030, an estimated one in every three people from 60 per cent of the world's population will live in cities with at least a million of inhabitants (United Nations, 2016). Understanding of this increasing urbanisation is critical as a physical form of the urban environment poses massive sustainability challenges including health (The New Urban Agenda, 2017). Stressors, social density, and social isolation are also health determinants that occur more frequently in cities than in rural areas (The Lancet Psychiatry, 2017). New Urban Agenda adopted at the Habitat III cities conference in Quito, in October 2016 has indicated the improvement of human health and well-being as a key priority to achieve sustainable development goals. In fact, World Urban Forum 9 (WUF 9), in February 2018 has concluded with Kuala Lumpur Declaration on Cities 2030 (2018) to localise the implementation of New Urban Agenda that highlights the concept of Cities for All. This seeks to address the major challenges of rapid urbanisation, including producing healthy and sustainable cities, as well as fostering prosperity and quality of life for all. Urbanisation is vital in urban planning, especially to health challenges in the 21st

century (World Health Organization, 2008). Many researchers indicated that living in urban areas might double the risks of schizophrenia and increase the chances of anxiety disorders by 21 per cent, mood disorders by 39 per cent and depression by 20 per cent (Byrne, 2017). Despite this interest, the inter-relationships between urban planning and health practitioners are somehow limited (Adli et al., 2017; Douglas et al., 2017). It is plausible that these fields influence each other over time. Therefore, understanding this sequencing is vital for understanding their association. Reflecting this, it is worth quoting Sarkar and Webster (2017) at length:

"A deeper understanding of the relationships between urban environment and human health will help devise effective preventive interventions towards minimising/offsetting environmental risk exposures reducing resulting health burdens, lead to healthy lifestyle and behaviour and thereby fulfil the goals of sustainable development."

Numerous works of literature has investigated on the relationship between characteristics of the urban physical environment and physical health (Fisher et al., 2017; Lau et al., 2018; Ling et al., 2020; Nurul Ashikin et al., 2018; Richardson et al., 2013). Nevertheless, little is known about the effects of urban planning on the mental health of the urban population (Adli et al., 2017; Gruebner et al., 2017). Thus, this research is important to meet the crucial aspect of planning and health challenges of contemporary mass urbanisation which will cause a transformative effect on the lives of the community.

Mental health refers to "a state of well-being, in which every individual realises his or her potential, who can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community" (WHO, 2014; 2018). What is worse, in Malaysia, four out of every ten Malaysians will suffer a mental health issue causing the number of mental health issues to increase (The Star, 2017). Mental health is defined in this research as the psychological symptoms of stress, depression and anxiety, but not psychiatric conditions, such as schizophrenia disorders and bipolar disorder (WHO, 2014). The urban planning or urban physical environment is one of the potential determinants of mental disorders (Sarkar & Webster, 2017). Helbich (2018) elucidated that "[i]t is increasingly recognised that mental disorders are affected by both personal characteristics and environmental exposures." From this viewpoint, the physical environment seems to have direct and indirect effects on mental health that may elevate psychological stress, depression and anxiety.

Attributes of Urban Planning to Mental Health

The urban physical environment is important to health and well-being as it can influence the city's liveability and people's behaviour. The urban physical

environment can also encourage or discourage a person from being active and improve an individual's ability to strive against an unhealthier lifestyle (Rebecchi, 2019). In this sense, the rapid pace of urbanisation and urban planning may play a particular role in shaping the mental health of the urban population.

Density

Urban density is calculated as the ratio of built volume over an area. Town and Country Planning Act 1976 (Act 172) described density as "the intensity of use of land reckoned or expressed in term of number of persons, dwelling units, or habitable rooms or combination of those factors, per unit area of land". Kuala Lumpur City Hall (DBKL) in Kuala Lumpur City Plan 2020 defined density as the number of persons to the land area in assisting of population distribution, as well as planning for facilities, utilities, infrastructure and service. Meanwhile, the definition of high-density cities by Second National Urbanisation Policy is a city that relies on diverse land uses, optimising public transportation systems and promoting walking and cycling. High density or overcrowding areas can give effect to mental health. There is an evidence that shows the floor area ratio and building density is positively associated with mental health (Qiu et al., 2019).

Land Use

Land use is one of urban planning attribute which might have associations with mental health. Land use consists of types of development and location for land use mix at three different land uses, which are residential, commercial and industrial. Miles et al. (2011) found an evidence that land-use diversity has adverse effects on mental health. Urban growth causes expansion of slums, exposure to hazardous conditions resulting in a location near to industries and dense traffic areas that affect the mental health of the residents (BMJ, 2017). Land use is vital in shaping a city by an urban planner and local authority. The location for each land use, such as residential, commercial, industrial, and green area should be suitable to create a more liveable city as the urban area continues to expand in the population (WHO, 2018).

RESEARCH METHODOLOGY

Study Area

This study focused on the influence of urban planning on mental health, which was the low-cost flat at Pantai Dalam. The area was selected due to the densely-populated housing area with a minimum provision of facilities and a lack of privacy. There were two low-cost flats selected which were PPR Pantai Ria and PPR Kerinchi Lembah Pantai. The total area of Pantai Ria low-cost flats is 9.41 acres, while the total area of Kerinchi Lembah Pantai low-cost flats is 11.12 acres. Both study areas of the low-cost flats were in Federal Territory of Kuala Lumpur within the administrative boundary of Kuala Lumpur City Hall (DBKL). Pantai

Ria low-cost flats are located near to Pantai Dalam commuter station, while Kerinchi Lembah Pantai low-cost flats are located near to Pantai Hillpark which can access with New Pantai Expressway (NPE). The Pantai Ria flats are located near to Pantai Sewerage Treatment Plant 2 and Pantai Eco Park Community Center. Besides that, the Pantai Ria flats' location is beside Klang River (see Figure 1). For the Kerinchi Lembah Pantai flats, they are located near to Bazaria Pantai, Lembah Pantai Library Complex and Masjid Al-Iklasih.



Figure 1: Study areas and its surrounding developments

Questionnaire Survey and Sampling of Respondents

The influence of urban planning on mental health was identified through a survey in a form of questionnaire. Stratified random sampling was ideal for respondents' selection because this research consisted of a survey in a form of questionnaire administered to the respondents who may experience mental disorder problems or without mental disorder problems. These respondents were chosen randomly, which represented the total population of the selected areas.

The questionnaire emphasised on identifying the public's opinions about the two attributes of urban planning to mental health, which were density and land use, as well as a checklist of adaptation on Depression Anxiety Stress Scales (DASS-21). A total of 102 respondents were selected from the total

population of 17,388 in the study areas by using Raosoft Sample Size Calculator. The samples were determined with the confidence level of 92 per cent with the amount of response distribution of 50 per cent. A four-point Likert type scaled items were set up, in which the respondents were asked to indicate their assessment to measure the emotional states of depression, anxiety and stress. The samples covered both males and females, different ethnic groups and different age groups (see Table 1).

Table 1: Background of respondents

Variables	Percentage (%)
Gender	
Male	52.0
Female	48.0
Ethnicity	
Malay	74.50
Chinese	4.90
Indian	19.60
Others	1.00
Age	
15-24 years old	12.70
25-34 years old	23.50
35-44 years old	23.50
45-54 years old	26.50
55-64 years old	11.80
> 65 years old	2.00

Method of Analysis

Data analysis for this research was based on a questionnaire and checklist of adaptation on Depression Anxiety Stress Scales (DASS-21). The data were analysed using frequency and correlation tests as provided in the IBM SPSS software.

RESULTS AND FINDINGS

The results of this analysis were summarised in Table 2. The results of states of depression, anxiety and stress were self-reported scales using DASS-21. From the DASS-21 scores, the severity states of depression, anxiety and stress were calculated. In Table 2, it was shown that the respondents who have a normal state for depression were equal with 33 respondents (64.7%) for both PPR Pantai Ria and PPR Kerinchi Lembah Pantai. Nonetheless, based on the results, the respondents at PPR Pantai Ria had a higher percentage of extremely severe depression, which was 7.8 per cent as compared to the respondents at PPR Kerinchi Lembah Pantai, which was 5.9 per cent only.

Based on the results, it was also displayed that a normal state of anxiety at PPR Pantai Ria was 58.8 per cent, while at PPR Kerinchi Lembah Pantai, it was 52.9 per cent. This indicated that PPR Kerinchi Lembah Pantai had slightly more respondents having anxiety as compared to PPR Pantai Ria. Conversely, PPR Pantai Ria exhibited a higher percentage of extremely severe anxiety cases as compared to PPR Kerinchi Lembah Pantai. Most of the respondents with anxiety at PPR Kerinchi Lembah Pantai were at the states of mild or moderate (see Table 2).

For the states of stress severity, based on the results (see Table 2), the percentage of respondents with normal states of stress was also higher at PPR Pantai Ria, which was 58.8 per cent. In contrast, the percentage of respondents having extremely severe stress, was higher at PPR Pantai Ria, which was 3.9 per cent.

Based on the findings from Table 2, the percentages of respondents having extremely severe states of depression, anxiety and stress were higher at PPR Pantai Ria as compared to PPR Kerinchi Lembah Pantai.

Table 2: The respondents' severity states of depression, anxiety and stress

Severity	Depression				Anxiety				Stress			
	PPR Pantai Ria		PPR Kerinchi Lembah Pantai		PPR Pantai Ria		PPR Kerinchi Lembah Pantai		PPR Pantai Ria		PPR Kerinchi Lembah Pantai	
	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%
Normal	33	64.7	33	64.7	30	58.8	27	52.9	30	58.8	28	54.9
Mild	8	15.7	6	11.8	7	13.7	8	15.7	8	15.7	6	11.8
Moderate	5	9.8	6	11.8	6	11.8	9	17.6	5	9.8	11	21.6
Severe	1	2.0	3	5.9	5	9.8	5	9.8	6	11.8	6	11.8
Extremely Severe	4	7.8	3	5.9	3	5.9	2	3.9	2	3.9	0	0
Total	51	100	51	100	51	100	51	100	51	100	51	100

Mental Health and Density

High density would cause crowding when the number of populations per acre was higher and uncontrolled crowding would cause overcrowding. Crowding was also involved in the neighbourhood and in-house crowding. The residents of low-cost housing were from a low-income group, and the number of households was also higher. The total numbers of a housing unit for the study area were 1,264 for PPR Pantai Ria and 1,896 for PPR Kerinchi Lembah Pantai respectively with 17 floors for both. The estimation of people who live per floor was 99, and the unit number per floor was 20 for both PPR Pantai Ria and PPR Kerinchi Lembah Pantai.

In general, PPR Kerinchi Lembah Pantai had a more density than PPR Pantai Ria based on the number of people per acre (see Table 3). On a contrary, based on observation, PPR Pantai Ria was more crowded including the environment at the parking area (see Photo 1). The spaces between residential blocks at PPR Pantai Ria were 40 metres as compared to PPR Kerinchi Lembah Pantai which had a greater distance of 75 metres. The road width for PPR Pantai Ria was also at a minimum width of 6 metres which was for one-way and insufficient provision of car parking. This caused the road overcrowded with the car parked on both sides of the road. The road width at PPR Kerinchi Lembah Pantai was 7.3 metres which was for two-ways. PPR Kerinchi Lembah Pantai had a housing unit size of 800 square feet, while PPR Pantai Ria had a housing unit size 750 square feet that illustrated the housing units size had a difference of 50 square feet. Even though the numbers of units, acreage, number of blocks, and density of PPR Kerinchi Lembah Pantai were higher than PPR Pantai Ria, the environment at PPR Pantai Ria showed that it was more crowded as compared to PPR Kerinchi Lembah Pantai. Thus, PPR Pantai Ria, which was more crowded with smaller roads and smaller apartment units, exhibited a higher percentage of extremely severe states of depression, anxiety and stress.

Table 3: Density per acre estimation of the residential area

Location	Acreage	Number of units	Density person/acre	Size of apartment unit
PPR Kerinchi Lembah Pantai	11.12	1896	853	800 sqf
PPR Pantai Ria	9.41	1264	672	750 sqf



Photo 1: Crowded parking spaces at PPR Pantai Ria



Photo 2: Less crowded parking spaces with green spaces at PPR Kerinchi Lembah Pantai



Photo 3: PPR Kerinchi Lembah Pantai residential building



Photo 4: PPR Pantai Ria residential building

Based on the results shown in Table 4, the number of respondents feeling anxious in crowded spaces was similar for both PPR Pantai Ria and PPR Kerinchi Lembah Pantai. There were 31 respondents (60.8%) who did not have an anxiety feeling at crowded spaces, while 3 respondents (5.9%) had a feeling of anxiety at a good part of the time. For the “experience trembling when they are in crowded spaces” and “stress feeling in crowded spaces”, there was a slightly higher percentage of respondents at PPR Pantai Ria who experienced trembling and stress feeling in crowded spaces during “a good part of the time” or “most of the time” (see Table 4). The data showed a higher mental health problem in more crowded area, for example, PPR Pantai Ria with smaller size of apartment units and smaller roads.

The density for both PPR areas exceeded the proper amount of 400 people per acre as provided in the Kuala Lumpur City Plan guidelines for density. Overcrowding would cause an insufficient provision of facilities as the number of users exceeded the provision. When the density for person per acre exceeded the limit provided by the authority, it could cause several problems, such as inadequate car park, as well as inadequate green spaces and service. This implied that the crowded environment had affected the state of mental health of the residents.

Table 4: The respondents' opinions about their feeling when they are at home

Justification	Area			1	2	3	4	Total
				Nos.				
Anxiety feeling in crowded spaces	PPR Pantai Ria	Pantai	Nos.	31	17	3	0	51
			%	60.8	33.3	5.9	0	100
			Mean					
	PPR Kerinchi Lembah Pantai	Pantai	Nos.	31	17	3	0	51
			%	60.8	33.3	5.9	0	100
			Mean					
Experiencing trembling in crowded spaces	PPR Pantai Ria	Pantai	Nos.	35	13	2	1	51
			%	68.6	25.5	3.9	2.0	100.
			Mean					

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(e.g. hands, body)	PPR Kerinchi Lembah Pantai	Nos.	36	13	1	1	51
		%	70.6	25.5	2.0	2.0	100
		Mean					1.35
Stress feeling in crowded spaces	PPR Pantai Ria	Nos.	11	23	9	8	51
		%	21.6	45.1	17.6	15.7	100
		Mean					2.27
	PPR Kerinchi Lembah Pantai	Nos.	11	23	10	7	51
%		21.6	45.1	19.6	13.7	100	
Mean						2.25	

Note: 1 = Did not apply to me at all, 2 = Applied to me some of the time, 3 = Applied to me a good part of the time, 4 = Applied to me most of the time

Mental Health and Land Use

Land use analysis based on Maslow's Hierarchy of Needs (Maslow, 1943; Ryan et al., 2020), which involved five stages. Maslow's theory was a list of human needs that led to a positive mental health. The foundation of Maslow's theory was on physiological needs which were the basic needs for an individual to live. For this study, the first stage of the theory was focused on the residential units or housing as a place to sleep, a food storage and a shelter that had the utility source.

In the second stage, which was about safety and security, it involved the location of the residents to the provision of security facilities, as well as health, such as police station, fire station, clinics, hospitals, and neighbourhood security. If one had fulfilled these two basic needs, their psychological needs were required to be fulfilled. When all the stages were fulfilled, then the final stage which was self-actualisation would be achieved.

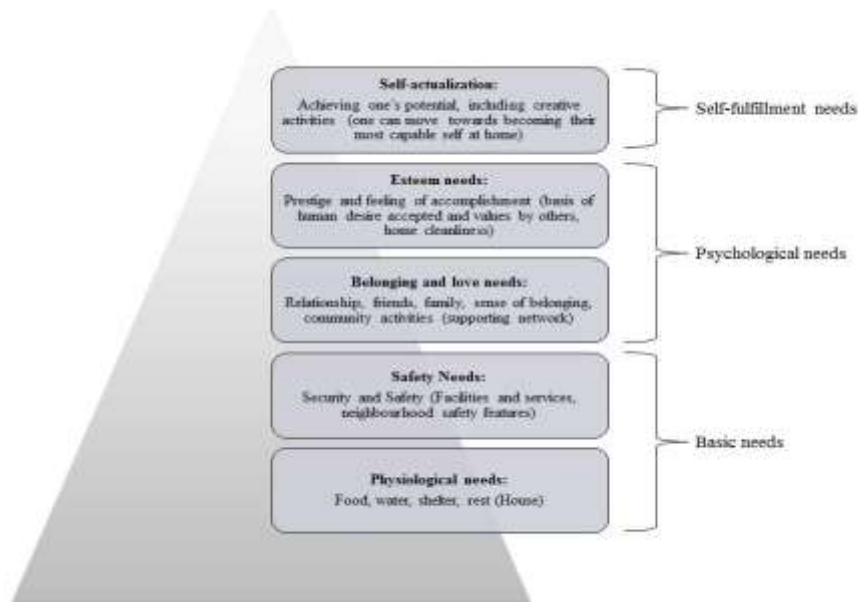


Figure 2: Maslow's Hierarchy of Needs
Source: Maslow (1943); Ryan et al. (2020)

Based on the study conducted, in the study area, each unit was provided with three bedrooms with an area of 750 and 800 square feet. Various types of land use surrounded the area of the residential. The important land use types related to Maslow's theories were about safety and security which made residents feeling safe and knowing they would be taken care with various facilities provided, such as police station, fire station and clinics as mentioned in Table 5. The location and distance to these facilities were important as these showed the access level to each facility. All the facilities were within three kilometres from the study area, which was mostly accessible with private transportations.

Based on the land use study, the location of PPR Kerinchi Lembah Pantai had a high accessibility to the facilities and service provided. PPR Kerinchi Lembah Pantai was also surrounded by various types of land use, such as commercials and facilities, including hospital. Its housing was also near to New Pantai Expressway (NPE) and Federal Highway exits as compared to PPR Pantai Ria. PPR Pantai Ria had a high access to Pantai Dalam commuter station. However, the surrounding land use was not supportive as the surrounding land use at PPR Kerinchi Lembah Pantai. The location of PPR Pantai Ria was like an island, in which it was located at the centre of an unplanned residential area, Klang River, New Pantai Expressway, and a sewerage treatment plant. The residents at PPR Pantai Ria would need to travel to commercial centres and

facilities located near to PPR Kerinchi Lembah Pantai or Jalan Klang Lama for any required service. Conversely, both PPR Pantai Ria and PPR Kerinchi Lembah Pantai had community clinics that provided basic health service within their residential areas.

From this analysis, it was noted that PPR Kerinchi Lembah Pantai had a higher accessibility to facilities and service. PPR Kerinchi Lembah Pantai was surrounded by various types of land use as compared to PPR Pantai Ria. Hence, this might have also contributed to the results shown in Table 2, which demonstrated that PPR Pantai Ria had more extremely severe mental health problems as compared to PPR Kerinchi Lembah Pantai. In other words, PPR Pantai Ria with a more crowded environment and a less accessibility to the facilities and surrounding land use displayed a less healthy lifestyle (mentally, as measured by the respondents' opinions and feelings when they are at home, as well as their severity states of depression, anxiety and stress as shown in Tables 2 and 4).

Table 5: Time for Travel Distance to facilities provided

Location	Types of Facilities	Travel Distance (minute)		
		Private Transport	Public Transport	Walking
PPR Kerinchi Lembah Pantai	Police Station	5	36	26
PPR Pantai Ria		6	25	26
PPR Kerinchi Lembah Pantai	Fire Station	4	25	28
PPR Pantai Ria		5	41	-
PPR Kerinchi Lembah Pantai	Community Clinic	Within residential area		
PPR Pantai Ria		Within residential area		
PPR Kerinchi Lembah Pantai	Hospital	8	-	-
PPR Pantai Ria		9	34	-

Pertaining to “comfortability when at home” (see Table 6), it was difficult to say if land use was the underlying factor for this aspect of mental health as a result of inconsistencies with the studies in the previous section. The findings about the respondents' comfortability when they were at home in Table 6 implied that the results were located at the fourth and fifth levels in Maslow's theory of psychological needs. Based on the results presented, more than 50 per cent of respondents had “difficulty to relax at home” for both study areas. However, PPR Kerinchi Lembah Pantai had a slightly higher percentage at “most of their time”. The respondents who displayed “feeling agitated when at home” at “some of the time” were observed to have a slightly higher percentage at PPR

Kerinchi Lembah Pantai as compared to PPR Pantai Ria. In the previous section, it was suggested that PPR Kerinchi Lembah Pantai had better mental health, more facilities and service, as well as land use types surrounded the residential areas as compared to the PPR Pantai Ria. The results did not shed much light on the relation with the surrounding land use and provision of facilities and service.

Table 6: The respondents' comfortability when they are at home

Justification	Area		1	2	3	4	Total
Difficulty to relax at home	PPR Pantai Ria	Nos.	21	20	3	7	51
		%	41.2	39.2	5.9	13.7	100
		Mean					1.92
	PPR Kerinchi Lembah Pantai	Nos.	21	19	3	8	51
		%	41.2	37.3	5.9	15.7	100
		Mean					1.96
Feeling agitated when at home	PPR Pantai Ria	Nos.	38	5	7	1	51
		%	74.5	9.8	13.7	2.0	100
		Mean					1.43
	PPR Kerinchi Lembah Pantai	Nos.	37	6	7	1	51
		%	72.5	11.8	13.7	2.0	100
		Mean					1.45

Note: 1 = Did not apply to me at all, 2 = Applied to me some of the time, 3 = Applied to me a good part of the time, 4 = Applied to me most of the time

The results in Table 7 represented the top level in Maslow's theory, in which each individual became capable and creative at his or her own space at the self-actualisation stage. Based on the results shown, for the respondents having difficulties in working up the initiatives at home, the percentage was slightly higher at PPR Pantai Ria. This finding may be a direct consequence of depression as it is consistent with the finding in Table 2. On a contrary, the respondents who felt downhearted and blue when they were at home most of their time demonstrated a slightly higher percentage at PPR Kerinchi Lembah Pantai as compared to PPR Pantai Ria. This showed that this finding is consistent with the finding at the previous section in Table 6, in which the respondents at PPR Kerinchi Lembah Pantai displayed more percentage of difficulty to relax and feeling agitated when they were at home.

Table 7: The respondents' abilities and feeling when at home

Justification	Area		1	2	3	4	Total
Difficulty to work up the initiative when at home	PPR Pantai Ria	Nos.	18	16	8	9	51
		%	35.3	31.4	15.7	17.6	100
		Mean					2.16
		Nos.	18	17	8	8	51
		%	35.3	33.3	15.7	15.7	100

	PPR Kerinchi Lembah Pantai	Mean							2.12
Feeling downhearted and blue when at home	PPR Pantai Ria	Nos.	35	6	5	5	51		
		%	68.6	11.8	9.8	9.8	100		
	Mean							1.61	
Unable to become enthusiastic about anything when at home	PPR Kerinchi Lembah Pantai	Nos.	35	5	5	6	51		
		%	68.6	9.8	9.8	11.8	100		
	Mean							1.65	
Unable to become enthusiastic about anything when at home	PPR Pantai Ria	Nos.	22	18	5	6	51		
		%	43.1	35.3	9.8	11.8	100		
	Mean							1.90	
Unable to become enthusiastic about anything when at home	PPR Kerinchi Lembah Pantai	Nos.	22	18	5	6	51		
		%	43.1	35.3	9.8	11.8	100		
	Mean							1.90	

Note: 1 = Did not apply to me at all, 2 = Applied to me some of the time, 3 = Applied to me a good part of the time, 4 = Applied to me most of the time

This analysis is related to Maslow's theory. In order to achieve the top of needs in Maslow's theory, one must fulfil each level. The final stage displayed that one was able to become his or her most capable self at home and was able to be creative in his or her own spaces. However, based on the analysis done, it was illustrated that the respondents were not comfortable and could not do any initiatives or felt enthusiastic when they were at home. This implied that they did not fulfil the hierarchy of needs in Maslow's theory. Apart from that, the respondents may not meet one of the needs, which caused them not to advance to self-actualisation.

Correlation between respondents' comfortability at home, as well as their abilities and feelings at home

For relationship analysis, correlation tests had carried out. The tests were conducted to examine the relationship between the respondents' comfortability at home, as well as their abilities and feelings at home (see Table 8). The analyses showed positive and significant correlations between items in Table 6 and Table 7 among respondents.

Table 8: Correlation between comfortability feelings with respondents' abilities at home

Comfortability at home	Abilities & feeling at home		
	Difficulty to work up the initiative when at home	Feeling downhearted and blue when at home	Unable to become enthusiastic about anything when at home

Difficulty to relax at home	Coefficient (r)	.515**	.467**	.669**
	Significant (p) value	.000	.000	.000
Feeling agitated when at home	Coefficient (r)	.443**	.651**	.477**
	Significant (p) value	.000	.000	.000

Note: ** significant at 0.01 level

This result (see Table 8 – first row) showed a positive and significant (at 0.01 level) relationship when the respondents had a difficulty feeling to relax at home. This could affect their capabilities and emotions when they were at home. Feeling down-hearted and blue, as well as being unable to become enthusiastic about anything was a symptom of a person having depression. Thus, when a person exhibited a difficult feeling to relax at home, it could lead to depression.

Correlation analysis was also done for the respondents staying at home with an agitated feeling with a difficulty to work up the initiatives, feeling downhearted and blue, as well as being unable to become enthusiastic about anything. The results (see Table 8 – second row) showed a positive and significant relationship (at 0.01 level) that feeling agitated at home may affect the respondents' feeling causing them feeling down-hearted and blue at home, which could lead to depression. This feeling could also cause them to become difficult to work up with initiatives and unable to become enthusiastic about anything when they were at home. Hence, home was supposed to be a place for a person to relax and feel safe from any harm.

SUMMARY AND CONCLUDING REMARKS

Based on the available data, it was proposed that there was an evidence of high density living with mental disorders by factors of environment overcrowding and in-house crowding. However, land use factors did not clearly show if it was responsible for contributing to mental disorders. There was also no direct evidence which supported the association between land use and mental disorders. On the contrary, there was a significant relationship between the respondents' comfortability feeling when they were at home that could affect their abilities in their own space. Therefore, it is recommended that further work is necessary to find possible associations between land use and mental disorders.

From the results discussed, even though the number of respondents having mental disorder problems was small (see Table 2), it was still important to pay attention to this group of people in order to mitigate the causal or contributing factors. High-density living also affected some people who could not be in crowding spaces and area. This was because they would avoid green spaces, public spaces and socialising that may trigger the mental disorders. It could be explained through Maslow's Hierarchy of Needs theory, in which they did not meet the level as suggested in Maslow's theory pyramid. This caused them not to

meet their self-actualisation. The findings confirmed that individual feelings, comfortability and capabilities in high-density living had an increased risk of mental disorders. As this study employed a cross-sectional design, this design may be useful to study particular aspects of land use associations with mental disorders using longitudinal studies in future studies.

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THE FUNCTIONS OF LANDSCAPE IN SCHOOL LEARNING PROCESS

**Salina Mohamed Ali¹, Noriah Othman², Faridatul Akma Abdul Latif³,
Abd. Hair Awang⁴, Katiman Rostam⁵**

^{1,2,3}Faculty of Architecture, Planning & Surveying,

UNIVERSITI TEKNOLOGI MARA

^{4,5}School of Social, Development & Environment, FSSK,

UNIVERSITI KEBANGSAAN MALAYSIA

Abstract

This article seeks to identify the function of the schools' landscapes in the learning process. For this study, primary data were collected through field observations using a checklist. 104 schools within the Klang Valley-Langat area were randomly selected. Structured interview sessions were conducted with school managers and secondary data were obtained from various agencies. Results showed that the function of landscapes in assisting learning was at a high score (47.1%). Scores of rural schools were at 51.6 percent ahead of urban schools (45.2 %). There was a significant relationship between the function of landscapes assisting in the learning process and academic achievement at the school level at 0.01 with a Chi-square value of 35.993. Pearson product-moment correlation test results showed a significant correlation in weak and moderate levels of landscape functions assisting in the process of learning and academic achievements. This proved that the landscape had an important role in the learning process. It is hoped that this study will create awareness among the school's community.

Keywords: Landscape functions, assisting the learning process, landscaping components, Klang Valley-Langat

¹ Lecturer at University Teknologi MARA Email: salina77775@yahoo.com

INTRODUCTION

Compared to other current issues in schools, such as curriculum development, learning in schools, students' nutrition and diet, as well as issues of students' obesity, not many other studies have been conducted on the function of landscapes in the schools' environment. This is not consistent with the landscape planning of schools, which provides an opportunity for the schools' management to beautify the schools' environment to enhance the learning experience. The school's management still has a little awareness of the importance and function of the landscape environment in supporting the learning process (Zaleha Abdullah, 2014). In an attempt to give some insights to this issue, the present article seeks to identify the function of the schools' landscapes in the learning process (Cody & Heather, 2017).

The role or function of the schools' landscape in preserving the environment should be from the schools' level. It is vital to have a clear way of preserving the schools' environment. Recognising the circumstances that there are problems in developing landscaping in schools, the government has its plans to permeate these problems (Salina et al., 2014). Several programmes are introduced to liven up the surrounding and environment in schools. These programmes are held at municipality, district and also, state levels. Programmes are introduced and organised via Ministry of Education, Malaysia in ensuring every school performs its position in developing its own landscaping. Ministry of Education introduced and launched its *Keselamatan, Kebersihan dan Keceriaan* (3K) Programme in 1993. This 3K programme stresses on the safety, cleanliness and beautifying the schools (Rohhayati, 2008).

Landscapes around the school's compound either directly or indirectly assist in the learning process (Dyment & Bell, 2007; Loebach & Gilliland, 2014; Van Dijk-Wesselius et al., 2018). This can be seen in terms of cognitive, psychomotor and affective skills through various spaces for leisure, socialising and interactions with landscaping components during the indoor or outdoor revision of lessons. Besides that, the landscaped environment may be used to conduct related subject matters, such as Geography, Biology and Chemistry. For example, trees can provide shade to reduce the amount of sunlight on the building and the ground to moderate the temperature of the environment (Alamah Misni, 2013). Microclimatic conditions of areas surrounded by trees are usually more comfortable when compared to open areas. Plants also act as a green lung to the schools' environment by absorbing carbon dioxide and by releasing oxygen. This indicates that green areas provide more oxygen, which is vital for the school's environment in creating responsive conditions for mental development. Evidence of a theory of attention restoration (Berman et al., 2008; Kaplan, 1995; Kaplan & Berman, 2010) associates the green environment to a calming of the mind and an increased concentration, especially to students who are studying. On the other

hand, trees are able to reduce extreme heat, thereby, reducing the usage of air-conditioning in schools.

The ambient atmosphere outside classrooms stimulates the mind and encourages the learning process. Past studies indicated that some plants can stimulate the thinking process through regular interactions with students (Ke-Tsung, 2009; Paddl & Gillil, 2016). The concept of an attractive landscape can also provide opportunities for students, teachers and visitors to obtain information about its flora species, function and diversity of plants within the school environment (Clevenger et al., 2020). As a result, the more the components and elements of the landscape that can be used to support and facilitate the learning process, either directly or indirectly, the better and higher the quality of the school's landscape and functionality (Chawla et al., 2014; Robert & Robert, 2020).

From an interview with one of the school principals, he felt that hard landscaping, such as gazebos, park benches and tables can be used by the students to discuss, analyse and facilitate the learning process. Hard landscapes, such as information signages and tree descriptions can provide invaluable knowledge to the students while creating awareness about the importance of protecting the environment. Signages of reminders and life's advice containing verses from the Quran form a contributing element to the character-building of the students to respect their teachers, friends and parents.

Soft landscaping components consisting of a large, medium and small trees along with fruit trees can cool temperatures within the schools and encourage the students to review their lessons in the school compound. Moogk-Soulis (2002) reported that trees can be used to provide shades against surfaces, as well as to act as a barrier to hot winds and to create cool air instead.

Researchers also observed that artificial landscapes consisting of fish ponds and cascading ponds can provide therapeutic facilities to the school's occupants (Kopeva et al., 2017). Sounds of water elements soothe the mind, providing the ideal environment for the acumen of knowledge (Kelz et al., 2013). However, the presence of koi fish, turtles and dragonflies can cultivate a sense of compassion for animals, as well as care for the school environment. Students enjoy sitting near ponds during the breaks to feed the fish while playing with friends.

A growing literature body suggests that individuals need a connection with natural environment for selves' well-being. Conversely, at this point, the young children are increasingly becoming more separated from their natural surrounding as their access to the surroundings are gradually diminishing (Dowdell et al., 2011; Robert & Robert, 2020). The significance of schooling and prior-to-school settings in correlating children with natural surroundings had been recognised. Furthermore, the yielded outcomes suggested that natural outdoor environments expanded the children's imaginative act and the

developmental of pro-behavioural relationships, as well as permitted the natural environment as a place of play-learning. Dowdell et al. (2011) concluded that in order to make use of effective outdoor play-learn settings, early childhood learning centres ought to provide the children with an access to the natural outdoor environment and educators who are supportive towards children developmental relationship with the nature.

The key intention in this study is to identify the function of the schools' landscapes in the learning process. A conducive landscaped environment may directly or indirectly help the learning process through a variety of ways, such as providing spaces for leisure, socialising, interacting with components of the landscape, or even the revision of lessons outside classrooms. The specific objectives of the study are to determine the benefaction of the soft and hard landscapes in the learning process to increase the schools' academic achievement.

LOCATION AND METHOD

The study was conducted in schools located at urban and rural areas in Klang Valley - Langat, especially schools located in the state of Selangor. Schools located in the Shah Alam and Subang Jaya Municipality in the Petaling district, Selayang City Council in Gombak and Klang City Council in the Klang district were selected to represent schools in urban areas. Schools in the district of Hulu Langat and Sepang were chosen to represent schools in suburban and rural areas. Classification of urban and rural schools was based on criteria set by State's Department of Education and the National Department of Education. The Klang Valley-Langat districts in Selangor were chosen for this study due to several reasons. First, its location is within areas of rapid urbanisation with the highest population growth in Peninsular Malaysia. Second, schools within this region experience rapid modernisation since they are within the vicinity of innovation, which is at the extended metropolis of Kuala Lumpur. Third, the size of the available landscapes in Klang Valley-Langat is limited and narrower due to land shortage and escalating land prices that impact development patterns (Katiman Rostam, 2006; Katiman Rostam, et al., 2010; The Federal Territory Development and the Klang Valley Planning Division, 2004).

This study used primary and secondary data. Primary data were collected from inspection and observation at schools. For secondary data, they were in the form of records, documents and other official statistics that were gathered from various departments and agencies, particularly State and Federal Territory Department of Education, as well as Ministry of Education. Basic data published by the Department of Statistics were also used. Information on students and teachers from the selected schools were also obtained. There were tertiary sources used that included books, journals, technical reports, theses, and dissertations. Before the formation of the structured interview form, references of procedures were obtained. These references included literature review and

expert feedback in the field of landscaping, landscape architects from National Department of Landscape, experts in the field of education, experienced school teachers, as well as landscape consultants with deep knowledge and experience in the field.

Structured interview was conducted with top school administrators involved in the development and management of the school landscapes. The number of school administrators interviewed for this study consisted of a total of 104 respondents. The selection of sample size was based on Krejcie and Morgan's (1970) table which denominated the sample required from a population for structured interview which was analysed using the SPSS software. The results were discussed in the next section.

The functional quality of the landscapes in schools was evaluated based on the functional aspects concerning the learning process. The basis of evaluation was on the relative merits of each component of the hard, soft and artificial landscapes, as well as facilities, flora and fauna using a Likert scale, consisting of 'not related', 'related' and 'highly related'. Overall, the quality of the functionality of the schools' landscape in the Klang Valley-Langat was divided into three categories: low, medium and high.

RESULTS AND DISCUSSIONS

In assessing the function of learning, majority of schools were in the category of high scores (47.1%) (see Table 1). Rural schools were at 51.6 per cent, ahead of the urban schools (45.2%). This suggested that school administrators of rural schools were more sensitive to the functional components of hard, soft and artificial landscaping, as well as in the usage of the external learning environment. Only 9.6 per cent of schools were in a low category. Schools that were in the low category were unable to maximise their landscapes as a learning tool due to limited finances and other financial constraints.

Table 1: Functions of landscape in the learning process

Score Quality	Category	Urban		Rural		Total	
		Frequency	%	Frequency	%	Frequency	%
123 - 153	Low	7	9.6	3	9.7	10	9.6
154 - 184	Medium	33	45.2	12	38.7	45	43.3
185 - 216	High	33	45.2	16	51.6	49	47.1
Total	-	73	100.0	31	100.0	104	100.0

Source: Author, 2019

For high category, samples of schools located at urban areas located in Shah Alam, Sekolah Menengah Kebangsaan (SMK) 101 with a score of 215 were selected. This was followed by Sekolah Menengah Kebangsaan (SMK) 78 with a score of 207 located in Subang Jaya and Sekolah Menengah Kebangsaan (SMK) 1 with a score of 207 located in Semenyih. Samples were also taken from a rural school in the district of Hulu Langat. Observations in these schools identified that facility of parking, walkways, lighting, and litter bins received the highest scores as compared to other components. Experts from the Ministry of Education, State's Department of Education and landscape architects from National Department of Landscape elucidated that facilities, such as walkways, toilets, litter bins, and others used by the students were crucial in the learning process. It was observed that the facility component was the most frequently found in almost all schools in the study area.



Figure 1: The water element and plants create a sense of comfortable. (Sekolah Menengah Kebangsaan 43 and 78)
Source: Author, 2019.

The flora component scored the second-highest after the facility. Most urban schools prioritised the cultivation of plants to compensate for the hot climate in the city (see Figure 1). This could serve as shade trees that absorbed heat (Alamah Misni, 2013; Lanza et al., 2020), cooled the school and provided shade for the students (Akbari & Taha, 1992). Comfortable shade trees increased enthusiasm and encouraged the students to gather and discuss extra-curricular activities, sports and recreation (Moogk-Soulis, 2002).

For rural schools, the hard landscapes were of a more important function in assisting the students. Many low-income families did not have basic facilities, such as furniture or sufficient recreational facility or area. Thus, many rural students used the schools' environment as their second home to study and complete their homework. They also used the schools' environment for recreation.

Table 2 shows the different learning activities held in the schools. For activities conducted outside the classroom, mean activity of planting flowers obtained the highest value (6.98), followed by camping (6.85), cooking (5.88), carpentry and painting (5.63), as well as others. The data were irregularly scattered among one another. All data were in the standard deviation of between 0.800 to 5.500 units. This demonstrated that the school environment was used for learning and co-curricular activities (see Figure 2).

Table 2: Learning activities conducted in schools.

Outdoor Classroom	N	Min	Standard Deviation
Sitting down to discuss	89	2.70	1.991
Revision of subjects	81	3.41	2.042
Experiments	70	4.34	2.126
Physical education	103	1.50	0.862
Observations of plants	83	4.53	1.896
Observations of insects and its habitat	76	5.05	1.825
Relating subject matters to the schools' environment	93	4.30	2.004
Green Earth and Environment Club	89	4.70	1.921
Gardening or vegetables	59	5.08	2.238
Flower planting	82	6.98	5.484
Recycling	94	5.37	2.145
Carpentry and painting	89	5.63	2.145
Cooking	73	5.88	2.248
Camping	99	6.85	1.798
Marching	102	3.45	2.132
Uniform bodies	104	2.88	1.585

Source: Author, 2019



Figure 2: The different learning activities held in the schools that use outdoor class.
(Sekolah Menengah Kebangsaan 72 and 85).

Source: Author, 2019.

RELATIONSHIP BETWEEN FUNCTIONS OF LANDSCAPE AND SCHOOLS' ACHIEVEMENT

Each landscape component was selected by hard, soft or artificial landscapes, facilities, fauna, and flora based on certain scores. Table 3 displays the mean scores of the dependent variable, in assisting the learning process. The cognitive aspects of the landscape functions had the highest mean score with facility component (54.80), followed by flora with a mean score of 43.59 and hard landscapes with a mean score of 33.94. This proved that flora of trees with shade, fruit trees, shrubs, ground cover, and plants were more prominent components used by the students during their studies in identifying the names and functions of plants in relation to Science subjects, Civil studies, Geography, Islamic Education, and Arts. The standard deviation values of hard landscapes, flora, and fauna were found to be high.

Table 3: Mean (dependent variables) representing the functional landscapes in assisting the learning process

Landscape Components	Min	Standard Deviation
Hard landscapes	33.94	6.270
Soft landscapes	21.83	3.230
Artificial landscapes	4.47	1.954
Facilities	54.80	2.120
Fauna	23.04	4.435
Flora	43.59	8.402
Total	180.20	18.270

Source: Author, 2019

By using the Chi-square statistics (Pearson product-moment correlation), the variable function of the landscape in assisting the learning process had been tested against variable segments of academic achievement. Table 4 illustrates the relationship between the function of landscapes in the learning process and that of academic achievement. It was demonstrated that the landscapes in assisting the learning process were in the high category (79.6%). There was also a significant relationship between the function of landscapes in assisting the process of learning and academic achievement at the school level of 0.01 with the Chi-square value of 35.993.

Table 4: Relationship (Chi-Squared) between landscape functions (learning) and academic achievements (total)

Category of Achievement for School (Academic)	Scores for Functional Landscapes (Learning)						
	High		Medium		Low		
	No	%	No	%	No	%	
	Schools		Schools		Schools.		

High	39	79.6	23	51.1	1	10.0
Medium	10	20.4	20	44.4	5	50.0
Low	0	0.0	2	4.4	4	40.0
Total	49	100.0	45	100.0	10	100.0

At the significance level of $p < 0.01$, $df = 4$, Chi-square and Pearson 35.993

A more detailed test was performed between the scores of the functional components of the landscape in assisting the school's academic achievements (see Table 5). The test results revealed a significant relationship at the weak and moderate levels (Guilford, 1956) between the total score of the functional landscape in assisting the learning process and that of academic achievements of schools ($r = 0.504$, $p < 0.01$). In general, these tests proved that there was a relationship between the schools' landscapes with the learning process in the Klang Valley-Langat. The test results also exhibited a significant reading for the landscapes assisting in the learning process by the achievements of Malaysia Certificate of Education (SPM) ($r = 0.355$, $p < 0.01$), Lower Secondary Assessment (PMR) ($r = 0.370$, $p < 0.01$) and awards for quality ($r = 0.243$, $p < 0.01$). This implied that the landscapes assisted in the learning process and had a significant relationship with all the segments of academic achievement.

Table 5: Pearson correlation of the relationship between landscape functions in assisting the learning process and academic achievement

Relationship	r	Sig	Relationship Level
Landscape functions (assist learning) with SPM achievements	0.355**	0.000	Weak
Landscape functions (assist learning) with PMR achievements	0.370**	0.000	Weak
Landscape functions (assist learning) with awards for quality	0.243*	0.013	Weak
Landscape functions (assist learning) with academic achievement (overall)	0.504**	0.000	Intermediate

Note: ** Correlation relationship significant at level 0.01 (two-tailed); *Correlation is significant at the 0.05 level (two-tailed).

CONCLUSION

Overall, there was a significant relationship at moderate and high levels of landscape functions towards the learning process and academic achievements of the schools. At this juncture, the relationship with landscaping functions in facilitating the learning process consisted of several components of hard landscaping elements. These hard landscaping elements comprised gazebos, pergolas, benches, garden tables, signages, flower vases, and soft landscaping elements. Pertaining to soft landscaping elements, they included shade trees,

shrubs, fruit trees, ground covers, and other herbal plants. It is hoped if the school's landscapes are better managed. This is particularly pertinent for the hard and soft elements of landscaping, the quality and its function because it is expected to increase. In effect, it is also expected to increase the school's academic achievement. Teachers are also able to use the school's garden for Science, Geography and Arts education. Artificial landscapes, such as fish ponds or cascading water features can also be used by the teachers to provide examples of aquatic habitats. For students, they will have the opportunity to examine the hard landscape closely by utilising hard landscape elements, such as benches and tables, as well as gazebos for discussions. This demonstrates that landscapes have an important role in the learning process of schools.

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REAPPROPRIATION OF ELEVATED HIGHWAY RESIDUAL SPACE THROUGH GREEN INFRASTRUCTURE PLANNING

Mohamed Ikhwan Nasir Bin Mohamed Anuar¹, Saiful Arif Abdullah²

^{1,2}*Institute for Environment and Development (LESTARI)*

UNIVERSITI KEBANGSAAN MALAYSIA

¹*Centre of Studies for Landscape Architecture,
Faculty of Architecture, Planning and Surveying,
UNIVERSITI TEKNOLOGI MARA*

Abstract

Kuala Lumpur City's demand for a better connectivity has led to the vast development of elevated highways. This has caused the formation of residual spaces underneath megastructures. Previous studies indicated that these residual spaces triggered issues from dumping of debris to crimes. Aimed at exploring the typologies and reappropriation of these spaces through green infrastructure planning, three methods were utilised in this study: site observation, document analysis and expert interview. Results from the study showed that there were two main typologies of residual spaces, namely: (1) easily accessible and (2) hard to access spaces. The interview sessions with the experts suggested that suitable green infrastructure elements, such as play lots, recreational lots and community gardens were regarded as suitable for Typology 1. However, semi-natural areas and functional landscapes were viewed as suitable for Typology 2. It is hoped that the understanding of the typologies of residual spaces underneath elevated highways and its appropriation through green infrastructure planning could lead to a more sustainable use and management of urban space thus viewing it as an important urban resource.

Keywords: Residual space, urban landscape planning, green infrastructure, infrastructural landscape

¹ PhD Candidate at Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia; and Lecturer at Universiti Teknologi Mara. Email: ikhwannasir@uitm.edu.my

INTRODUCTION

The number of private vehicles rises and urban areas expand, causing an increase in demands for better transportation infrastructures. Transportation infrastructures, including elevated highways are one of the major drivers to cause landscape fragmentation in urban areas (Bürgi et al., 2004; Forman et al., 2003). Landscape fragmentation may affect almost all components of urban landscapes, such as aesthetic, ecological, historical, and recreational qualities (Forman et al., 2003; Weisbrod, 2011). In Malaysia, Kuala Lumpur City is not exceptional from the situation as the ratio of highways is considerably high (Barter, 2004) as compared to the number of population (68 metres per 1,000 urban population). The development of elevated highways has resulted in the formation of empty and residual spaces (Franck, 2011; Sanches & Pellegrino, 2016). Kuala Lumpur City is also experiencing the same scenario (Qamaruz-Zaman et al., 2013). Nevertheless, there have been a few studies carried out in Kuala Lumpur City. The studies in the local context include Barter 's (2004) study which highlighted the extreme scale of number of people to the number of highway areas. On the other hand, Qamaruz-Zaman et al. (2013) delved deeper into the situation by studying some of the spaces underneath elevated roadways and noted that these spaces were informally utilised and had a potential to be planned and designed as a space that could serve the public better if permitted by local bylaws. Concern about issues regarding residual space is also highlighted in Kuala Lumpur Structure Plan 2040, in which it states that the available residual spaces are often neglected and should be better planned for.

In order to address the issues at hand, there is a need to review the current situation primarily in understanding the types of typologies of the residual spaces underneath elevated highways. The understanding of the typologies may facilitate planners, designers and policy makers to engage in more effective planning for residual spaces. Therefore, the objectives of this study are to identify the typologies of spaces underneath elevated highways and to explore the possibilities of usage for the residual spaces through green infrastructure (GI) planning approach. Prior to achieve the objectives, there is a need to understand the current situation of the elevated highways and the formation of residual spaces, as well as the concept of green infrastructure which are pertinent to provide a stance towards the whole issue. Thus, this paper begins with a brief discussion about the topic of formation of residual urban spaces caused by the elevated highways followed by the discussion on green infrastructure planning as an approach in addressing residual spaces. Then, the methods used in this study are described, followed by results, discussion and finally the conclusions.

GREEN INFRASTRUCTURE PLANNING AS AN APPROACH TOWARDS ADDRESSING RESIDUAL URBAN SPACES

Considered as the most generally used and economical means of transportation, elevated highways are one of the most significant connections in landscape between urban areas and their outskirts. Elevated highways have often been built in the subsequent urban areas: urban fringe, river bank, industrial areas, as well as crossing low-income housing areas (Bisecker, 2015). The development of the elevated highways would increase the accessibility and mobility of urban dwellers. Nonetheless, the development of the elevated highways, at the same time, become obstructions that separate district or neighbourhood and create vast amount of residual spaces that affect the city as a whole. Territorial vagueness of the spaces can also lead to issues of land misuses, such as dumping of debris, abandoning of cars or illegal activities (Hamersma et al., 2017; Mohamad & Kiggundu, 2007; Rahim, 2001; Shoaib & Ghendy, 2013). The unsuitable use of the residual spaces eventually lead to social and economic problems, in which can affect the value of adjacent properties. Branas et al. (2011) relate the residual spaces to the “incivilities” theory, in which the abandoned residual spaces promote weak social ties among nearby residents and encourage crimes, ranging from harassment to homicide. Harnack and Cohler (2011) describe elevated highways as pieces of infrastructure which seldom attract people’s affection and pose a constant provocation. Following this, Jalian (2015) states that the resulting interstice in an example of “a space that intervenes between one thing and another” often generates seemingly uninhabitable zones and problematic discontinuities in the physical and social fabric. Issues relating to formation and unclear function of these residual spaces have mostly been discussed in the Western world but still limited in South East Asian region (Clements, 2013; Hormingo & Morita, 2004; Qamaruz-Zaman et. al., 2013; Sanches & Pellegrino, 2016).

Scholars, designers and planners, ranging from multiple fields of practice, have noted that the issue of residual spaces in relation to transport infrastructure is a result of a lack of integration during the early stages of development, primarily during the planning and design process. Thus, the problem of residual spaces is indeed a gap that needs to be addressed (Akinci et al., 2016; Jalian, 2015; Mossop, 2006; Prasetyo & Iverson, 2015). One of the recent approaches in addressing residual spaces in the city is through green infrastructure planning. The greening of residual, derelict and vacant land approach becomes a suitable opportunity to reduce crime and social tensions, as well as to enhance the quality of life, leisure, recreation, and social cohesion in the city (Sanches & Pellegrino, 2016). The greening approach can be considered as an opportunistic strategy, acknowledging the potential of the residual landscape to be managed or structured in a different manner to provide specific functions, such as pedestrian and cycle paths or as greenways (Ahern, 2007).

The term green infrastructure is defined in various ways by different scholars in vast literatures. For example, European Commission defined green infrastructure as a network of green spaces, habitats and ecosystems within a defined geographic area, which can range in scale and varies in functions from providing ecosystem service to enhancing the human quality of life (Maes et al., 2015). In contrast, prior to that, Beer (2010) states that green infrastructure is purposeful, intentional, designed, and intended primarily for widespread public use and benefit. Following this, Mell (2016) remarks that green infrastructure has been broadly defined in literature to mean either investment in green space or as an infrastructure with sustainable objectives. On the contrary, Vandermulen et al. (2011) have associated green infrastructure with green spaces in general. Roe and Mell (2016) describe green infrastructure as highly modified, man-made or engineered “intentional landscapes” and not covered by spontaneous vegetation. In a latter study by Matthews et al. (2015), green infrastructure is seen as an approach that highlights human modification and ecosystem services within green infrastructure (water purification and heat reduction), which are purposefully- designed spaces.

In differentiating green infrastructure (GI) planning with traditional planning approach, Benedict and McMahon (2012) elucidate that the main contrast between traditional planning and GI-based planning approach is that traditional planning is mono-functional, while GI-based planning approach is multi-functional. Adding to this, Lennon and Scott (2014) state that GI concept reverses traditional planning practice and provides an array of benefits, such as economic benefits in terms of increasing land and property value, inward investment, visitor spending, environmental cost saving, health improvement, market sales, and employment generation (Donovan & Butry, 2010; Gore et al., 2013; Kim 2016). Social and cultural benefits are also associated to GI planning, such as increasing spiritual attachments, recreation experiences and aesthetic values. This, in turn, may catalyse greater community engagement within a space (Nemeth & Langhorst, 2014). Through GI, the exposure to nature and real or perceived biodiversity may provide many benefits to people, such as improved psychological well-being, physical health and cognitive function (Anderson & Minor, 2017; Kim, 2016; Nemeth & Langhorst, 2014; Sanches & Pellegrino, 2016). Adding to this, environmental benefits are related to GI being introduced in the residual spaces in providing climatic and microclimatic modifications in terms of mitigating urban heat island (Armson et al., 2012), as well as enhancing ecosystem service (Gore et al., 2013; Hensen & Pauleit, 2014; Kim, 2016; Pauleit et al., 2017; Sanches & Pellegrino, 2016). The benefits range from potential to increased urban biodiversity (Harrison & Davies, 2002; Muratet et al., 2007). It is in this sense that GI is foreseen as a suitable planning approach to address the issue of residual urban spaces, particularly underneath elevated highways in the city.

METHODOLOGY

This research was done through two phases; a case study and through expert interview which allowed the authors to investigate current phenomenon using qualitative methods. Data collection for the case study which mainly involved site observations were guided by a systematic framework established by Malterre-Barthes (2011) and was carried out within a period of several months. This data collection consisted of observations and documentation of sites that were based on a set of checklists describing the typology of the site, namely: (1) public space, (2) public space with service function (3) transit space hub (4) transit space circulation, and (5) inaccessible space. Through this set of checklists, the typologies of the site were recorded, documented and categorised. The categories and characteristic observed in relation to the typologies were presented in Table 1. The specific framework was chosen as the main data gathering tool that was supported by Biesecker (2015) who indicated that it allowed the documentation of the typologies of the studies site to be systematic. Biesecker (2015) also explained that the specific framework was chosen to provide a general understanding of people who used the space and the types of activities that may happen or happened at the site, specifically in residual spaces. In this study, Duta Ulu Kelang Expressway (DUKE - E33), Ampang Kuala Lumpur Elevated Highway (AKLEH - E12) and the Maju Expressway (MEX - E20) were selected as the case studies (see Figure 1). These sites were purposively selected as they represented the highest available residual space underneath elevated highways in Kuala Lumpur City with a combined total area of 582,793 m². These three elevated highways have parts that run across dense urban communities and neighbourhood, as well as green areas resulting in the presence of multiple typologies of interstitial spaces.

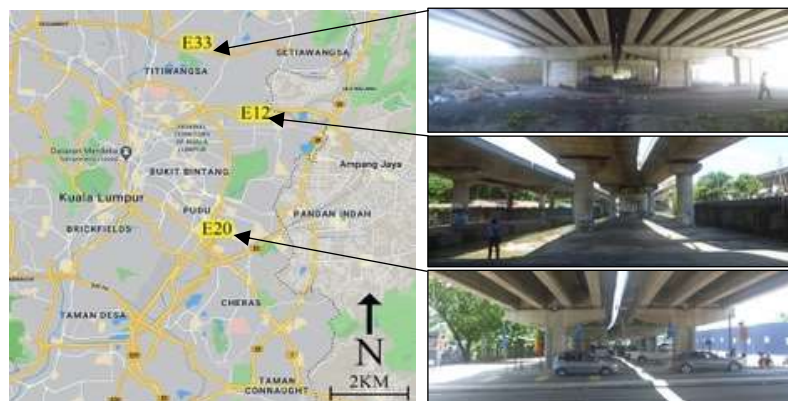


Figure 1: The location of DUKE (E33), AKLEH (E12) and MEX (E20) in relation to its location in the city of Kuala Lumpur

Source: Author and map adapted from Google Maps

Table 1: Categories and General Related Characteristic to the Typologies of Spaces Underneath Elevated Highways

Typology	Characteristics	Category
Public Space	Public space is accessible to pedestrians only. Activities and function are determined by surrounding businesses and people. It is designed and maintained by the city's authorities	Typology 1 Easy to Access
Public Space with Service Function	Most of the space is accessible by cars and motorised vehicles. It is crammed in between two to four traffic lanes adjoining the main road axis, as well as it is dominated by parking zones and partly-furnished with some form of urban furniture. It has a presence of service space with limited public access.	
Transit Space Hub	Transit space hub is a commuter-friendly transit space and provides shelter in times of adverse weather. It is used as a hub for transportations (bus or taxi stops)	
Transit Space Circulation	Transit space circulation is solely dedicated to vehicular and pedestrian circulation. It has a presence of traffic lanes with minimal sidewalks and crossings.	Typology 2 Hard to Access
Inaccessible Space	Inaccessible space does not give access to public as it is only accessible to private business. It is mainly used for storage and transportation depot and is oftentimes fenced or gated.	

(Source: Adapted from Malterre-Barthes, 2011)

First phase: Site Documentation and Observations Duta Ulu Kelang Expressway (DUKE E33)

The site of the first case study is located underneath the DUKE highway near the Jalan Pahang ramp and Sentul Pasar Interchange. At present, the surrounding major site context, included religious institutions - Jamiul Ehsan Mosque, commercial lots, as well as a newly built mix residential tower – The Reach @ Titiwangsa. The 103,090 m² space was predominantly used as an informal parking space, a shelter for motorcyclist taking refuge from rain and an informal space for selling of food items by the roadside (see Figure 2). Moving further into the space underneath DUKE, it was revealed that the space was used as an informal dumping site for construction waste (see Figure 3). However, some parts of the site are enclosed by a structure of the highway, while some other parts of the site offer a more open area which supports informal passive activities, such as jogging and fishing in the nearby flood retention pond (Gombak River Retention Pond). At night, the space was poorly lit with no activities to be seen and recorded. The accessibility to the space was somewhat easy because of multiple entry points into the residual space underneath the structure, as well as no barriers found at the site during the time of field work.



Figure 2



Figure 3

Figures 2&3: The spaces underneath DUKE being utilised informally as a place to sell food and dumping debris

Source: Author



Figure 4: The residual space underneath DUKE is easily accessible from the surrounding existing and future residential area

Source: Author

Ampang Kuala Lumpur Elevated Highway (AKLEH E12)

The site underneath AKLEH runs from Datuk Keramat Light Rail Transit (LRT) Station to Jalan Gurney. The surrounding site context encompasses a light rail transportation hub, residential dwellings, as well as some institutional buildings. Although the site can be accessed rather easily, accessibility into the site is limited due to some parts of the site not being at the similar level with the surrounding road sides and streets. The discontinuation between the interstitial spaces is furthermore accentuated by the contrast in scale between the structure and the adjacent neighbourhood. Moreover, the massive form and high-paced nature of

the AKLEH intensifies the juxtaposition of scale. Although much of the 110,010m² space underneath AKLEH is somewhat easily accessible, the residual spaces generally appear to be undefined in use, ownership, management, and function. These residual spaces project a sense of abandonment and lost opportunities in contrast to the highly-managed and planned roadway above it. The observed activities in the space underneath AKLEH observed were limited to people using the concrete bank of the river as passage ways (see Figure 5) and people fished for aquatic life on some parts of the riverbank (see Figure 6). No activities involving commerce were observed in the site or any activities during night time.



Figure 5



Figure 6

Figure 5&6: Activities observed underneath AKLEH, using the concrete bank as passage ways and fishing for aquatic life in the Klang River

Source: Author



Figure 7: Residential land use surrounds the residual space underneath AKLEH

Source: Author

Maju Expressway (MEX E20)

There were two parcels which was studied underneath MEX. The first parcel (Tun Razak – Jalan Peel) which has a total area of 54,850 m² was still in use for commerce (see Figure 8), while the second parcel (Salak Selatan – Kuchai Lama) which has a total area of 314,843 m² was covered by informal vegetated space (see Figure 9). The spaces studied were surrounded by residential and industrial areas. Some parts of the space still remained empty and vague. The manifestation of human activity that involved in and out movement of the space was mainly due to the ease of access into the area, particularly in the first parcel. In contrast, the second space of MEX was left unused because the accessibility and continuity of human-scaled movement were obstructed by physical barriers. This was because this area is surrounded by a major highway and fences in some parts.



Figure 8



Figure 9

Figure 8&9: Spaces under MEX are currently being used as a space for commerce in Parcel 1 (Figure 8) and informal vegetated space in Parcel 2 (Figure 9)

Source: Author



Figure 10: The residual space underneath MEX (Parcel 2: Salak Selatan – Kuchai Lama) is cut off by a major highway making it hard to access

Source: Author

Second phase: Expert Interviews

The second phase addressed the second objective of the study which was to explore the possibilities of usage for the residual spaces through green infrastructure (GI) planning approach. It involved a brief but in-depth interview. A series of structured interview was conducted with experts ranging from landscape architects with professional certification and more than ten years of industrial experience to academicians with a Doctor of Philosophy (PhD) qualification relating to landscape architecture and planning background. To gain exclusive insights regarding the suitable usage of the studied residual spaces underneath elevated highways, a total of ten (10) experts were interviewed. A series of structured questions was presented and answers were recorded through scores and notes. The questions were arranged in two sections as suggested by the two common typologies of residual infrastructural spaces that were identified as underneath elevated highways in Kuala Lumpur City.

The respondents were shown pictures, as well as two dimensional plans of the sites and were asked to give scores from 1 (not suitable) to 5 (most suitable) with regards to the green infrastructure elements. The respondents thought that these green infrastructure elements would be suitable to be applied in the two typologies of residual spaces underneath elevated highways. These typologies were identified through the initial conducted fieldwork based on the framework adapted from Maltere-Barthes (2011). The list of green infrastructure elements that was presented to the interviewees was based on a review of several published local and international documents. Elements, such as parks (neighbourhood parks, playing field, playlot, and recreational plots), green roof and wall, natural and semi natural green areas, green corridors, community garden and allocation for urban farming, public social space, as well as functional green space were listed as variables. Scores were given to each of them in accordance to the suitability of their implementation in the reviewed typologies. Based on the interview transcripts, key words and themes that determined the suitability of the application of green infrastructure elements in the studied spaces were also noted. Results of the interview were then descriptively analysed.

RESULTS AND DISCUSSION

Typologies of Spaces Underneath Observed Elevated Highways

Through the recorded observation of the case studies, two key typologies of the spaces underneath the highways in Kuala Lumpur were suggested. The observation had considered the typologies of spaces underneath elevated highways as suggested by Malterre-Barthes (2011). Conversely, as opposed to the five categories, the categorisation of the typologies had been further categorised into two main categories which were (i) easily accessible space and

(ii) hard to access or inaccessible space. Results of the fieldwork were presented in Table 2

Table 2: Typologies associated with the spaces underneath the three studied elevated highways

Site	Typology 1 (Easily Accessible)			Typology 2 (Hard to Access)	
	Public space	Public space with service function	Transit space hub	Transit space circulation	Inaccessible space
DUKE (Sentul Interchange)	X	X	X	X	
DUKE (Gombak Retention Pond)	X	X			
DUKE (SK Sentul Interchange)			X	X	X
AKLEH (LRT Dato Keramat)	X			X	
AKLEH (LRT Damai)	X			X	
AKLEH (Tun Razak Junction)	X			X	
MEX (Tun Razak – Jalan Peel)	X	X	X	X	
MEX (Salak Selatan-Kuchai Lama)			X	X	X

(Source: Author)

The result indicated that the spaces underneath elevated highways showcased an array of typologies. All of the studied sites possessed some characteristics of the observed typologies at certain locations with varied scales and form. DUKE (Sentul Interchange) and MEX (Tun Razak – Jalan Peel) were dominated with Typology 1, in which most of the observed sites were public-friendly and easily accessible with some form of informal, modular and makeshift urban furniture. Pertaining to Typology 2, the spaces underneath MEX (Salak Selatan – Kuchai Lama) and DUKE (SK Sentul – Interchange) exemplified this typology the most as the spaces in these areas were dominated by storage areas utilised by the city hall. Some of the areas were fenced, as well cut off from the surrounding area by major highways. The spaces underneath AKLEH were mainly associated with Typology 1 as most of the spaces in that particular site were mainly commuter-friendly and utilised as transit space but lacking in other forms of service or amenities.

Potential Green Infrastructure Elements for Residual Space Reutilisation

The interview with experts had revealed that based on a mean score of 1 that indicated less suitable to 5 that indicated most suitable, green infrastructure elements, such as play lots (4.6), recreational lots (4.5) and community gardens (4.5) were perceived as suitable to be planned and designed into the spaces with Typology 1 (easily accessible). Nevertheless, semi-natural (4.7), green corridors (4.5), as well as functional green spaces (4.5) which encompassed systems for sustainable urban drainage systems were more suitable for residual spaces which were categorised as Typology 2 (hard to access). The mean scores of the suitability of green infrastructure elements presented to the respondents were tabled in Table 3.

Table 3: Mean score of suitability of green infrastructure elements application underneath elevated highways based on the two observed typologies

Green Infrastructure Elements	Typology 1	Typology 2
Neighborhood park	3	1
Playing Field	3	1
Play lot	4.6	1
Recreational lot	4.5	2
Green roof and wall	4	3
Semi natural area	3	4.7
Green corridor	3	4.5
Community garden	4.5	3
Public plaza	4	2
Functional green space, SUDS	4	4.5

(Source: Author)

Results from the interview displayed that spaces underneath elevated highways with Typology 1 – DUKE (Sentul Interchange) and MEX (Tun Razak – Jalan Peel) – were suggested to be suitable for implementation of the green infrastructure elements in the form of play lots, recreational lots or community gardens. However, spaces of Typology 2, such as MEX (Salak Selatan – Kuchai Lama) and DUKE (SK Sentul – Interchange) were suitable in the form of semi-natural area, green corridor and functional green spaces, as well as linked to sustainable urban drainage system (SUDS). Following the scores given, the main factors which had been regarded by the respondents as key factors in determining the suitability of the application of green infrastructure elements were the typology of the spaces, the locality and site context, accessibility, safety, community needs, as well as approval from the local authority.

The study had shown that the spaces underneath elevated highways in Kuala Lumpur had an array of typologies. The residual spaces studied underneath elevated highways mentioned showcased that all the spaces to a certain extent

possessed the various typologies, namely, Typologies 1 and 2. Conversely, upon investigation, the typologies varied primarily in terms of scale and location. The results from the study had shown that a comprehensive examination, as well as understanding the typologies of residual spaces underneath elevated highways could facilitate planners, designers and policy makers to engage in a more effective and informed planning for residual spaces, particularly underneath elevated highways. Various government bodies at different scales, as well as private agencies could create a suitable spatial programming for these residual spaces to encourage the use of transportation-related sites, as well as to enhance a green network system within the urban core and its outskirts.

The findings of the study are in line with several precedent studies (Allen, 2014; Biesecker, 2015; Weththasinghe & Wijesundara, 2017) which had identified an array of green uses for leftover spaces in urban areas, such as urban farming, community green spaces and an opportunity to increase biodiversity in the city. A synthesis of these green infrastructure efforts in conjunction with current and recent approaches generated a set of green infrastructure project typologies that were organised in broad categories, such as income generating (commerce), environmental services, as well as social or community benefit (Allen, 2014). The findings of this study suggested that each typology was evaluated for its relative suitability for re-use of residual spaces or underutilised property based on professional assessment, public preference, feasibility, opportunity, and the physical resource characteristics of each space, site or lot. Hence, based on the underlying principles and elements of green infrastructure, it was suggested that green infrastructure (GI) could be a suitable planning and design approach to address residual spaces as it would offset the issues generated by traditional mono-functional planning and provide a wide range of environmental, social as well as economic benefit to the city.

The overall aim in the study was to explore the potential reappropriation of these spaces through green infrastructure planning. The revealed typologies proved to be a useful first step as the understanding of the typology supported a better appreciation and understanding of the potential benefits of residual infrastructural spaces, namely, underneath elevated highways within the urban landscape. The study conducted exemplified the initial attempt to conduct a comprehensive survey of the current condition of residual spaces underneath highways in the city, as well as to develop a means to support city policies and guidelines in terms of the use or reuse of these vague spaces through the green infrastructure elements. The empirical data gained for this study could primarily assist the landscape architects, planners, as well as urban designers who aim to envisage in a more effective planning and design processes for residual spaces in terms of their ecological, social, as well as economic benefits in line with the Kuala Lumpur Structure Plan 2040, particularly with regards to sustainable use of space. These residual spaces could offer unconventional and imaginative ways

to envision the public realm and landscape designs in cities. The spaces studied could be used as an important resource when the spaces were considered as a potential redevelopment opportunity that would primarily benefit the public at large. Although subjected to approval of local bylaws and regulations, the understanding of the typologies and their suitability for redesigning and development in this study may have important implications for policy development. The findings are also expected to help practitioners, as well as academicians to have a better comprehension about infrastructural residual spaces.

CONCLUSION

In conclusion, this initial study has highlighted the main types of residual space typologies underneath elevated highways in Kuala Lumpur, namely, easily accessible space and hard to access space. Through the understanding and appreciation of the typologies of residual spaces underneath elevated highways, suitable green infrastructure elements could be applied according to the typologies and thus, could lead to a more sustainable use of urban space and an appreciation of these spaces as an important urban resource. State and federal government agencies may create programmes that encourage residual elevated highway space use for public amenities, useful community assets, as well as natural city assets and to enhance the green network system of a city. Through the green infrastructure planning, residual spaces could be transformed as an interconnected network of multi-functional spaces rather than solitary element that would provide a range of ecological, social and economic benefits to the city. Future studies could include the studies on the needs of the surrounding communities in accordance to using residual infrastructural space as green spaces for leisure and enhancement of quality of life, as well as looking at the technical aspects, such as safety, planning policy and regulations.

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LAND USE DEVELOPMENT AND RIDERSHIP AT KELANA JAYA LRT LINE, MALAYSIA

Jamalunlaili Abdullah¹, Kushairi Abdul Rashid², Muhammad Ikram Baharom Shah³, Oliver Ling Hoon Leh⁴, Rohayu Abdul Majid⁵, Rohana Ngah⁶

*¹⁻⁵Southeast Asia Built Environment Research Centre (SEABERC)
Faculty of Architecture, Planning and Surveying,*

UNIVERSITI TEKNOLOGI MARA (UITM)

*⁶Malaysian Academy of SME and Entrepreneurship Development (MASMED)
UNIVERSITI TEKNOLOGI MARA (UITM)*

Abstract

Urbanisation has led to increased traffic use and congestion in various cities around the world. Various policies and strategies have been implemented to address the issue. One of the most popular strategies is the development of transit system, including mass rapid transit (MRT) and light rapid transit (LRT). To ensure the success of the transit system, the concept of Transit Oriented Development, in which land uses around the stations that are developed for urban development has been implemented. This paper evaluates a possible relationship between land uses around the station and ridership in selected stations along the Kelana Jaya LRT line in the Kuala Lumpur metropolitan area, Malaysia. The land uses around the station were calculated using Land Use and Public Transport Accessibility Index (LUPTAI). The research did not conclusively find a strong relationship between LUPTAI and ridership. This was perhaps due to the fact that almost all stations had been developed for urban land uses, such as commercial, residential and public facilities, thus giving all stations almost the same index figures. It is hope that a more detailed index that accounts for type and mixture of development on land, as well as the density for residential areas would probably give a better index result, as well as perhaps a stronger relationship with ridership figures.

Keywords: Transit Oriented Development, land uses, LUPTAI, transit ridership

¹ Jamalunlaili Abdullah, professor of Town Panning, UiTM. Email: jamal858@uitm.edu.my

INTRODUCTION

Urbanisation has led to increased traffic use and congestion in cities around the world. Automobile dependency, especially in relation to urban sprawl has led to gridlocks and increased greenhouse emissions, resulting in negative environmental, social and economic impacts to nations. Various policies and strategies have been implemented to address the issue of automobile dependency and the resulting traffic congestions. One of the most popular strategies is the development of transit system, including the mass rapid transit (MRT) and light rapid transit (LRT). LRT was first implemented at Metropolitan Kuala Lumpur, Malaysia in 1998 and has since expanded to include MRT and covers newer areas within the Klang Valley. The transit system has been successful in that LRT3 and MRT2 are currently being constructed at the metropolitan area.

The literature has argued that many factors do influence the ridership figures of the transit system. These factors, include socio-economic factors, such as the population served by the system, the fare and the incentives provided to the riders. Other factors encompass physical aspects, such as the areas served which are the types of land use and intensity of use. The physical aspect theory contends that the land uses and intensity of use found around the station will affect the number of riders using the transit system. Commercial, residential and public facilities land uses are likely to attract more transit riders as compared to other land uses, such as forestry and open spaces. Thus, the former categories are encouraged to be built around the LRT station, especially in stations designated as Transit Oriented Development (TOD) station, in which a greater intensity of use is also allowed. Sohoni et al. (2016) argued that TOD is a viable tool for sustainable development of cities, particularly in relation to TOD.

TOD is a land use solution that focuses in enhancing accessibility, as well as also encouraging compact, high density and mixed-use development within an easy walk of a transit station. Transit Oriented Development (TOD) is now becoming a popular solution to optimise the use of land and to tackle urban transportation issues. A typical TOD neighbourhood has a diameter of a quarter to half mile (400 to 800 metres) which represents pedestrian scale distances (five to ten minutes' walk). Kuala Lumpur City Hall and surrounding municipalities have identified Transit Planning Zone (TPZ) to areas within 400 metres of a transit station in order to encourage more TOD development at Kuala Lumpur metropolitan.

This paper discusses the analysis of land uses within selected ten stations along Kelana Jaya LRT line within Petaling Jaya City Council and Subang Jaya Municipal Council areas. This study applies Land Use and Public Transportation Accessibility Index (LUPTAI), as well as observation method to analyse the relationship between land uses and LRT ridership. These LUPTAI figures are then compared to the ridership data of the stations provided by

Prasarana Malaysia. The relationship between these two variables are then ascertained through a comparative analysis.

LITERATURE REVIEW

This section reviews literature related to Transit Oriented Development (TOD), transit ridership, as well as LUPTAI. It analyses the concept and evolution of TOD, factors influencing transit ridership, as well as the LUPTAI technique since all three variables are closely related and influence one another. It also seeks to ascertain if previous studies have proven that there is a relationship between LUPTAI and ridership of transit system.

Transit Oriented Development

The provision of train-based mass transportation systems, also known as transit systems, is an effective way to tackle the challenges faced by cities, such as traffic jams, air pollution, greenhouse gas emissions, and other social problems which affect the quality of city life (Suzuki et al., 2015) as it alters the use of private vehicles. While many factors affect the performance of the transit system, physical development surrounding the transit station has been thought to influence the ridership figures. Effective integration of land uses surrounding the transit stations can help to spur ridership of the transit system.

TOD is a developed area that focuses on transit as its basic principle is a development of which is expected to fulfill the purpose of sustainability both in transport and urban planning (Mohammed Ali Berawi et al., 2020). TOD devises urban development plans based on public transportation systems to enhance the sustainability of MRT systems, land use efficiency and traffic operation effectiveness. Several studies have shown a connection between transit service, ridership and improvements in traffic safety (Litman, 2016).

Besides that, rather than separately considering transit systems and relevant land uses, a good planning strategy should integrate both aspects into the TOD aspect of the urban spatial structure planning (Ding et al., 2017). TOD provides a compact and mixed-use with transit-oriented communities that has a convenient access to employment areas and facilities. TOD also focuses on urban growth around transit facilities and leverages on transit investments to help produce substantial benefits, such as walkable communities, an improved accessibility to jobs and economic opportunities, a reduced motor traffic congestion, less air pollution and lower greenhouse gas emissions. (Buang, 2018). Theoretically, TOD can enhance accessibility by providing a relatively high level of transportation connections and high-density, mixed-use, cycling- and pedestrian-friendly land use around transit stations (Guowei & Pfeffer, 2020). TOD is a potential solution to support the growth of urban population and to make the transit system more attractive. This is because TOD is primarily expected to

help in reducing dependability on private vehicles, as well as encouraging public transportation and walking as a lifestyle in a city (Litman, 2018).

TOD has been applied in several countries, such as Singapore, China, Australia, India, and United States (Arina Rahmat et al., 2016). In Malaysia, TOD increasingly becomes a priority for developers and property companies to lead urban planning towards creating a quality, prosperous and sustainable living environment. There are some policies and incentives related to TOD are contained in 10th Malaysian Plan (Chapter 6), National Physical Plan 3 (NPP3), National Urbanisation Policies 2 (NUP2), as well as Draft Planning and Design Guidelines for Compact and Livable Development to encourage the use of public transportation, walking and cycling as an alternative to the main modes in the development.

The emphasis on TOD is also clearly outlined in the state structure plans and local plans, such as the Selangor Structure Plan 2020, and Kuala Lumpur City Plan 2020, as well as in regional plans, such as Iskandar Region's Comprehensive Development Plan (CDP) (Gomez et al., 2019). Some local authorities do provide incentives for developers to build within 400 metres of the transit station. This is usually done through higher than normal plot ratio for commercial development and higher density for residential development.

Ridership

Pertaining to TOD, the relationship between the built environment and transit ridership attracts lots of attention (Choi et al., 2012). Many governments use land use policies to influence travel demand (Singh et al., 2018). The land use policies' primary benefit is to increase transit ridership which is critical for a sustainable transit system. To understand the correlation of transit ridership and to predict transit demand, many scholars investigated the relationship between the station-area built environment and transit ridership (Liu et al., 2018). The coefficients of built environment variables are found to vary across space, indicating that the influences of residential locations on commuting behaviour vary by the type of employment centre (Hu et al., 2018).

Public transportation plays an important role in fulfilling transportation needs as there are many external and internal factors that affect public transportation demands. External factors are associated with socioeconomic developments, which are not subjected to controls, such as income, car ownership, population, employment, and other household characteristics. On the other hand, the internal factors are characteristics of the public transportation system and are subjected to policy decisions including public transportation fares, trip length, travel time, and service levels (Al-Sahili et al., 2003). Table 1 lists factors that influence transit ridership.

Table 1: Factors that influence ridership

Factors That Influence Ridership	Author or Researcher
<i>Commercial and governmental land uses, bus connectivity and transfer stations are all associated with station attraction ridership during morning peak hours.</i>	<i>Chan and Miranda-Moreno (2013)</i>
<i>The influencing factors on Taipei metro station ridership cover four dimensions: land uses, social economy, accessibility, and network structure.</i>	<i>Yuxin et al. (2018)</i>
<i>Transit planners and policy-makers need to know the influences of changes in transit service and the built environment on transit ridership. It is important to know these influences for several reasons.</i>	<i>Chu (2004)</i>
<i>Probing into the issue of last-mile solutions in Singapore, Tay (2012) found that porosity, which is a pedestrian connectivity measure, is significantly and positively associated with a higher station ridership.</i>	<i>Tay (2012)</i>
<i>TOD is intended to increase transit ridership and walking but to decrease biking, and shares of automobile trips. The design and mixed-use features of TOD may reduce both work and non-work automobile trips.</i>	<i>Lund et al. (2004)</i>

Source: various authors as listed

Land Use and Public Transport Accessibility Index (LUPTAI)

Land Use and Public Transport Accessibility Index (LUPTAI) is a decision-aiding tool to enable local and state governments to optimise land uses and transportation integration. LUPTAI seeks to measure how easy it is to access common destinations, such as health, education, retail, banking, and employment centres by walking and/or public transportation (Pitot et al., 2006). Accessibility indexing is important in evaluating existing land use patterns and transportation service, predicting travel demands and allocating transportation investments (Tan et al., 2007). LUPTAI reflects the ease of reaching needed or desired activities and thus, reflects the characteristics of both land use system and the transportation system (Handy & Clifton, 2001; Wu & Hine, 2003).

Accessibility refers to the ease, in which people can access important destinations using public transportation service. LUPTAI is developed by Queensland's Department of Transportation and Main Roads (TMR) to estimate the expected travel time from origin nodes to important destinations (Bertolaccini et al., 2018). It was developed in 2006 to measure how easy it was to access common destinations, such as residential, health, education, commercial, and offices by walking or using public transportation. LUPTAI is an origin-based accessibility model. This information relates to the land use destinations (LUDs), the road or pedestrian network and the public transportation network. The four-colour scale shows the levels of accessibility for an area, highlighting areas of high, moderate, low, and weak accessibility. Therefore, the land uses and distance

from the transit stations are the main determining factors for LUPTAI (Tan et al., 2006).

METHODOLOGY

The data collection method in this study area consisted of primary and secondary data. The primary data were observations of the land uses and built up area within 500 metres of ten selected LRT stations along the Kelana Jaya LRT line. The secondary data were obtained from the land use plan provided by Petaling Jaya Municipal Council (MBPJ) and Subang Jaya Municipal Council (MPSJ), as well as ridership data provided by Prasarana Malaysia. LUPTAI was calculated by measuring the distance from the station to the urban development within the 500-metre parameter. The distance was divided into four (4) categories ranging from weak to high based on distances as displayed in Table 2.

Table 2: Ranking score of LUPTAI index

RANKING	W	L	M	H
LEVEL	WEAK	LOW	MODERATE	HIGH
DISTANCE	300-500M	200-300M	100-200M	100M
SCORE	0.1	0.2	0.3	0.4

- i. High (Green in Table 3.1) – for land uses within a 100-metre radius from the station which has the strongest impact on ridership for that station
- ii. Moderate (Yellow in Table 3.1) – for land uses between 100 to 200-metre radius from the LRT station which is likely to have a moderate impact on ridership
- iii. Low (Orange in Table 3.1) - for land uses between 200 to 300-metre radius, in which people start to calculate, whether they should walk on a sunny day or using another mode of transportation.
- iv. Weak (Red in Table 3.1) – For land use between 300 to 500-metre radius which is likely to have a weak impact on LRT ridership among the four groups due to the distance.

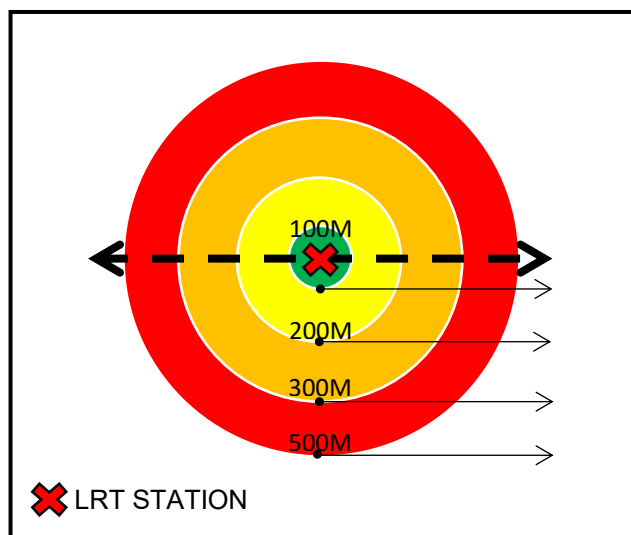


Figure 1: LUPTAI measurement distance

The land use survey confirmed the secondary data of land uses provided by MBPJ and MBSA around the ten selected stations. The land use pattern consisted of commercial, residential and public facilities. One of the key outputs of LUPTAI was a composite index that provided a measure of the level of accessibility for all the land use destinations considered within the analysis. The composite index was based on a rudimentary weighting that residential area, commercial and public facilities land used as an equal value of influence on the overall composite index. The LUPTAI measured the distance of these land uses to the station and contributed to a higher value to land uses closest to the station.

STUDY AREA

Klang Valley currently has a six-line rapid rail transit network. while LRT 3 and MRT Sungai Buluh Serdang Putrajaya (SSP) are currently constructed. The rail networks within the Klang Valley are KTMB Commuter, KLIA Transit or Express, Sri Petaling LRT line, Kelana Jaya LRT line, Kuala Lumpur (KL) monorail, and the newly operated MRT Sungai Buluh-Kajang line. Kelana Jaya LRT line is the fifth rail transit line and the first fully-automated and driverless rail system in the Klang Valley area that forms a part of Klang Valley Integrated Transit System. Kelana Jaya LRT line runs from Putra Heights LRT through Kelana Jaya to Gombak, comprises 46.4 kilometres of grade-separated tracks with 37 stations. This shows that Kelana Jaya LRT line is one of the most established rail lines at Klang Valley which contributes the highest ridership among all the lines, serving Subang Jaya, Petaling Jaya and Kuala Lumpur. This paper evaluates the selected ten stations, namely Lembah Subang (KJ25), Ara

Damansara (KJ26), Glenmarie (KJ27), Subang Jaya (KJ28), SS15 (KJ29), USJ7 (KJ31), Taipan (KJ32), Wawasan (KJ33), USJ21(KJ34), and Alam Megah (KJ35) which are located within the MBPJ and MPSJ jurisdictions.

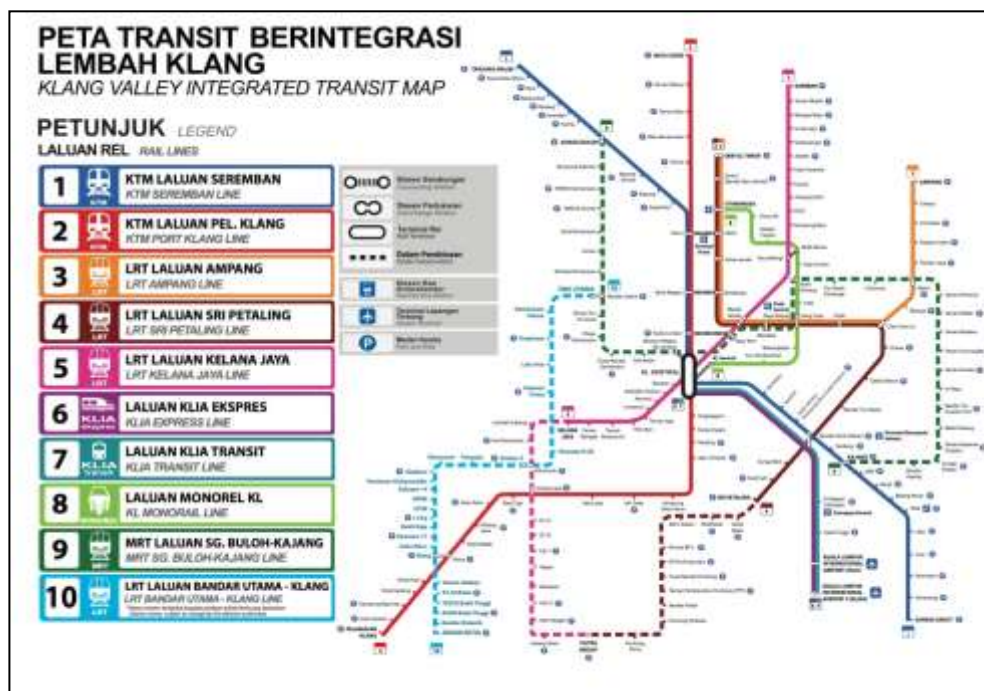


Figure 2: The rail network at Klang Valley, Malaysia



Figure 3: Kelana Jaya LRT line route map

RESULTS AND FINDINGS

Land uses

The result of the land use analysis in Table 3 illustrated that almost all land-use patterns within 500 metres of the LRT stations were commercial and residential areas. Some, such as Taipan, Wawasan, and USJ21 stations were dominated by residential land uses, while a few others were a mixture of residential and commercial uses. This land-use data distribution was used to calculate LUPTAI for each station. Since the study area was a mature transit line, almost all lands around the stations had been developed with mostly commercial or residential development.

Table 3: Land use distribution around LRT stations

LRT STATION	LAND USE						Total %
	Residential		Commercial		Public Facilities		
	Area(Km)	%	Area(Km)	%	Area(Km)	%	
LEMBAH SUBANG	0.462	55.66	0.283	34.10	0.085	10.24	100
ARA DAMANSARA	0.305	35.46	0.340	39.54	0.215	25	100
GLENMARIE	0.255	49.04	0.220	42.31	0.045	8.65	100
SUBANG JAYA	0.270	51.92	0.220	42.31	0.030	5.77	100
SS15	0.510	65.81	0.200	25.80	0.065	8.39	100
USJ 7	0.330	52.80	0.240	38.40	0.055	8.80	100
TAIPAN	0.420	70.59	0.110	18.49	0.065	10.92	100
WAWASAN	0.600	80.00	0.080	10.67	0.070	9.33	100
USJ 21	0.670	84.28	0.030	3.77	0.095	11.95	100
ALAM MEGAH	0.310	62	0.045	9	0.145	29	100

Source: MBPJ, MBSA and Own Survey



Figure 4: Land use distribution at Wawasan LRT station High LUPTAI index 24.34 and low ridership 586,272

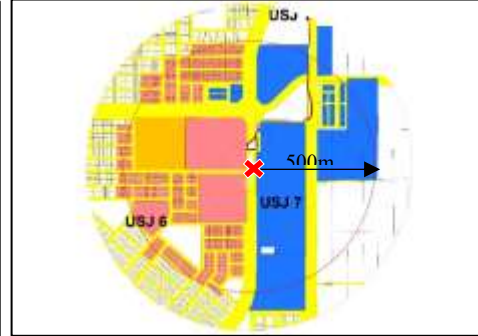


Figure 5: Land use distribution at USJ7 LRT station Low LUPTAI index 18.37 and high ridership 2,051,381



Figure 6: Land use distribution at Alam Megah LRT station LUPTAI index 20.24 and 501,382 total ridership



Figure 7: Land use distribution at Subang Jaya LRT station LUPTAI index 19.55 and 1,949,828 total ridership

LAND USES AND PUBLIC TRANSPORTATION ACCESSIBILITY INDEX (LUPTAI)

The land-use data comprising of residential, commercial and public facilities land uses were calculated based on the distance of the uses from the stations (see Table 3). Hence, stations that had most of the lands closest to them were developed as commercial, residential or public facilities. These stations also tended to have a higher LUPTAI as compared to areas around stations that had not been developed yet. The results demonstrated that LUPTAI for all stations did not differ much from one another. Seven out of ten stations had LUPTAI readings of 19 and 20 (see Table 4). This was perhaps because almost all areas around the stations had been developed since they were in relatively mature urban areas. Consequently,

not much variation was shown in terms of LUPTAI among the stations as most stations seemed to have commercial or residential uses. Wawasan station had the highest LUPTAI score of 24.3 since it had a larger percentage of urban land use within 100 metres from the stations as exhibited by the green colour in Table 4 and Figure 8. Figure 8 shows the distribution of land uses by group ranking within the 500-metre radius of the ten selected stations.

Table 4: LUPTAI index of TOD Station Kelana Jaya Line

Station	LRT Line	Weak	Low	Moderate	High	Total Index
	Score	0.1	0.2	0.3	0.4	
LEMBAH SUBANG	KJ25	18.65	61.12	12.76	7.47	20.88
ARA DAMANSARA	KJ26	40	20.78	30.4	8.82	20.79
GLENMARIE	KJ27	37.48	35.33	24.16	3.03	19.19
SUBANG JAYA	KJ28	29.26	53.68	9.15	7.91	19.55
SS15	KJ29	16.94	60.69	17.70	4.64	20.98
USJ7	KJ31	37.75	45.39	12.06	4.8	18.37
TAIPAN	KJ32	31.18	46.62	19.82	2.38	19.32
WAWASAN	KJ33	28.57	41.47	23.68	15.27	24.34
USJ21	KJ34	16.96	51.92	22.77	8.01	22.1
ALAM MEGAH	KJ35	29.28	44.74	20.43	5.67	20.24

Source: Own survey

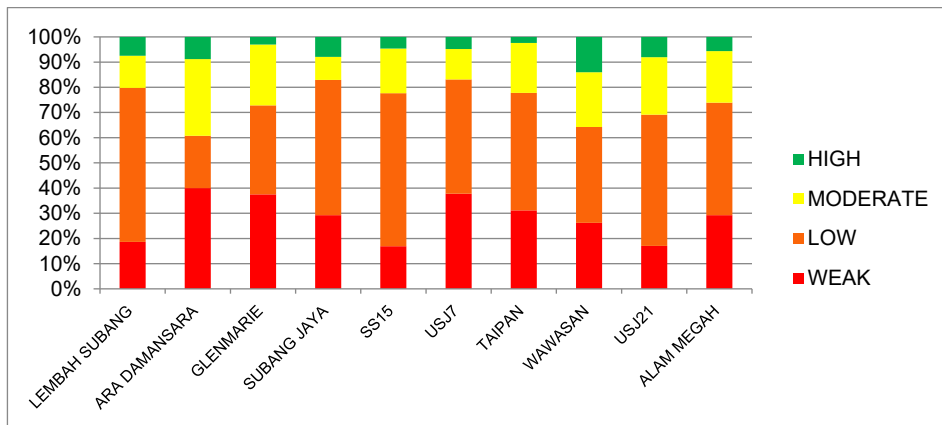


Figure 8: Distribution of urban land use around LRT stations
Source: Own survey

Ridership

Data of ridership for 2019 were provided by Prasarana based on the number of passengers entering and leaving the ten selected stations (see Table 5). There was a significant variation of total ridership among the stations with the lowest at Taipan (501,382 passengers) of only one-fourth of total ridership at USJ7 (2,051,358 passengers). Generally, stations with dominant commercial and mixed commercial and residential use were observed to have a much higher ridership as compared to stations surrounded mostly by residential or facilities land use. All stations with commercial land uses would have at least 1.5 million passengers as compared to stations with residential base that had ridership between half a million to 1.2 million. The highest figure was exhibited by USJ 7 stations which had a mixture of commercial and residential uses. This was perhaps because the commercial areas tended to attract diverse people, especially if they were also seeking for a place in employment. They also seemed to attract commuters throughout the day, unlike residential areas which seemed to peak in the morning and afternoon rush hours.

Table 5: Number of ridership year 2019

STATION NAME	STATION NO	DOMINANT LAND USE	TOTAL RIDERSHIP 2019
LEMBAH SUBANG	KJ 25	RESIDENTIAL BASE	1,224,799
ARA DAMANSARA	KJ 26	COMMERCIAL BASE	1,473,422
GLENMARIE	KJ 27	COMMERCIAL BASE	1,446,392
SUBANG JAYA	KJ 28	COMMERCIAL BASE	1,949,828
SS15	KJ 29	COMMERCIAL AND RESIDENTIAL BASE	1,476,560
USJ7	KJ 31	COMMERCIAL AND RESIDENTIAL BASE	2,051,381
TAIPAN	KJ 32	RESIDENTIAL BASE	845,917

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WAWASAN	KJ 33	RESIDENTIAL BASE	586,272
USJ21	KJ 34	RESIDENTIAL BASE	555,394
ALAM MEGAH	KJ 35	FACILITIES BASE	501,382
TOTAL			12,111,347

Source: Prasarana Malaysia (2020)

Relationship between LUPTAI and Ridership

Table 6 and Figure 8 present a simple relationship between LUPTAI and ridership. It was expected that a station with a high LUPTAI was likely to generate a high ridership figure. However, as could be seen in Figure 8, there was no a close relationship between LUPTAI and total ridership. Stations with higher LUPTAI figures, such as Wawasan, USJ 21 and Alam Megah were reported to have lower numbers of ridership as compared to stations with slightly lower LUPTAI, such as USJ7, Subang Jaya, SS15, and Ara Damansara. USJ7 had a very high ridership since the station was connected to a mixture of residential and commercial area which also had many facilities resulting with higher ridership figures.

Table 6: Total ridership and station LUPTAI index

STATION NAME	STATION NO	DOMINANT LAND USE	TOTAL RIDERSHIP 2019	LUPTAI INDEX
LEMBAH SUBANG	KJ 25	RESIDENTIAL BASE	1,224,799	20.88
ARA DAMANSARA	KJ 26	COMMERCIAL BASE	1,473,422	20.79
GLENMARIE	KJ 27	COMMERCIAL BASE	1,446,392	19.19
SUBANG JAYA	KJ 28	COMMERCIAL BASE	1,949,828	19.55
SS15	KJ 29	COMMERCIAL AND RESIDENTIAL BASE	1,476,560	20.98
USJ7	KJ 31	COMMERCIAL AND RESIDENTIAL BASE	2,051,381	18.37
TAIPAN	KJ 32	RESIDENTIAL BASE	845,917	19.32
WAWASAN	KJ 33	RESIDENTIAL BASE	586,272	24.34
USJ21	KJ 34	RESIDENTIAL BASE	555,394	22.1
ALAM MEGAH	KJ 35	FACILITIES BASE	501,382	20.24
TOTAL			12,111,347	

Source: Prasarana Malaysia (2020)

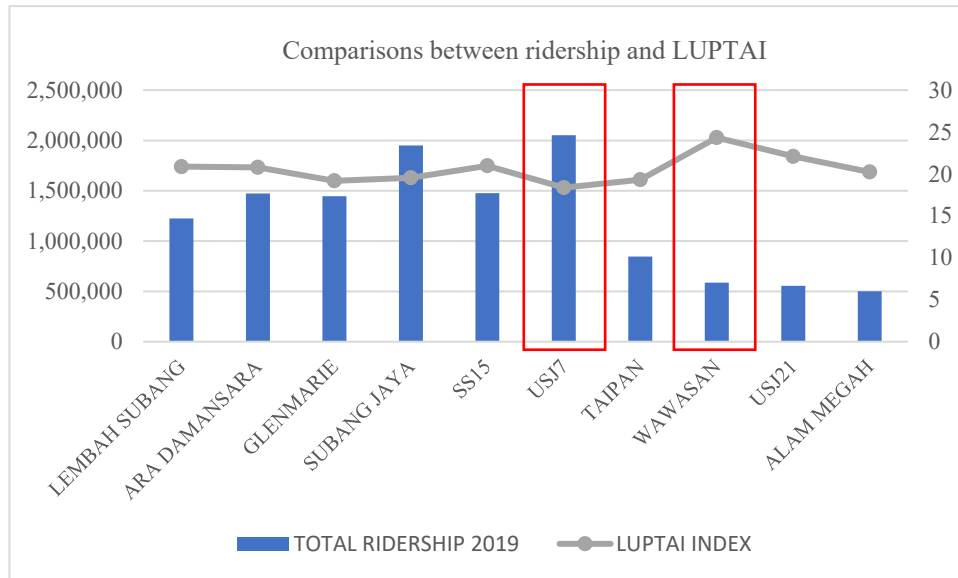


Figure 8: Comparisons between ridership and LUPTAI

Further analysis through observations of selected sites revealed that simple LUPTAI calculations based only on distance of urban land uses (commercial, residential and public facilities) from LRT stations were inadequate to explain the variation in ridership. A closer look around Wawasan station showed that despite its highest LUPTAI figures, the development around the station that consisted of schools and terrace houses was shown to generate low ridership. The proximity of these school and houses had given Wawasan station a high LUPTAI figure. Although there was a USJ City mall nearby, its location was about 300 metres from the station, reducing its effectiveness in attracting more ridership.

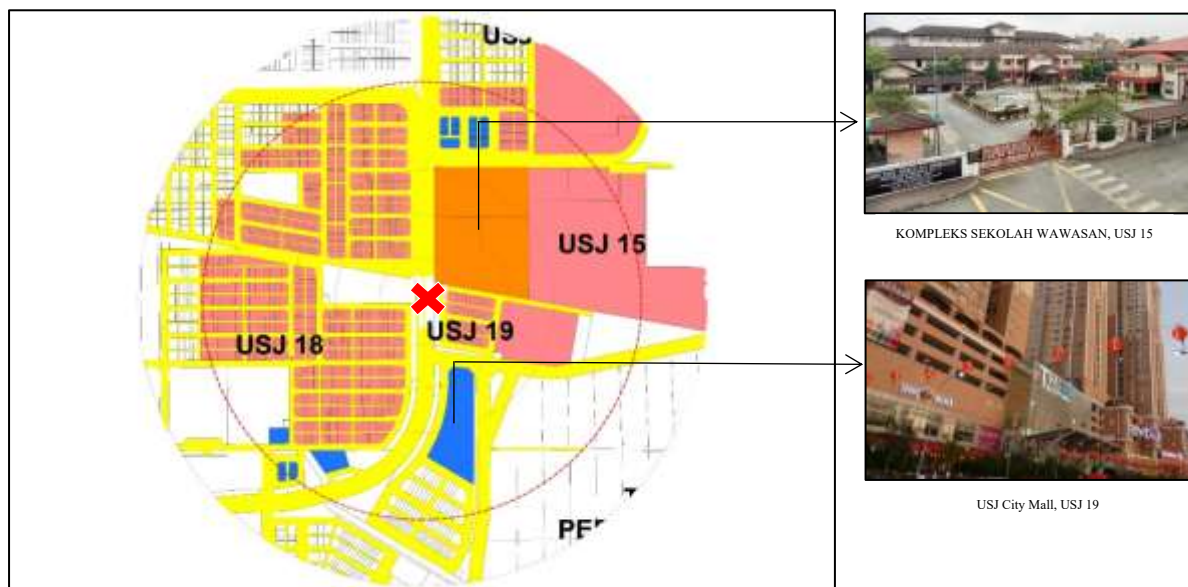


Figure 9: Land use distribution at Wawasan LRT station (high LUPTAI, low ridership)

The reverse situation was found at USJ 7 station. Despite having a lower LUPTAI figure, it had the highest ridership number which was four times that of the Wawasan station. The reason was that it had a good mixture of commercial and residential land uses within the 500 metres of radius. The commercial development, such as USJ Summit Mall and Mydin Hypermarket, as well as the multi-storey apartments, such as the Subang Perdana Goodyear provided a strong base of ridership to the station. USJ Summit Mall and Mydin Hypermarket with the surrounding commercial areas, were the main commercial areas in Subang Jaya. In addition, the provision of park and ride parking facilities in the station area attracted people who lived farther from the station to use the LRT service.

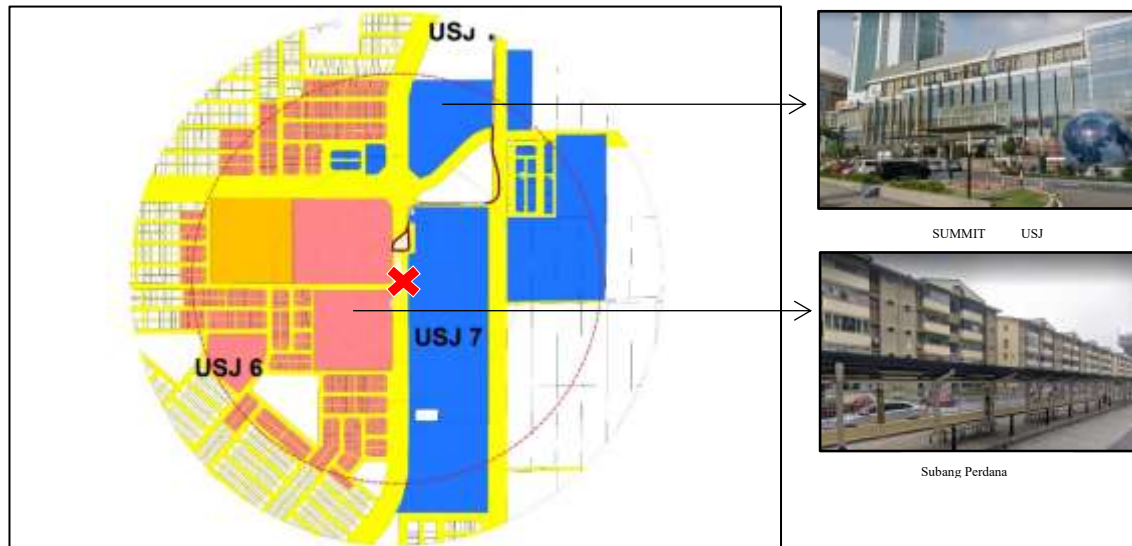


Figure 10: Land use distribution at USJ7 LRT station
(low LUPTAI, high ridership)

SUMMARY AND CONCLUDING REMARKS

The study found that there was no conclusive relationship between LUPTAI and ridership for the ten LRT stations selected. This was perhaps due to the fact that LUPTAI figures for all stations did not differ much since they were based on the distance of urban land use – commercial, residential, and public facilities – from the LRT stations. Since all the ten stations are located in urban areas of Petaling Jaya and Subang Jaya and thus have been developed with the said urban land uses, not much variations in LUPTAI figures were found among them. As a result, the simple LUPTAI method of measuring distance of urban land uses from LRT stations in this study was probably more appropriate in a comparative analysis of LRT stations in more established areas (with commercial and residential areas) and newer areas which tended to have more undeveloped lands.

A modified LUPTAI index that took into account the other factors than the distance of urban land uses from the LRT stations would most likely provide a better reflection of urban development around the stations. These factors which included the type and mixture of developments on land, the density for residential areas and intensity of commercial development would provide a better reflection on intensity of urban development around stations. This index would perhaps have a strong correlation with the ridership of the stations as expected based on the TOD theory.

Regardless of the lack of relationship due to the simplified LUPTAI calculations, it was observed that areas with commercial or mixture of commercial and residential uses seemed to have high ridership figures. In addition, there seemed to be a relationship between the higher intensity of use, such as high rise residential or high plot ratio for commercial building with high ridership figures as exhibited by USJ7 station. This augured well with the theory of TOD which advocated for high density and intensity of use for areas within the vicinity of TOD stations.

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IMPACT OF URBAN LAND USES AND ACTIVITIES ON THE AMBIENT AIR QUALITY IN KLANG VALLEY, MALAYSIA FROM 2014 TO 2020

**Oliver Ling Hoon Leh¹, Marlyana Azyyati Marzukhi², Qi Jie Kwong³,
Nurul Ashikin Mabahwi⁴**

^{1,2,3}*Environmental & Social Health Research Group (ESH Group)*

Faculty of Architecture, Planning & Surveying (FSPU),

UNIVERSITI TEKNOLOGI MARA (UiTM)

⁴*Graduate School of Engineering and Science,*

SHIBAURA INSTITUTE OF TECHNOLOGY, Japan

Abstract

Ambient air in the urban area normally is more polluted than less developed areas. This is due to the concentration of urban activities, such as industrial, transportations and commercial or business activities. A study about the impact of urban land uses and activities on the levels of air pollutants in Malaysia's most urbanised and most developed region that is Klang Valley was conducted. Data of Air Pollutant Index (API) and average concentration of selected air pollutants were used to analyse the ambient air quality of the selected five (5) cities or towns in Klang Valley. The air quality condition of the five (5) cities or towns were related to the land use distributions of the cities or towns with a purpose to understand the impact of land uses on the ambient air quality. Furthermore, the changes of ambient air quality before and after Movement Control Order (MCO) were analysed to examine the impact of human activity changes on the ambient air quality. The study found that a city or a town with more industrial and transportation land uses with fewer greens was more polluted than the area with less industrial and transportation land uses with more greens. However, this finding did not apply to all areas due to effect of winds on the distribution of air pollutants. Besides that, because of MCO, most people stayed at home with the mode of "work from home" that caused air pollutant levels in urban areas to decrease due to less urban activities. Nevertheless, there was a risk of an increase in air pollution levels in residential areas due to the concentration of activities, especially driving motor vehicles in residential areas. A recommendation is given to encourage "work from home" and reduce dependency on auto-mobile in residential areas in order to improve the air quality in urban areas.

Keywords: air pollutant index (API); COVID-19; health; lockdown; movement control order (MCO); urban land use

¹ Assoc. Prof. at UiTM, Puncak Alam, Selangor. E-mail: oliverling.my@gmail.com

INTRODUCTION

Clean air is one of the essential needs of human health and well-being. Nonetheless, urban development, energy consumption, transportation, industry activities, lacking green areas, and an increase in the urban population contribute to air pollution (Ling et al., 2014; Nurul Ashikin et al., 2015; Nurul Ashikin et al., 2018). In Malaysia, the region that consists of Selangor state and Kuala Lumpur city was commonly called as Klang Valley. It is the most rapidly grown, as well as the most urbanised region in Malaysia. Being the most developed region, Klang Valley is facing the issue of air pollution.

In Malaysia's most urbanised city that is Kuala Lumpur, there was a clear increasing trend in the number of unhealthy or hazardous days (based on API), which increased from 11 days in 2001 to 67 days in 2005 (Ling et al., 2010). Conversely, the unhealthy days in Kuala Lumpur decreased after 2005 and returned high again in 2010 and 2015 with 59 days and 52 days, respectively (DOE, 2015). For the most developed state in Malaysia that is Selangor, Nurul Ashikin (2017) analysed Air Pollutant Index (API) of the five urban areas from 2000 to 2014. Generally, the five urban areas showed a sudden increase in number of unhealthy days from 2001 to 2002 and from 2004 to 2005, and a sudden drop of unhealthy days in 2007 (Nurul Ashikin, 2017). Figure 1 shows the previous trend of unhealthy days in Klang Valley, Malaysia.

People who live in urban areas are facing the air pollution issue due to air emission (including particulate matter, PM) from various sources, such as auto-mobiles, industries, road and soil dust, household combustion (Shi et al, 2020), as well as energy generations. This will turn a safe city into a "toxic city" (Siti Nurazlina, 2011). Mobile sources (for example, automobiles) generally contribute at least 70 to 75 per cent of the total air pollution. Meanwhile, stationary sources (for example, industries and power generations) contribute around 20 to 25 per cent, and open burning and forest fires contribute around 3 to 5 per cent (Rafia et al., 2003).

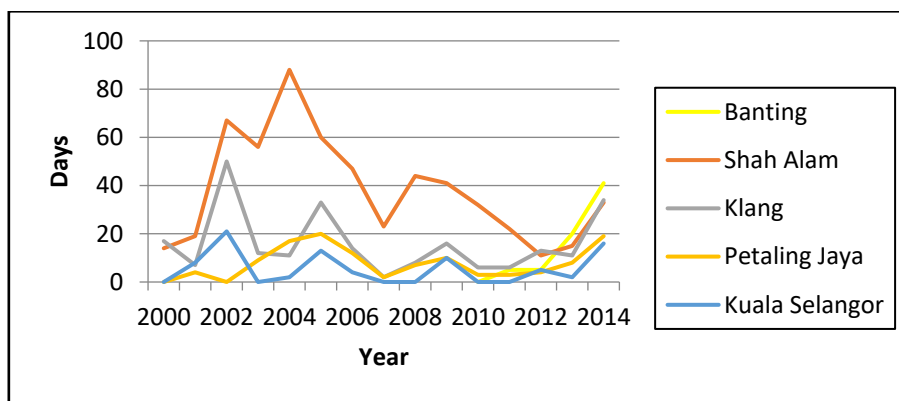


Figure 1: Number of Unhealthy Days in Klang Valley, 2000-2014 (Source: Nurul Ashikin, 2017)

LITERATURE REVIEW

Several studies had been carried out to relate air pollution with urban land use or activities. For instance, a study in an urban region of Petaling Jaya, Shah Alam and Klang (Ling et al., 2014) showed a relationship between city or local land use coverage and air quality. Besides that, a study in Kuala Lumpur city showed that an increase of “shopping floor space”, “office floor space” or “industrial units” in the city was positively related with the number of unhealthy or hazardous days (as measured in API) (Ling et al., 2010).

Globally, most of the countries are also experiencing an increase in air pollution due to urbanisation or land-use changes. For instance, the urbanisation can cause the increase of ozone (O₃) concentration based on the study in Yangtze River Delta, China (Chen et al., 2020) and Selangor, Malaysia (Ooi et al., 2019). In contrast, urbanisation causes other pollutants, namely, particulate matter 2.5 (PM_{2.5}) and Nitrogen Oxides (NO_x) to decrease. A study at eight cities in China (Sun et al, 2016) displayed a correlation between particulate pollution and land use changes that was lower in coastal areas but higher in inland areas.

Moreover, a study at Ethiopia (Kasim et al, 2018) discovered that carbon dioxide (CO₂) emissions from the same land use were relatively similar. Kasim et al.’s (2018) study indicated that there were differences across different land uses. For instance, CO₂ emission was highest at commercial land-use, moderate at residential land use, and lowest at recreational land use in Bahir Dar. In Hawassa, industrial land use CO₂ concentration was the highest, followed moderately by circulation, residential and commercial, as well as lowest at recreational land use (Kasim et al., 2018). In general, the degree of urban land use mix, clustering, and concentration of development was significantly associated with better air quality (Kang et al., 2019).

Air pollution is a major environmental risk to health and affects urban public health (WHO, 2014). Exposure to ambient air pollution has been associated with a series of adverse health effects (Chen & Kan, 2008). Exposure to high concentration levels of ambient PM_{2.5} increases the health risk of stroke mortality, cardiovascular disease, respiratory diseases, and lung cancer, as well as reduces a cognitive function of a person (Shi et al, 2020). In addition to the illnesses caused by pollution, loss of productivity, as well as missed educational and other opportunities in life happened (UN, 2001).

Apart from that, the effects of urban land use and activities on air quality can be observed during the implementation of Movement Control Order (MCO) to control the widespread of Corona Virus Disease 2019 (COVID-19). MCO was implemented in Malaysia starting 18 March 2020 until 12 May 2020. Because of that, most of the physical, economic and social activities, except those providing essential services and items in the country, including the Klang Valley were closed down (Khor et al., 2020; Tang, 2020). Most of the workers had

changed from the mode of “work from office” to “work from home”. Due to the lockdown of industry, tourism, recreational, social, sports, schooling, offices, and other non-essential activities, especially in urban areas (PMO, 2020; Tang, 2020), air quality was observed to be better than before with a reduction of air emission (Abdullah et al., 2020; DOE, 2020). A study by Abdullah et al. (2020) illustrated a high reduction of up to 58.4 per cent of PM_{2.5} concentrations in Malaysia. The study was carried out by comparing the air quality between the period of 14 to 17 March 2020 and 18 March to 14 April 2020. Additionally, a study at Kuala Lumpur city (Suhaimi et al., 2020) observed a decrease of air pollutant concentrations, except for O₃ during MCO as compared to the same period in 2019, as well as to a period of 11 weeks before MCO in the year 2020.

In China, in which the first general lockdown established on 23 January 2020, the NO₂ and NO_x levels had reduced by about 50 per cent as compared to the previous year and time before as observed at Wuhan and East China (Kanniah et al., 2020). A different percentage of reduction of NO₂, PM₁₀, SO₂, PM_{2.5} and CO concentrations were also reported in 44 cities in Northern China due to the lockdown. On the contrary, after the lockdown was over and most of the people resumed their daily working lives, the NO_x levels had gradually increased in some Chinese provinces. Reduction of air pollutants concentrations were also observed in other countries and cities, such as India and Barcelona during MCO or lockdown (Kanniah et al., 2020). The study by Kanniah et al. (2020) found the impacts of COVID-19 on the atmospheric environment in the Southeast Asia region.

Previous research showed a relationship between land use, activity and air quality. Urban activities and industry were related to the increase in air pollution. Meanwhile, the control of human activities improved the air quality in urban areas during MCO. However, there was insufficient specific study on the relationship between air quality and urban land use (and activities) in Malaysia’s most developed region that is Klang Valley. Thus, this paper was aimed to analyse the impact of urban land use and activities on the ambient air quality in Klang Valley from January 2014 to April 2020.

METHODOLOGY AND CASE STUDY

The Klang Valley is considered to be the main focus of Malaysian property, industry and commerce developments. It is estimated as having a total population of 8.3 million in 2020 by combining the estimated population of Selangor and Kuala Lumpur (DOE, 2020c). Due to the geographical location as the central region of Peninsular Malaysia and the capital city of Malaysia, the rapid urbanisation, population growth, industrial activities, and high traffic volume had made the Klang Valley constantly exposed to the problem of air quality (Siti Zawiyah et al., 2010). Klang Valley had been chosen as a case study in this study

with the focus on the five cities or towns, namely, Kuala Selangor town, Klang town, Shah Alam city, Petaling Jaya city, and Banting town.

These five urban areas are equipped with Continuous Air Quality Monitoring Stations (CAQM) by the Department of Environment, Malaysia (DOE). The locations of the CAQM stations are as shown below (see Figure 2):

- a) Secondary School of Science Kuala Selangor, Kuala Selangor town,
- b) National Secondary Girls School Raja Zarina, Port Klang town,
- c) National Primary School Taman Tun Dr Ismail Jaya, Shah Alam city,
- d) National Primary School Bandar Utama Damansara, Petaling Jaya city, and
- e) College MARA Banting, Banting town, Selangor.

Data of ambient air quality and land uses had been collected from public departments and their documents. Land use data were collected from local authorities via maps and local plans. The data of ambient air quality were obtained through secondary sources as provided by DOE which consisted of API data and average air pollutant concentrations for the study areas.

API is an indicator of the air quality status at any particular area used by Government of Malaysia. The API value is calculated based on the average concentration of air pollutants, namely, SO₂, NO₂, CO, O₃, and PM₁₀ before 2018. Since 2018, DOE added another type of pollutant into the calculation of API, which was PM_{2.5}. Apart from that, new standards (IT-2) were adopted starting from 2018 (see Table 1). The air pollutant with the highest concentration (dominant pollutant) would determine the API value. Normally, the concentration of PM is the highest among other pollutants and determines the API value in Malaysia based on an observation on the daily API values in DOE's website. Table 1 shows the six parameters used in API calculation and the previous (IT-1, before 2018) and new (IT-2, since 2018) ambient air quality standards. Table 2 shows the colour references of API to indicate different levels of API values and potential health effects.

Table 1: Malaysian Ambient Air Quality Standards

Parameter	Averaging time	Unit	Standards	
			IT-1	IT-2 (2018)
PM ₁₀	24 hour	µg/m ³	150	120
PM _{2.5}	24 hour	µg/m ³	75	50
SO ₂	24 hour	ppm	0.040	0.035
CO	8 hour	ppm	8.750	8.750
NO ₂	1 hour	ppm	0.170	0.160
O ₃	1 hour	ppm	0.100	0.100

Source: DOE (2018)

Table 2: Air Pollutant Index (API) and the Potential Health Effects

	Good: API 0 - 50 Low pollution without any bad effect on health.
	Moderate: API 51 – 100 Moderate pollution does not pose any bad effect on health.
	Unhealthy: API 101 – 200 Worsen the health condition of high-risk people with heart and lung complications.
	Very Unhealthy: API 201 – 300 Worsen the health condition and low tolerance of physical exercise to people with heart and lung complications. Affect public health.
	Hazardous: API more than 300 Hazardous to high-risk people and public health.

Source: DOE (2013); DOE (2018)

RESULTS AND DISCUSSION

Land uses, activity and air quality, 2014-2018

Based on API, it was found that Kuala Selangor had the best air quality level with the highest number of good days (see Figure 3) and lowest number of unhealthy days (see Figure 4). It was followed by Petaling Jaya and Shah Alam with a moderate number of good days among the five urban areas (see Figure 3). Nevertheless, based on the unhealthy days, Petaling Jaya and Klang had a moderate number among the five urban areas (see Figure 4). Banting had the least number of good days (see Figure 3) and the highest number of unhealthy days (see Figure 4).



Figure 2: Location of CAQM stations in Klang Valley (study areas)
Source: edited from Google Earth (2015)

To rank the five urban areas from the best air quality to the most polluted area, the list of the five urban areas is shown as follows:

- a. Kuala Selangor town (best air quality)
- b. Petaling Jaya city
- c. Shah Alam city and Klang town
- d. Banting town (most polluted air)

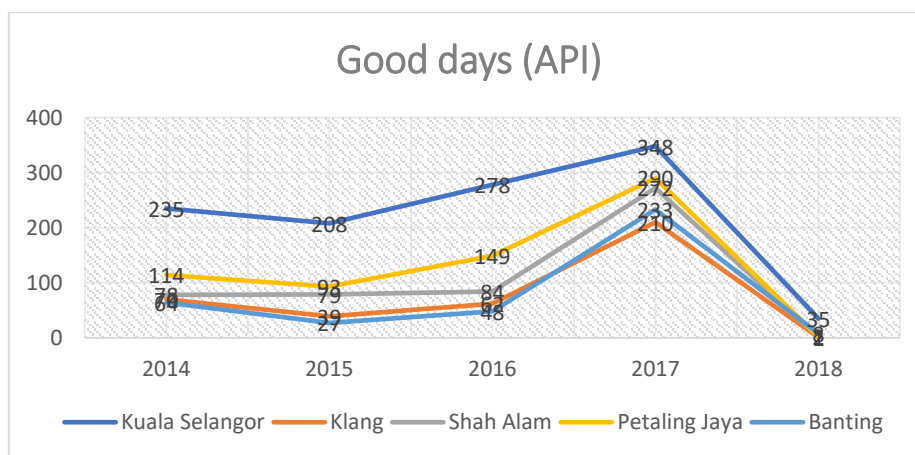


Figure 3: Number of Goods Days in Klang Valley, 2014-2018
 Source: DOE (2014, 2015, 2016, 2017, 2018)

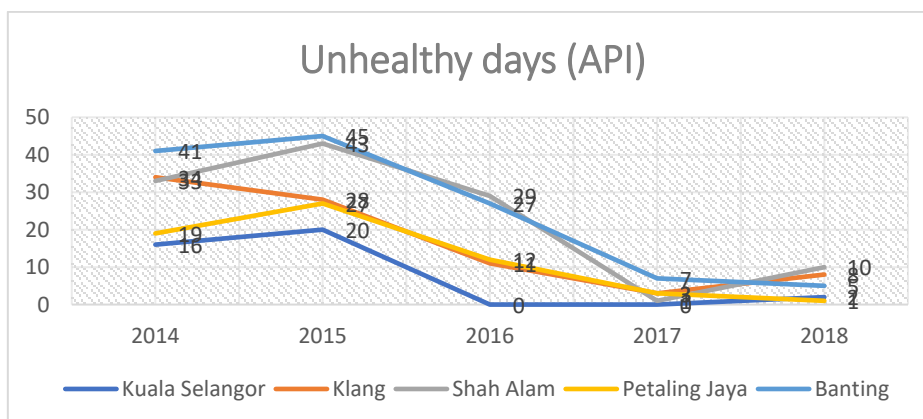


Figure 4: Number of Unhealthy/Very Unhealthy Days in Klang Valley, 2014-2018
 Source: DOE (2014, 2015, 2016, 2017, 2018)

To relate the urban (city or town) land uses and activities to the air quality among the five areas, it was noticeable that Kuala Selangor had the least percentage of industrial and transportation land uses (see Table 3) and the highest percentage of green land use (including forest, agriculture, recreational, nature, and open areas) had best air quality from 2014 to 2018. Shah Alam with the least percentage of green land use and the highest percentage of industry or transportation land use was the second polluted area among the five study areas (see Table 3).

Table 3: Land uses and the air quality of the study areas

CAQM stations	Overall City/Town's land use (%)	Selected land use (%)	The rank of air quality based on Figure 3 and 4
Kuala Selangor	Open space & recreation: 4.86%		1 (The best among the five areas)
	Agriculture: 49.64%		
	Forest: 33.74%		
	Residential: 3.64%	*Green = 88.24%	
	Industrial: 0.39%	Industry & transportations=4.58	
	Commercial: 0.12%		
	Institution & service: 0.59%		
	Transportations: 4.19%		
	Infrastructure & utilities: 0.38%		
	Water reservoir: 2.44%		
Petaling Jaya	Open space & recreation: 7.62%		2
	Agriculture: 0.32%		
	Green lung: 7.19%		
	Residential: 34.34%	*Green = 15.13%	
	Industrial: 12.79%	Industry & transportations=29.12	
	Commercial: 3.92%		
	Mix development: 1.16%		
	Institution: 8.80%		
	Transportations: 16.33%		
	Infrastructure & utilities: 4.99%		
Water reservoir: 2.69%			
Klang	Open space & recreation: 2.21%		3
	Agriculture: 7.04%	*Green = 37.1%	
	Natural ecology: 27.85%	Industry & transportations=22.73	
	Housings: 28.91%		
	Industrial: 10.98%		
Commercial & services: 2.07%			

	Institution & public facilities: 3.23%		
	Transportations: 11.75%		
	Infrastructure & utilities: 1.95%		
	Water reservoir: 4.01%		
	Agriculture: 0.32%		
	Open space & recreation: 7.55%		
	Forest: 7.25%		
	Residential: 33.81%		
	Commercial & services: 4.04%	*Green = 15.12%	
Shah Alam	Industrial: 12.67%	Industry &	4
	Mixed development: 1.16%	transportations=29.33	
	Institution & public amenities: 8.80%		
	Transportations: 16.66%		
	Infrastructure & utilities: 4.99%		
	Water reservoir: 2.70%		
	Open space & recreation: 1.14%		
	Agriculture: 43.36%		
	Forest: 6.85%		5
	Residential: 28.37%		
	Industrial: 6.90%	*Green = 51.35%	(The most polluted among the five areas)
Banting	Commercial & services: 1.76%	Industry &	
	Institutions & public amenities: 1.20%	transportations=11.68	
	Infrastructure & utilities: 0.99%		
	Water reservoir: 4.40%		
	Transportations: 4.78%		

Notes: Percentage of unhealthy days based on the number of unhealthy, very unhealthy and hazardous API days.

*Percentage of green area based on the total percentage of agriculture, open space or recreation, agriculture, forests, green lung, natural ecology.

Source of land use data: Majlis Daerah Kuala Selangor (2015); Majlis Bandaraya Petaling Jaya (2011); Majlis Perbandaran Klang (2011); Majlis Bandaraya Shah Alam (2012); Majlis Daerah Kuala Langat (2011)

On a contrary, the air quality levels of Banting and Petaling Jaya were unable to be justified by green land uses and pollution sources land uses (industry or transportations). Banting with a high percentage of green land use and less industry or transportation land use was the most polluted or unhealthy area. Meanwhile, Petaling Jaya with a high industry or transportation land use and less green land use exhibited the second-best air quality among these five areas. This scenario could be related to the effect of wind. Sham (1988) elucidated that the effect of wind (sea breeze and land breeze) had “stored” air pollutants at the area

located at the centre in between seashore and highland in Klang Valley (see Figure 5). Thus, Banting and Shah Alam which are located at the centre between seashore and highland were most polluted in Klang Valley. Meanwhile, Petaling Jaya is located just beside Kuala Lumpur which is near to the highland. This influenced the ambient air to be cleaned by the effect of wind that blew from the highland to the sea (land breeze).



Note: Shah Alam (SA) & Banting (B) received more air pollutants from Kuala Lumpur (KL) & Petaling Jaya (PJ)

Figure 5: Wind effects on air quality in Klang Valley
Source: edited from Google maps (2020)

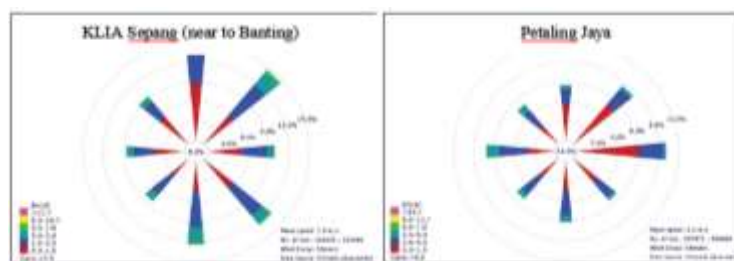


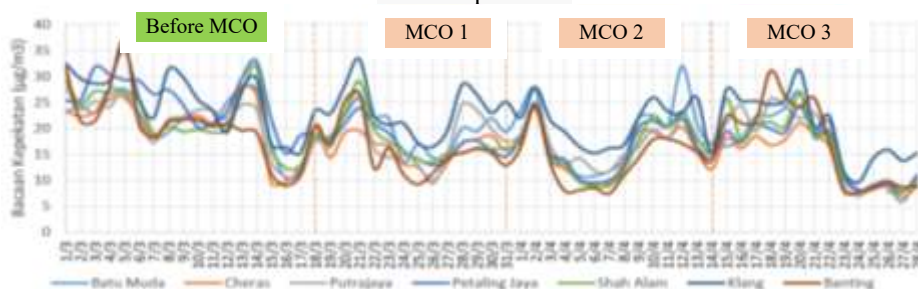
Figure 6: Wind rose diagrams for KLIA Sepang and Petaling Jaya (1999-2013)
Source: Malaysian Meteorological Department (2014)

Based on Figure 6, at Petaling Jaya, most of the winds were from the East, followed by the West direction. Hence, the wind transported the air pollutants away from Petaling Jaya and Kuala Lumpur areas to the West which is Shah Alam (see Figure 5). Due to the wind from the West (sea breeze), the air pollutants were “stored” at Shah Alam and not much was moved to the West (Klang). For Banting (see Figure 6), most of the winds blew from the North and the North-East, followed by the South and the South-East. Because of the wind effects, air pollutants from Petaling Jaya, Kuala Lumpur and the Eastern part of Selangor were transported to the South (Banting area). However, the air pollutants were “stored” at the Banting area due to the sea breeze from the South and the West that reduced the transmission of air pollutants farther to the South or the West (see Figure 5).

Air quality before and after MCO, 2019-2020

Most of the urban activities were on lockdown due to MCO. This caused the air emission from pollution sources to be expected to decrease which contributed to a better air quality. Figure 7 to Figure 10 showed the concentrations of PM_{2.5}, SO₂, NO₂, and CO that were decreased since the declaration of MCO on 18 March 2020 in Klang Valley (see Figure 7 to Figure 10). This displayed that the reduction of urban activities that were industrial, commercial, schooling, transportations, tourism, recreation, and other non-essential activities successfully improved the ambient air quality.

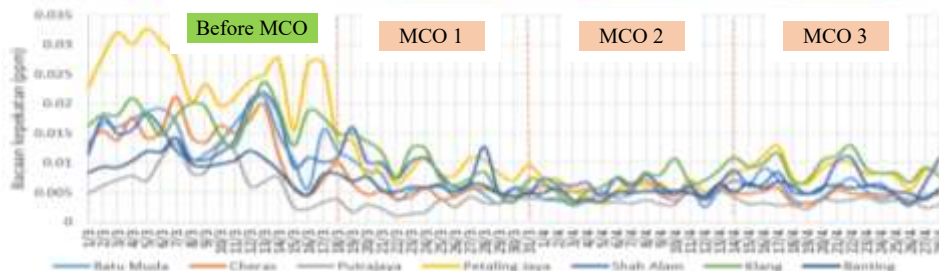
Figure 7: Average daily concentrations of PM_{2.5} before and during MCO, Klang Valley, March-April 2020



Note: Reduction of 17% to 36% of the concentrations after the enforcement of MCO on 18 March 2020

Source: DOE (2020a)

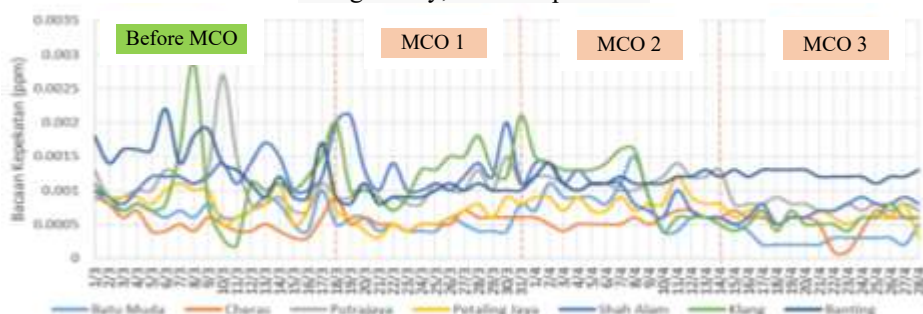
Figure 8: Average daily concentrations of NO₂ before and during MCO, Klang Valley, March-April 2020



Note: Reduction of 49% to 68% of the concentrations after the enforcement of MCO on 18 March 2020

Source: DOE (2020a)

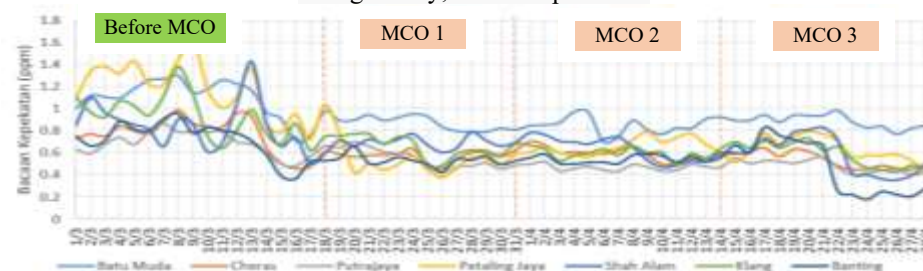
Figure 9: Average daily concentrations of SO₂ before and during MCO, Klang Valley, March-April 2020



Note: Reduction of 6% to 26% of the concentrations after the enforcement of MCO on 18 March 2020

Source: DOE (2020a)

Figure 10: Average daily concentrations of CO before and during MCO, Klang Valley, March-April 2020

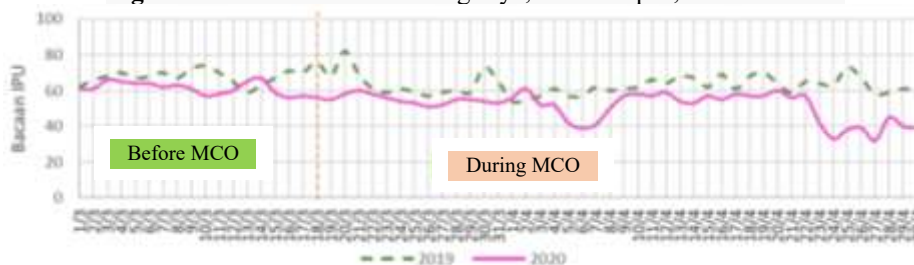


Note: Reduction of 21% to 48% of the concentrations after the enforcement of MCO on 18 March 2020

Source: DOE (2020a)

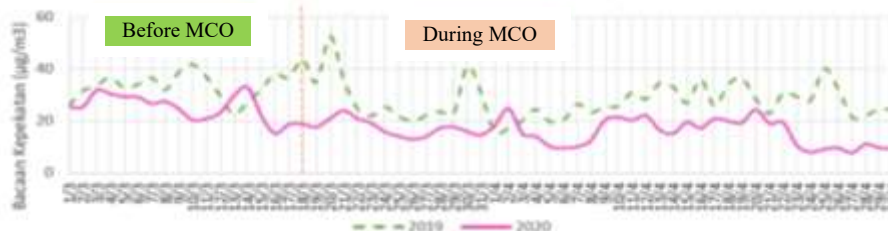
For the purpose to compare the air quality between 2019 and 2020 within the same period of March and April, Petaling Jaya city was only chosen for this analysis. This was due to the limitation of data available in the existing DOE's publication. Figure 11 to Figure 14 indicated reductions of API values, PM_{2.5} concentration, NO₂ concentration, and CO concentration after 18 March 2020 were larger than the same period in 2019. Nonetheless, the trend of SO₂ concentration was similar between 2019 and 2020 for the period of March to April (see Figure 15).

Figure 11: API values in Petaling Jaya, March-April, 2019 and 2020



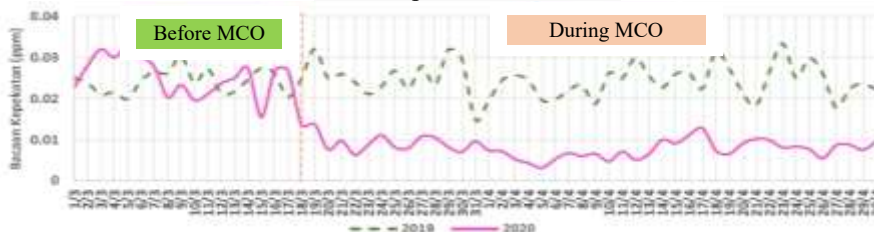
Source: DOE (2020b)

Figure 12: Average daily concentrations of PM_{2.5} in Petaling Jaya, March-April, 2019 and 2020



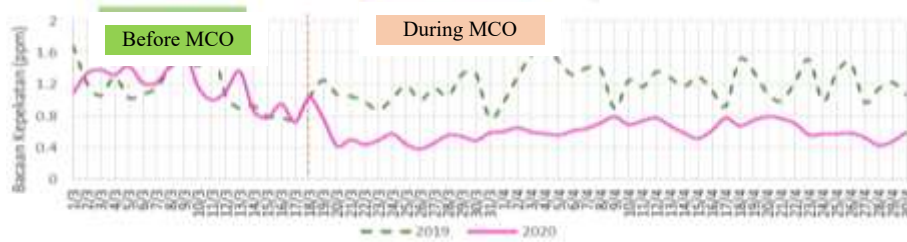
Source: DOE (2020b)

Figure 13: Average daily concentrations of NO₂ in Petaling Jaya, March-April, 2019 and 2020



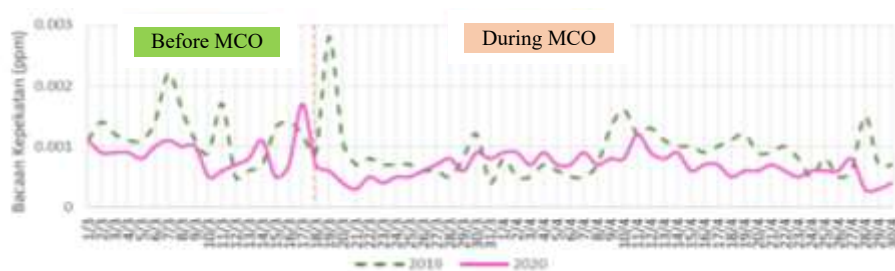
Source: DOE (2020b)

Figure 14: Average daily concentrations of CO in Petaling Jaya, March-April, 2019 and 2020



Source: DOE (2020b)

Figure 15: Average daily concentrations of SO₂ in Petaling Jaya, March-April, 2019 and 2020



Source: DOE (2020b)

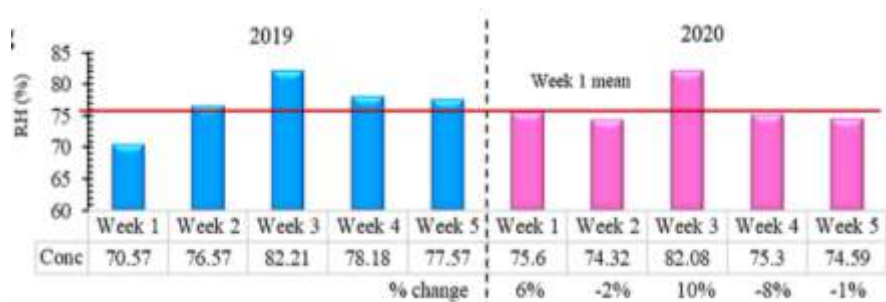


Figure 16: RH (%) in Kuala Lumpur city from 18 March to 21 April for both 2019 and 2020

Source: Suhaimi et al. (2020)

Again, the reduction of air pollution could be associated with the decreasing urban activities which contributed to the air emission. Based on the relative humidity (RH) data (see Figure 16 and Figure 17) in Kuala Lumpur (a city in Klang Valley and adjacent to Petaling Jaya), RH exhibited no apparent difference between the same period in those two years (2019 and 2020), as well

as before and after MCO in 2020 (Suhaimi et al., 2020). Consequently, the improvement of air quality was affected by urban activities and not caused by the change of RH or precipitation.

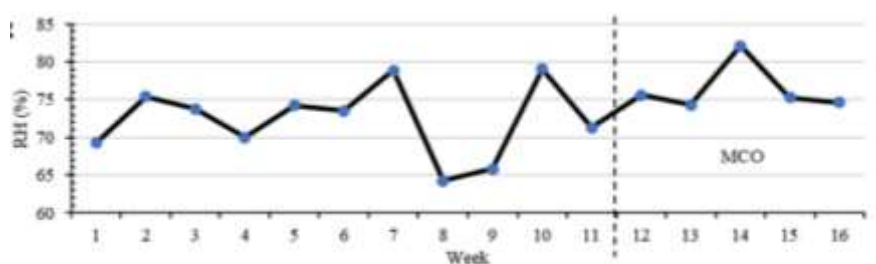


Figure 17: RH (%) in Kuala Lumpur city from 1 January to 21 April 2020
 Source: Suhaimi et al. (2020)

Besides the data from DOE, air quality data from Mohd Nadzir et al. (2020) in five locations in Petaling Jaya city showed a relationship between land use, activities and air quality. After the enforcement of MCO, the concentrations of air pollutants were decreased but with a different rate among the five locations in Petaling Jaya (see Table 4 and Table 5).

Table 4: Daily average concentrations of CO, PM₁₀ and PM_{2.5} measured by AiRBOXSense at Bukit Gasing (BG), Kelana Jaya (KJ), Kota Damansara (KD), Petaling Jaya (PJ) and Uptown (UP)

Locations		Normal day			MCO		
		CO (ppm)	PM _{2.5} (µg m ⁻³)	PM ₁₀ (µg m ⁻³)	CO (ppm)	PM _{2.5} (µg m ⁻³)	PM ₁₀ (µg m ⁻³)
BG	Min	0.01	0.100	0.100	0.0100	0.100	0.100
	Max	8.88	1540	7110	1.94	477	2540
	Average	0.400	28.8	54.1	0.240	11.8	26.0
KJ	Min	0.0100	0.250	0.25	0.0100	0.34	0.34
	Max	12.8	193	2260	2.30	155	936
	Average	0.560	9.32	19.0	0.310	6.32	12.4
KD	Min	0.0100	0.250	0.250	0.0200	0.54	0.54
	Max	7.78	414	3460	5.11	213	3410
	Average	0.550	21.4	32.9	0.300	36.4	38.4
PJ City	Min	0.0100	0.140	0.140	0.0100	0.240	0.240
	Max	8.02	101	849	0.850	38.7	266
	Average	0.540	10.4	21.7	0.300	6.26	12.6
UP	Min	3.46	0.380	0.380	0.0100	0.360	0.360
	Max	8.59	300	1160	6.24	104	2010
	Average	0.680	11.1	22.2	0.360	8.78	15.8

Note: data during a normal day (20th November 2019–17th March 2020) and during the MCO (18th March 2020–12th April 2020)

Source: Mohd Nadzir et al (2020)

In Petaling Jaya, a car park at a recreation area (Bukit Gasing) experienced the largest reduction of air pollutant concentration, especially PM (see Table 5). Highway, town and industrial areas moderately improved the air

quality. Areas with residential units (Uptown and Kota Damansara) faced the least reduction of air pollution or increased air pollution. This implied that urban land uses and human activities affected the air quality of the areas.

The car park at the recreational area (Bukit Gasing) normally had a higher concentration of PM (see Table 4) due to emission of motor vehicles; henceforth, it experienced the highest reduction of PM during MCO due to no or very less emission from motor vehicles for recreational activity (see Table 5).

Residential areas with a moderate concentration of PM (see Table 4) only experienced a small reduction of PM concentrations (at Uptown) or increased in the PM concentrations (at Kota Damansara) (see Table 5). This was because during MCO, most people stayed and only drove within their residential areas to obtain their basic daily goods, such as food. Thus, residential areas faced less reduction or even increased air pollution during MCO as measured by PM_{2.5} and PM₁₀.

Meanwhile, highway, town and industrial areas (PJ city and Kelana Jaya) faced a moderate reduction of PM concentrations. This was because these areas had a lower concentration of PM in normal days (see Table 4). During MCO, these areas experienced less traffic due to the movement control which limited residents' activities within 20 kilometres only from residential areas. Therefore, there was a moderate reduction of PM concentrations as compared to other areas as listed in Table 4 and 5.

Table 5: Overall reduction of CO, PM_{2.5} and PM₁₀ recorded during MCO in Petaling Jaya

Station	Sensor deployment	Type of area	Air pollutants	Average reduction (%)
BG	Car park	Recreation area	CO	40.5
			PM _{2.5}	58.9
			PM ₁₀	51.8
KJ	Facing highway	Main highway	CO	45.2
			PM _{2.5}	32.2
			PM ₁₀	34.9
PJ City	Main road	Township and industrial	CO	44.1
			PM _{2.5}	39.8
			PM ₁₀	42.0
UP	Main road	Residency, Mall, Shops and restaurant area	CO	47.5
			PM _{2.5}	20.8
			PM ₁₀	28.8
KD	Main road	Residency and small industries	CO	44.7
			PM _{2.5}	+41.2
			PM ₁₀	+14.2

Source: Mohd Nadzir et al (2020)

CONCLUSIONS

To conclude, this study successfully examined the impact of urban land use and activities on ambient air quality in selected five areas in Klang Valley. The wind also affected the distribution of air pollutants in Klang Valley. Some of the areas with fewer pollution sources land uses had a higher level of air pollution. In

contrast, some areas with more pollution sources land uses had a better air quality due to the effect of winds. From the experiences during MCO, the study found that human behavioural change could reduce the level of air pollution. By reducing the industrial operations, transportation activities and other urban activities with more people choosing the mode of “work from home”, the air pollutant levels in urban areas were reduced. Conversely, it was noticeable that the air pollution level in residential areas could be increased due to the concentration of human activities in the residential areas. Thus, it is recommended that urban managers should carry out a detailed urban management plan to reduce the concentration of activities in urban areas by enhancing development to other less developed areas as well as encouraging the culture of “work from home” even after the event of COVID-19 outbreak in the human habitats. Besides that, residents should be encouraged to walk or bike more instead of driving to reduce air emission in residential areas.

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USER AWARENESS, IMPEDIMENTS AND PROPOSED IMPROVEMENTS TO THE ONE STOP CENTRE (OSC) ONLINE 3.0 SYSTEM. CASE STUDY: MUNICIPAL COUNCIL OF SUBANG JAYA, SELANGOR, MALAYSIA

Siti Mazwin Kamaruddin¹, Rozdiana Mohd Rosmi², Faridah Muhamad Halil³, Alamah Misni⁴ Marlyana Azyyati Marzukhi⁵

*^{1,3,4,5} Centre of Studies for Town and Regional Planning, Faculty of Architecture, Planning and Surveying
UNIVERSITI TEKNOLOGI MARA
² Majlis Perbandaran Subang Jaya*

Abstract

This study provides an insight into an adoption of online submission approach at a planning stage. The case study is an implementation of One Stop Centre (OSC) Online 3.0 System at a Local Authority. Local Authority is Majlis Perbandaran Subang Jaya (MPSJ) as one of the pioneers to implement this system. Currently, not all Local Authorities implement the system fully. For this study, the data collected consisted of primary and secondary data. Primary data of users' knowledge, readiness and satisfaction of the system were collected through a survey in a form of questionnaire. In contrast, secondary data were acquired from Local Government Department, MPSJ OSC Department and reliable sources, such as reports of the development plan, Local Authorities, relevant agencies, and websites. The findings indicated that almost half of the users found the system effective and successful while suggesting that there was still room for improvement relevant in shaping the alignment between technology, organisation and human factor. The resulting knowledge from this study could help to improve e-government implementation in Malaysia and could benefit other Local Authorities towards digital e-submission of plans online.

Keywords: e-submission, OSC Online System

¹ Senior Lecturer at UiTM. Email: sitim065@uitm.edu.my

BACKGROUND

One-Stop Centre (OSC) Online 3.0 System is an electronic system for submission applicants to improve a delivery system at a Local Authority. This system is in line towards positioning Malaysia into the top 20 World Bank Ranking for Ease of Doing Business among 190 countries in the world (CIDB, 2019). Dealing with Construction Permit (DCP) is one of the ratings used by World Bank to determine the ranking. Digital or e-government provides information and online transaction service to citizens in the state by government. E-government is an essential application of information technology for the functioning of the government to enhance the delivery of public service to citizens and other individuals, as well as organisational consumers of the government service.

Since 2011, the OSC Online 3.0 System has been introduced to all Local Authorities in Malaysia. The module of the system contains e-submission and e-processing. The application is mandatory for every Local Authority to use. However, to date, only a few Local Authorities use the system fully. Local Authorities (LAs) that use the system implement e-submission for Planning Approval Integrated with Infrastructure Plan and Building Plan or Planning Approval with Building Plan or Planning Approval for Material Change of Use. Relevant stakeholders, who use the system are Local Authority, Professional Submission Person (PSP), External Technical Department or Agency, and Owner (Public). In line with Eleventh Malaysia Plan (RM Ke-11) that emphasises on broader adoption of Information and Communications Technology (ICT), the new system shall be based on an open source, which is fully integrated with an existing system, as well as utilises cloud computing and customer-centric transaction processing. This study provides an insight into the adoption of ICT approach at the planning stage using the case study of OSC Online 3.0 System at Majlis Perbandaran Subang Jaya (MPSJ). MPSJ is a Local Authority and one of the pioneer implementers of this system. The findings can help in informing strategies to enhance the municipality's delivery system of submission.

E-GOVERNMENT IN MALAYSIA

Malaysia started the e-government initiative more than 17 years ago since announcing Multimedia Super Corridor (MSC) project. In keeping with worldwide trends, Malaysia has joined the bandwagon by introducing its e-government initiative as one of the flagships for MSC. In 2010, Malaysia government embarked on the transformation programme that would not only affect the public delivery service through a concept of connected government that addresses citizen centricity (EPU, 2015).

Under one of seven MSC flagships which were launched in August 1996, e-government aimed to improve the convenience, accessibility and quality of delivery government service, as well as improve the information flows and

processes. This was done to increase the speed and quality of policy development, coordination and enforcement (MAMPU, 2010). Under the Tenth Malaysia Plan, which spanned between the years 2011 until 2015, it was shown that 77% out of 13,483 government service had been provided online by the government of Malaysia. This portrayed the huge investment made to ensure e-government a success (EPU, 2015).

EFFECTIVENESS CRITERIA OF E-GOVERNANCE

Several studies have been conducted on information technology effectiveness and adoption (Petroni & Cloete, 2005; Tarhini et al., 2015) and overcoming barriers (Meijer, 2015). Karavasilis et al. (2010) elucidated that based on theory of reasoned action, a person's actual system usage is mostly influenced by his or her behavioural intentions towards a usage. The person's actual system storage is influenced by the perceived usefulness and ease of use of the system. Petroni and Cloete (2005) argued that the effectiveness criteria of e-governance include the attainment of stakeholders towards their goals and the responsiveness of the administration. In this study, the perceptions, as well as opinions of submitting persons and technical staff in using this system at the planning stage can shed light on the issue of incompetency of the system management itself or difficulties faced by the system users on the submission, e-processing and approval notification. The case of a Local Authority's implementation of the system and its stakeholders' opinions can be used to provide an insight into the e-governance approach to enhance the municipality delivery system by identifying the potential areas for improvement and monitoring process. The resulting knowledge from this study could help to improve e-government implementation in Malaysia and other developing countries.

LOCAL GOVERNMENT'S EFFECTIVENESS DELIVERY SYSTEM

Effectiveness can be defined as a level, in which something intended is successful in producing desired results. Meanwhile, efficiency is defined by achieving maximum productivity by appropriately using available resources (Mariana et al., 2014). Nevertheless, effectiveness and efficiency are both popular words in the service delivery system used to evaluate service delivery performances. Bourn (2006) summarised that something is effective if it is adequate to accomplish a purpose and produce the intended or expected result. On the other hand, it is efficient if it performs or functions in the best possible manner with the least waste of time and effort. Bourn (2006) mentioned that "Being effective is about doing the right things, while being efficient is about doing things in the right manner".

The effectiveness and efficiency of service delivery among Local Authorities have been the priority of federal and state governments of Malaysia.

The effectiveness and efficiency of service delivery are parallel with the government aspiration towards a developed nation by the year 2020. Mariana et al. (2014) explained that the vital contribution delivered by the local government is providing essential service to everyone without discrimination, especially those who currently have minimal access or no access to the service. Thus, effective and efficient delivery is considered as an essential element of the local government's responsibility. This makes this sphere of government closest to the people.

CONTENT OF ONLINE SYSTEM

Electronic government has the processes and structures related to the electronic delivery of government service to the public. Zhiyuan (2002) stated that e-government is functionally dependent on an association between private partnership, namely, executive, policymakers, administration, and civil service. Furthermore, e-government is dependent on an association between external partnership, namely, Central or Federal Government and State, Country or Local Government.

THE INDICATORS OF SUCCESSFUL ONLINE SYSTEM

There are three (3) indicators contributing to the success of an online system, which are organisation factors, as well as technology and people factors (Prybutok et al., 2008). The organisational factors comprise issues that are internal to a typical public sector organisation, as well as they influence the adoption and implementation of e-government in those organisations. Strong political leadership is claimed to play a significant role in putting e-government into the agenda and making it a success (Al-Tameem et al., 2006; Furuholt & Wahid, 2008; Gil-Garcia & Pardo, 2005).

In the context of inter-organisational, Garfield (2000) argued that the presence of internal leadership in each participating organisation is very important as the existence of system-wide leadership is not always sufficient to provide the necessary strategic direction for the initiative. Moreover, the internal leadership in each participating organisation views effective strategic leadership as moderating the espoused relationship between organisational resources investment and transformative e-government development. Governments require committed and knowledgeable leaders who will enable the governments to carry out their strategic roles and tasks.

Muhammad (2014) described that e-government initiatives require a considerable degree of technical competence through maintaining infrastructure, integrating distributed systems and providing necessary applications to ensure efficient implementation. The technological infrastructure is a significant

determinant factor that shapes the success or failure of worldwide e-government initiatives.

On the other hand, failures of e-government initiatives around the world have been linked to poor technological infrastructure. Unreliable information technology (IT) infrastructure in public sector organisations will degrade e-government performance. Governments view a lack of technical infrastructure as a significant barrier to the development of the public sectors' capabilities to provide online service and transactions (Bonham et al., 2001). Inadequate IT infrastructure is mainly due to the lack of consistent and reliable electricity, telecommunications, Internet connectivity, as well as low accessibility to the necessary applications (Muhammad, 2014).

METHODOLOGY

Upon identification of the study background and problem, the aim of the study was formed. Next, the review of the existing literature focusing on user adoption of online e-governance or e-submission was conducted. Following that, data were gathered on variables of interest. Data types were segmented into two categories, which included primary data and secondary data. Primary data of users' knowledge, readiness and satisfaction of the system were collected through a questionnaire survey.

On a contrary, secondary data were acquired from Local Government Department, Ministry of Housing and Local Government (MHLG), MPSJ OSC Department, and reliable sources, such as reports of development plan, Local Authorities, relevant agencies, and websites. Survey in a form of questionnaire was distributed to three primary users of the system, namely, Professional Submission Persons or Submission Person (PSP/SP), Technical Department, including internal and external department, as well as MPSJ OSC Department, including non-government, professional boards or agencies related to the e-government initiative. Questionnaire to the respective users included information about the challenges faced by PSP/SP, Internal and External Technical Department, OSC Department itself, and other agencies.

The respondents for e-submission at the planning stage under OSC Online 3.0 System consisted of the professional people, the owners, and the representatives of the project owners. Meanwhile, the respondents for the re-processing under OSC Online 3.0 System were the key people who were directly involved with the system starting from applicants' identification data (ID) registration to screening the applications submitting by Principal Submitting Person/Submitting Person (PSP/SP) and Technical Expert Comments. The key people directly involved with the system were MPSJ OSC Secretariat, Technical Internal Department, and External Technical Department. The respondents were selected based on the main criteria that each had experience using the online

submission at any stage of the online process submission. The respondents were identified and invited by the research team to participate in answering the questionnaire voluntarily (see Tables 1 and 2).

Table 1: Category of Respondents for e-Submission

No.	Category	Frequency	Percentage (%)
1.	Owner	3	5
2.	Representative	6	10
3.	Town Planner	11	16
4.	Architect	30	48
5.	Engineer	10	16
6.	Landscape Architect	3	5
		63	100

Twenty-eight (28) survey forms were distributed to the respective technical agencies, including eight (8) officers at OSC Department who were directly involved with OSC Online System. Another twenty (20) respondents were divided into Internal Department and External Department. The details of the selected respondents for e-processing were shown in Table 2 below: -

Table 2: Category of Respondents

No.	Category	Frequency	Percentage (%)
1.	OSC Secretariat	8	28.5
2.	Internal Department	8	28.5
3.	External Department	12	43.0
	Total	28	100.0

ANALYSIS AND FINDINGS

Analysis of system effectiveness and user adoption in this study referred to the users' readiness, awareness of the system and their satisfaction level. These criteria were adapted from the various literature related to online submission (Meijer, 2015; Petroni & Cloete 2005).

Table 3: Analysis of System Effectiveness and User Adoption

Readiness Analysis					
	First Timer	Established User	Percentage (%)		Total
PSP/SP	18 (28%)	45 (72%)	72		63
OSC Secretariat	0	8	100		8
Internal Department	0	8	100		8
External Department	2	10	83		12
Users Frequency Usage Mode using OSC Online					
	20 Days/ Month	6-10 Days/ Month	2-5 Days/ Month	0-1 Days/ Month	Total
PSP/SP	4	14	36 (57%)	9	63
OSC Secretariat	8	0	0	10	8
Internal Department	2	6	0	0	8
External Department	4	4	2	2	12
Users Ease of Setting Up Identification Data Online					
	Yes	Percentage (%)	No	Percentage (%)	Total
PSP/SP	47	76	15	26	63 (100%)
Users Ease of Project ID Approval					
PSP/SP	Immediately	3-5 Days	More than 5 days	Total	63 (100%)
	11(18%)	39(62%)	12 (20%)		
Users Awareness of Registration Guideline is at MPSJ Website					
	Yes	Percentage (%)	No	Percentage (%)	Total
PSP/SP	59	95	4	5	63 (100%)
Users Satisfaction level of Consultation Counter Services Quality					
PSP/SP	Excellent	Good	Satisfied	Others	Total
	48(77%)	12(18%)	3(4%)	1%	63 (100%)
Users Accessibility To The Checklist Form					
	MPSJ website	JKT website	OSC counter		Total
PSP/SP	58(93%)	4(6%)	1(1%)		63 (100%)
Online Submission					
Users Awareness of the Flow Chart Process					
	Yes	Percentage (%)	No	Percentage (%)	Total
PSP/SP	48	77	15	23	63 (100%)
Users Awareness of two stages of Checking (Revised Process)					
	Yes	Percentage (%)	No	Percentage (%)	Total
PSP/SP	36	57	27	43	63(100%)
Users Awareness of Multilayer Comments					
	Immediately	3-5 Days	More than 5 days		Total
	17(27%)	41(65%)	5(8%)		63(100%)

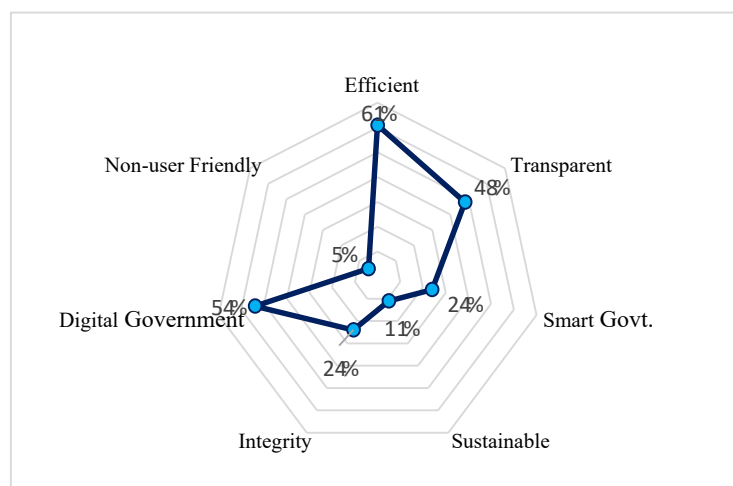


Figure 1: Users Opinion of OSC Online 3.0 System Quality Criteria

The respondents (PSP/SP) could select more than one quality criterion to describe the system. The data revealed that "Efficient" ranked the highest, as users perceived that it was an efficient way for submission online followed by "Digital Government". Nevertheless, the third highest rank was "Transparent" with users perceiving that the system was transparent in the process, followed by "Smart government" and "Integrity".

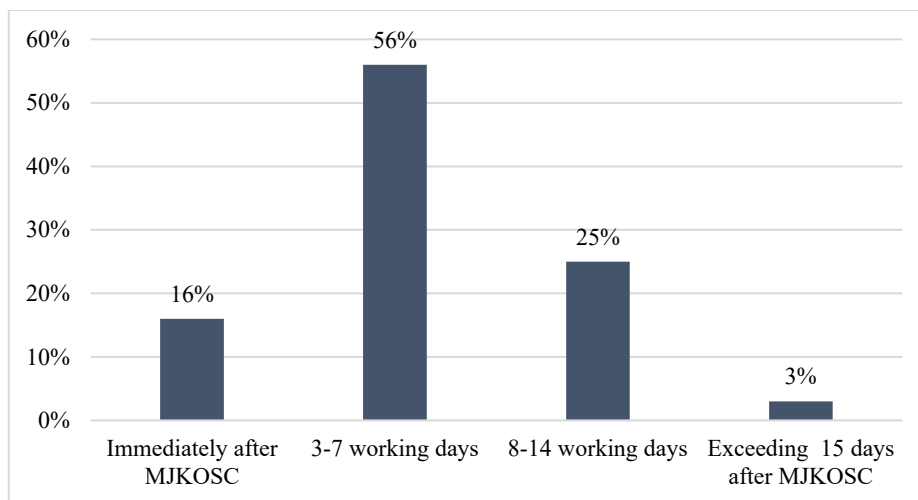


Figure 2: Duration of time in receiving result acknowledgement letter

As shown in Figure 2, 56 per cent of PSP/SP received the results from OSC Secretariat from three to seven working days. About 25 per cent of the users obtained a letter of acknowledgement in 8 to 14 days, and 5 per cent of the users received the results after 15 days. Only 16 per cent of the users received the results immediately after post OSC secretariat meeting. Besides that, PSPs reported that they had to call OSC Counter to check their online submission status because sometimes, they could not communicate with the person in charge.

The study also found that about 70 per cent of the respondents agreed that the existing system lacked self-checking and monitoring system, in which the application tracking could not be traced effectively. This incident occurred since the system was not linked to users' email notification. This exposed a weakness of OSC Online System as the public had to resort to other practical means to check their status of the submission.

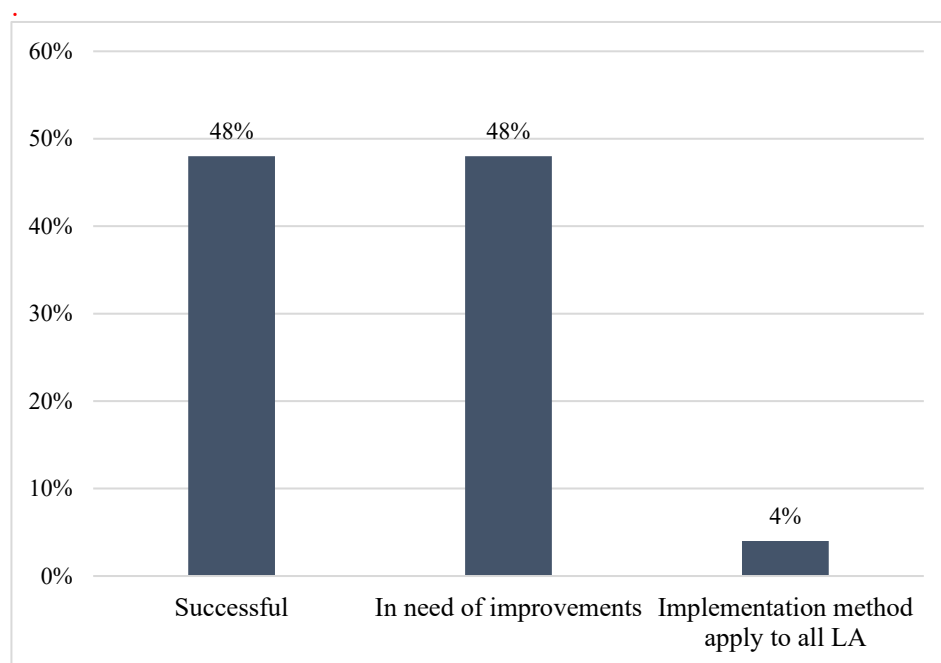


Figure 3: Overall Comments of e Submission

PROPOSED IMPROVEMENTS

Several proposed improvements are suggested. These improvements focus in shaping the alignment between technology, organisation and human factor. A challenge to OSC Secretariat is to improve the transparency of work distribution among technical staff. It is recommended that for efficiency, several tasks should be fairly distributed. These tasks are seen as important as the staff multitask

activities, such as processing online submission, duty counters to receive processing fees or payment and preparing the submission for distribution purpose to other technical departments.

Ministry of Housing and Local Government (MoHLG) can produce a simplified submission application that can be accessed through mobile and desktop. The application can include OSC Checklist that is available in the system and auto-generated when PSP chooses the types of submission. The checklist link must be editable to PSP/SP to upload the necessary documents. The auto-generated checklist helps to standardise the documents needed to be uploaded for submission and processing. Moreover, the system providers should enable digital signature for the validity of every drawing plan submitted. A further recommendation in the system to ease the users towards e-submission is enabling accessibility to online banking with an automatic fee calculation for standard submission. Recommendations in the system to ease the users for both the OSC Secretariat technical staff in e-processing and PSPs include enabling automatic notification to PSP/SP as an acknowledgement of submission, as well as status through the email and other applications.

Another recommendation in the system to improve efficiency among processing department, internal department and external agencies technical staff is enabling a direct notification to the staff's official email. The notification can be sent in two stages: on initial submission by PSP, with the second notification automatically sent three (3) days before the stated two weeks' due date for technical comments. In support of the digital movement, a notification can also be relayed in other mediums, such as Short Message Service (SMS) or WhatsApp application. The system can also auto-disable for any comments from the technology that does not comply with the due date and as a record for further actions. Furthermore, another recommendation in the system includes enabling ease of information sharing between the departments for a compilation of paperwork. This is because the system can include a friendly function of e-meeting that records the proceedings of the e-meeting.

CONCLUSION

This study provides an insight into some of the impediments faced by the users of OSC Online System 3.0 using a case study of one of the implementing pioneers, which is Majlis Perbandaran Subang Jaya. This system is introduced to facilitate PSPs and users from the technical department in the several stages of e-submission and e-processing. The findings of this research are essential towards identifying improvements for OSC Online System as these findings comprise a solution-based approach towards minimising wastage of resources, as well as promoting increased accessibility, speed and transparency of the government's service.

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TREE PRESERVATION ORDER (ACT 172) ADOPTION PROCESS WITHIN THE NATIONAL DEVELOPMENT PLANNING FRAMEWORK

**Nik Adlin Nik Mohamed Sukri¹, Zulhabri Ismail², Wan Tarmeze Wan
Ariffin³, Rumaizah Mohd Nordin⁴**

^{1,2 & 4}Faculty of Architecture, Planning and Surveying

UNIVERSITI TEKNOLOGI MARA (UiTM)

³Development Project Management Taskforce

FOREST RESEARCH INSTITUTE MALAYSIA (FRIM)

Abstract

This study was conducted to obtain comprehensive information on the process of Tree Preservation Order or TPO (Act 172) adoption by the states in the context of National Development Planning Framework (NDPF) that includes the formulation and adoption of TPO Rules. The study was part of the authors' research in finding answers to the lack of TPO (Act 172) implementation in the country. The data were acquired through consultation with PLANMalaysia and state JPBDs, and by reviewing the agencies' documents. The results, presented in the form of process flowcharts, would be useful for the current and future research in making evaluation concerning the adequacy of planning and actions taken during the adoption process that would ensure TPO (Act 172) implementation. This study preliminarily concludes that the planning and actions taken were adequate, i.e., done in an orderly manner and followed the procedures common to the NDPF. However, the next step in ensuring that the TPO (Act 172) adoption is effective, TPO (Act 172) implementation must be put as high priority in the work plans of each related agency.

Keywords: Tree Preservation Order (Act 172), TPO Rules, formulation, adoption, NDPF, construction industry

¹ Postgraduate Student (PhD) at Universiti Teknologi MARA. Email: nikadlin@frim.gov.my

INTRODUCTION

In 1995, the Malaysian government passed the Tree Preservation Order (TPO) with the inclusion of Part VA sections 35A to 35H to the Town and Country Planning Act 1976 (Act 172) (Laws of Malaysia, 2014). This gives power to the Local Planning Authorities (LPA) to preserve any tree or a group of trees and protect them from being felled [or cut-down, topped, lopped, uprooted, damaged or destroyed, as interpreted in Part I section 2(1) of the Act], for instance, during construction or as the results of development activities.

Before an LPA is able to implement TPO (Act 172), it is of best practice that the state adopts the legislation through a gazette notification of TPO Rules. The rules (regulation and by-law alike), defined as "subsidiary legislation" in the Interpretations Act 1948 & 1967, is part of Malaysian legal sources that supplement the legislative function of Malaysian legal system (Muhammad Syahlan et al., 2018). Usually, rules require publishing in the Government Gazette to become legal. Selangor, Perak, and Melaka are the only states in Peninsular Malaysia that have successfully adopted the legislation by gazetting the TPO Rules in 2001, 2011, and 2017, respectively (Nik Adlin et al., 2020). According to the TPO Rules, TPO (Act 172) is considered implemented by a LPA only when it has issued a public notice (or TPO Notice consisting of the List of Trees, Form A and Form B) to protect a tree or trees in a designated area.

To clarify the points discussed in this paper, the terms "successful adoption" and "effective adoption" are distinguished from each other. The former is when the main target of the process is achieved regardless of what should follow afterwards (opposite to the later). In other words, adoption of TPO (Act 172) is considered successful when the TPO Rules have been gazetted by the states, but not considered effective until they are implemented by the LPAs.

Cases whereby trees that should have been preserved were cut down without consent of the LPA have raised questions whether the TPO (Act 172) have been effectively implemented (Nik Adlin et al., 2017) or even worse, whether it have been successfully implemented at all. To answer those questions, we may have to look at the bigger picture, i.e., at the process of TPO (Act 172) adoption prior to the implementation. Taking a step back, we could ask whether TPO (Act 172) has really been adopted effectively in the sense that all the actions taken and activities carried-out during the adoption process were meticulously planned to ensure that TPO (Act 172) will be implemented by the LPAs or at least to facilitate the implementation process.

A study was conducted to obtain comprehensive information on the process of TPO (Act 172) adoption which includes the formulation and adoption of TPO Rules in the context of national development planning hierarchy, i.e., from the federal government to LPA via the state governments. The results of this study may provide some answers for the future research, especially those

concerning the adequacy of planning and actions taken during the adoption process necessary to ensure that TPO (Act 172) implementation will take place.

NATIONAL DEVELOPMENT PLANNING FRAMEWORK

The Town and Country Planning Act, 1976 (Act 172) underlines the National Development Planning Framework (NDPF) within which a development plan in Malaysia is implemented. As shown in Figure 1a, the NDPF comprises of three levels of planning: National (Federal), Regional/State, and Local (JPBD, 2010). Implementation of development plans and matters related to it, such as policies and legislations, is a 'top-down' affair (Abdul Aziz et al., 2011) starting at the federal level down to the state level and finally to the LPA level, directed towards achieving a national development vision, e.g., Vision 2020. The planning is prepared by the National Physical Council (NPC) at the Federal level, the State Planning Committee (SPC) at the state level, and the local council at the local authority level. The National Physical Plan (NPP) is the highest planning document in the national physical development plan framework (JPBD, 2015). With the requirement for the NPP to be reviewed every five years, it is pertinent for the NDPF to also involve a 'bottom-up' flow consisting of feedbacks on matters arising during the implementation.

LEGISLATION ADOPTION PROCESS

A legislation, e.g., an act, is often the result of a government's need to legitimise a policy to its people. Normally, a policy or a legislation has to go through the following stages: formulation, adoption, implementation, and evaluation (Howlett & Ramesh, 2003; Benoit, 2013; Anisur Rahman & Md Mizanur, 2017).

In the context of TPO (Act 172) adoption, the process within NDPF could be exemplified as in Figure 1b. To the three levels of planning, the fourth level is added representing the implementation stage. Even though this fourth level has never been displayed in the National Physical Plan (NPP) documents (JPBD, 2005, 2010, & 2015), since its inception in 2005, some previous researchers such as Zakiah (2011) and Ismail et al. (2019) have added it to the NDPF in their publications, i.e., regarding Shah Alam Draft Local Plan and about National Housing Policy, respectively. The inclusion of the fourth level signifies the fact that the adoption process within the planning levels ends at LPA and what comes after is the implementation.

The actions taken and activities carried-out at the planning levels should be directed towards ensuring the success of TPO (Act 172), not only being adopted by the states, but also being implemented by the LPAs. FAO (2010), in its guidelines for developing effective forest policy, states that formal adoption, including the approach to implementation and the division of responsibilities, must be at a high enough political level to commit all relevant sections of

government to actions that are needed to achieve the goals set by the policy. Hence, it is important to know the list and flow of activities that had been carried-out within the planning stages of TPO (Act 172) adoption, i.e., at Level 1 down to Level 3, right after the legislation was passed by the Parliament in 1995. By having this information, we could examine/evaluate whether or not the activities were adequate and have been carried-out in an orderly manner. Moreover, the information would ease the future efforts in identifying the factors contributing to the success or failure of TPO (Act 172) implementation. Unfortunately, such information is not readily available as literature for the researchers to refer. With this in mind, a study was conducted to gather information as much as possible regarding the events that occurred during the process of TPO (Act 172) adoption consisting of TPO Rules formulation by the federal agency and adoption by the states of Melaka, Perak, and Selangor.

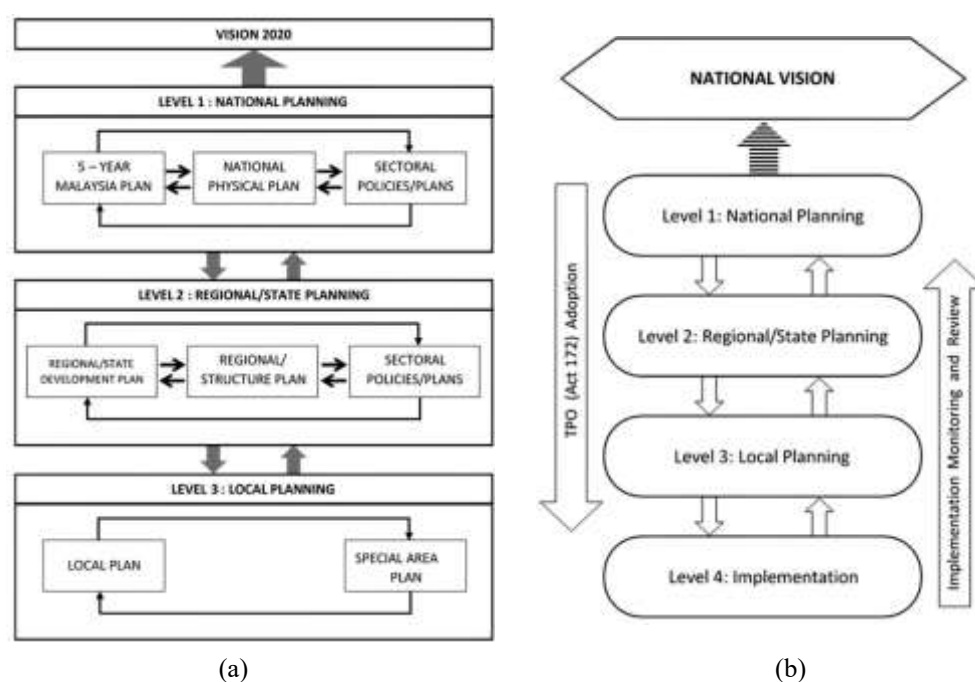


Figure 1: (a) National Development Planning Framework (JPBD, 2010),
 (b) TPO (Act 172) adoption process within NDPF

MATERIALS AND METHODS

This study employed two methodologies: 1) consultation and 2) document review.

Consultation with Planning Authorities

In this study, we consulted a number of planning-related government agencies to obtain their authoritative inputs and advices on matters related to TPO (Act 172) adoption processes. The government agencies being consulted and the biodata of the responding officials are as shown in Table 1 and Table 2, respectively.

PLANMalaysia (then *Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia* or JPBD HQ) or the Federal Department of Town and Country Planning, of which all physical planning and land use developments are under its purview, is the sole agency at the federal level mandated to oversee the implementation of provisions in Act 172. At the state level, the agencies are of the similar departments, also known as state JPBDs, each bearing a name of the state, such as JPBD Selangor (Table 1).

Table 1: Government agencies consulted in the study

No.	Agencies	Address
1	PLANMalaysia	Level 13, Block F5, Parcel F, Precint 1, Federal Government Administrative Centre, 62675 Putrajaya.
2	JPBD Selangor	15 th - 18 th Floors, Darul Ehsan Building, No.3 Indah Road, Section 14, 40646 Shah Alam, Selangor.
3	JPBD Perak	3 rd & 7 th Floors, Seri Perak Building, Panglima Bukit Gantang Wahab Road, 30646 Ipoh, Perak Darul Ridzuan.
4	JPBD Melaka	Level 5, Wisma Negeri, Hang Tuah Jaya, M.I.T.C, 75450 Ayer Keroh, Melaka.

The selection of officials (Table 2) was based on several criteria. The most important was whether they had involved the TPO Rules formulation and adoption processes at the federal and state levels, respectively. If they had not, the second criteria would be whether or not they had the capacity and the ease to acquire the requested information from their agencies. Lastly, the officials should be willing to be consulted and able to give the feedbacks.

The officials were contacted through letters, phone calls, and e-mails, and sometimes, a face-to-face communication to get information and/or clarification on the subject matters. The information had to be acquired from the consultation and the objectives of having the information were as summarised in Table 3.

Table 2: Biodata of the officials consulted in the study

ID	Position	Academic Qualification	Work Experience*	TPO Knowledge
O01	Town & Country Planning Officer,	Bachelor of Urban &	PLANMalaysia, UTM	Legislative

	Legal and Regulatory Div.	Regional Planning		
O02	Assistant Director, Corporate & Secretarial Unit	Bachelor of Urban & Regional Planning	JPBD Melaka, PLANMalaysia, ANZ Planner	Legislative
O03	Chief Assistant Director, Corporate Planning Div.	MSc in Land Administration	JPBD Perak PLANMalaysia	TPO Rules formulation
O04	Assistant Director, Development Plan Div.	MSc in Urban Development & Management	JPBD Selangor, PLANMalaysia	Legislative

Note: * in descending chronological order

Table 3: Information to be acquired and the objectives

No	Information	Objective
1	Activities and events in TPO Rules formulation process (PLANMalaysia).	To produce a flowchart of TPO Rules Formulation Process within PLANMalaysia.
2	Activities and events in TPO Rules adoption process (state JPBDs).	To produce a flowchart of TPO Rules Adoption Process within state JPBDs.
3	Details of each activity/event: date, place, agencies involved, ranks of officials (committee members, participants), objectives, <i>etc.</i>	To reflect the degree of involvement of agencies at each planning level in the processes and collaboration between the parties.
4	Other activities or committees dedicated to ensuring successful implementation of TPO (Act 172), besides those of 1 and 2 above.	To reflect the TPO (Act 172) implementation preparedness.

For each of the TPO Rules formulation and adoption processes, a flowchart would be produced. This task required ample information of the actions taken, the goals (or milestones) and chronology of the activities and events, if possible, with the exact time frame. The list of agencies involved and the rank of officials in each activity and event to achieve the specific goal or milestone would give some insights on several aspects. For instance, it reflects whether or not the TPO (Act 172) adoption has been a smooth 'top-down' affair which requires involvement of high enough planning level (PLANMalaysia) and the commitment of all related agencies, especially state JPBDs and LPAs. Moreover,

the list would also echo the extent of collaboration between the parties to achieve the goals.

The existence of activities and committees, other than 1 and 2, within each agency aimed towards ensuring that the TPO (Act 172) is successfully implemented by the local authority could reflect the agency's preparedness to further involve at the lower planning levels. Such activities would include training programs to enhance awareness and understanding of TPO (Act 172) and TPO Rules among the state JPBD and LPA workforces.

In addition, we requested the officials to provide us with other helpful information such as lists of published documents and an access to the classified documents of their agencies, which would contain information on TPO Rules formulation and adoption process, for reviewing. Lastly, the officials were also required to give their comments and to verify the findings that we had suggested.

Document Review

Document review is a way of collecting data and information by reviewing existing documents. There are three primary types of documents: public records, personal documents, and physical evidence (O'Leary, 2014). In this study, the document review was done to get detailed information relating to the events and activities conducted by the agencies during TPO (Act 172) adoption process. The documents were as shown in Table 4. All the documents, except state gazettes, department records, and official correspondences were obtained from PLANMalaysia library and also downloaded from PLANMalaysia and state JPBDs websites.

Table 4: Documents reviewed in the study

ID	Category	Title	Year
SG01	State Gazette	<i>Kaedah-kaedah Perintah Pemeliharaan Pokok 2001. Jil. 54 No. 7 Tambahan No. 3 Perundangan (Tree Preservation Order Rules 2001. Vol. 54 No.7 Legislative Supplement No.3). Sel. P.U. 8. 29 March 2001.</i>	2001
SG02	State Gazette	<i>Kaedah-kaedah Perintah Pemeliharaan Pokok Negeri Perak 2011. Jil. 64 No. 26 Tambahan No. 21 Perundangan. (State of Perak Tree Preservation Order Rules 2011. Vol. 64 No. 26 Legislative Supplement No. 21). Pk. P.U. 40. 30 December 2011.</i>	2011
SG03	State Gazette	<i>Kaedah-kaedah Perintah Pemeliharaan Pokok (Negeri Melaka) 2017. Jil. 61 No. 18 Tambahan No. 10 Perundangan. [Tree Preservation Order</i>	2017

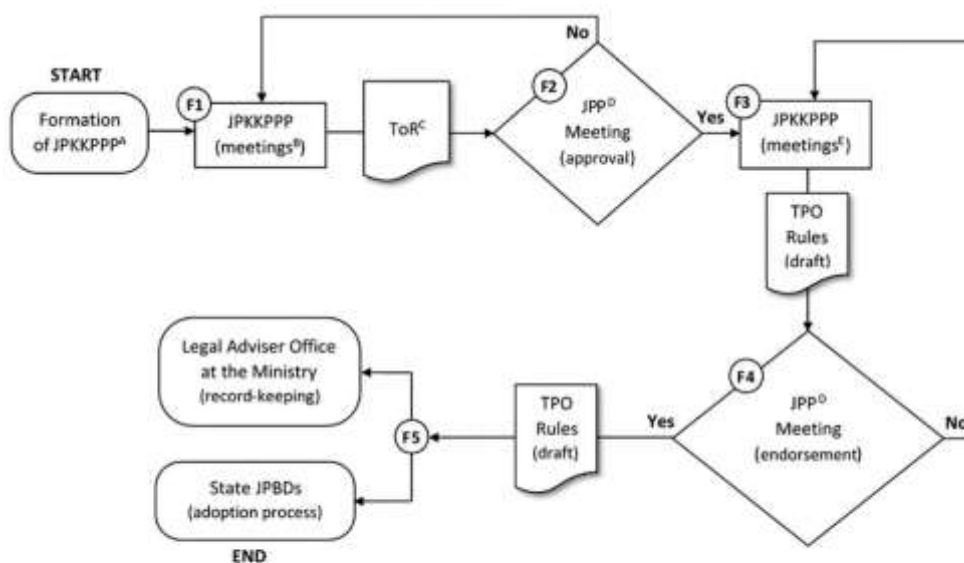
		Rules (State of Malacca) 2017. Vol. 61 No. 18. Legislative Supplement No. 10]. M. P.U. 16. 31 August 2017.	
MR01	Annual Report	<i>Laporan Tahunan 1994, 1995 & 1996. Kementerian Perumahan & Kerajaan Tempatan</i> (Annual Report 1994, 1995 & 1996. Ministry of Housing and Local Government).	1997
AR01	Annual Report	<i>Laporan Tahunan 1996. JPBD Semenanjung Malaysia.</i> (Annual Report 1996. Federal Department of Town and Country Planning).	1997
AR02	Annual Report	<i>Laporan Tahunan 1997/1998. JPBD Semenanjung Malaysia.</i> (Annual Report 1997/1998. Federal Department of Town and Country Planning).	1999
AR03	Annual Report	<i>Laporan Tahunan 1998/1999. JPBD Semenanjung Malaysia</i> (Annual Report 1998/1999. Federal Department of Town and Country Planning).	2000
ARP01	Annual Report	<i>Laporan Tahunan 2010. JPBD Perak Darul Redzuan.</i> (Annual Report 2010. Perak Department of Town and Country Planning).	2011
ARP02	Annual Report	<i>Laporan Tahunan 2011. JPBD Perak Darul Redzuan.</i> (Annual Report 2011. Perak Department of Town and Country Planning).	2012
B01 to B07	Bulletin	<i>Buletin Perancangan. JPBD Melaka</i> (Planning Bulletin. Malacca Department of Town and Country Planning). Nos. 1/2014; 2/2014; 1/2015; 2016; 2017; 2018; 2019.	2014 to 2020
DR01	Department Record	<i>Gubalan, Semakan dan Pindaan Kaedah-Kaedah di Bawah Akta Perancangan Bandar dan Desa 1976 (Akta 172)</i> (Formulation, Review and Amendment of Rules under Act 172). JPBD (IP) PKK (Kaedah). No. 3.	2018
DR02	Department Record	<i>Minit Mesyuarat J/Kuasa Kaedah-Kaedah Perintah Pemeliharaan Pokok Negeri Melaka 2016. Bil. 3/2016</i> (Meeting Minutes of State of Malacca TPO Rules Committee. No. 3/2016). JPBD Melaka.	2016
DR03	Department Record	<i>Penerima Pakaian Kaedah-Kaedah di Bawah Akta Perancangan Bandar dan Desa 1976 (Akta 172) (Sehingga 31 Disember 2007)</i> [(Adoption of Rules under Act 172 (up to 31 Dec 2007)]. JPBD Selangor.	2008

OC01 Official Correspondence Permohonan Maklumat / Dokumen Kaedah 2019
Perintah Pemeliharaan Pokok Negeri Melaka
(Info Request / State of Malacca TPO Rules
Documents) JPBD (M) 3/7 Klt. 2. 12 May 2019.

RESULTS AND DISCUSSION

TPO Rules Formulation Process within PLANMalaysia

The flow of activities and events in the TPO Rules formulation process within PLANMalaysia is as shown in Figure 3. This flowchart was developed based on the document of standard operation procedure for the process of formulating, reviewing, and making amendments to the Rules under Act 172 (DR01) disclosed to us by O01. The time frame of each activity and event is as tabulated in Table 5. Some of the information on the events were available in PLANMalaysia annual reports (AR01, AR02 and AR03) and considered sufficient as far as the chronological aspect was concerned.



- A. JPKKPPP = Jawatankuasa Pasukan Kajian Kaedah-kaedah Perintah Perlindungan Pokok (TPO Rules Study Team committee)
 B. Discussion/technical meeting/workshop to produce the Term of Reference (ToR) for the formulation of TPO Rules
 C. Term of Reference for the formulation of TPO Rules
 D. JPP = Jawatankuasa Perancangan dan Pembangunan PLANMalaysia [Planning and Development Committee of PLANMalaysia]
 E. Discussion/technical meeting/workshop to produce TPO Rules draft

Figure 3: TPO Rules formulation process within PLANMalaysia (based on DR01)

The MNKT or *Majlis Negara bagi Kerajaan Tempatan* (National Council for Local Governments) during its 44th meeting on 27 June 1996 approved the PLANMalaysia TPO Guidelines for adoption by LPAs (MR01, AR01). This approval led to the formation of a committee, namely, JPKKPPP or *Jawatankuasa Pasukan Kajian Kaedah-Kaedah Perintah Pemeliharaan Pokok* (TPO Rules Study Team Committee) in PLANMalaysia tasked to formulate the rules for TPO (Act 172) implementation, probably later in 1996. Chaired by the Director of the Legal and Regulatory Planning Division (LRPD), the committee consisted of a core team supervised by one of the heads of units in the division. Other members of JPKKPPP were reps from State JPBDs, selected LPAs, and Legal Adviser Office at the Ministry.

Prior to the formulation of TPO Rules, the core team was required to prepare the Term of References (ToR) for the undertakings (F1). Among the content of the ToR are the introduction and background, the objectives, the scope of the study, the methodology, the results of the study, expertise required, work programme, and financial allocation (DR01). This ToR was then presented by the LRPD director during a JPP or *Jawatankuasa Perancangan dan Pembangunan* (Planning and Development Committee) of PLANMalaysia meeting, chaired by its Director General for approval (F2), *circa* late 1996 or early 1997. Members of the JPP were all state JPBD directors, division directors within PLANMalaysia, reps of the KPKT and other related ministries as well.

After the approval, the JPKKPPP began the TPO Rules drafting of activities which would also include technical meetings and workshops, chaired by the PLANMalaysia Deputy Director General (Development) and LRPD director, respectively (F3). The TPO Rules draft prepared in 1997 (AR02) was then endorsed (F4) during another JPP Meeting in March 1998 (AR03) before it was able to be presented to the states (F5) upon approval of the MNKT. A copy of TPO Rules draft was submitted to the Legal Adviser Office in the Ministry for record-keeping purposes. Each state also received a copy of the draft via official correspondence for adoption process.

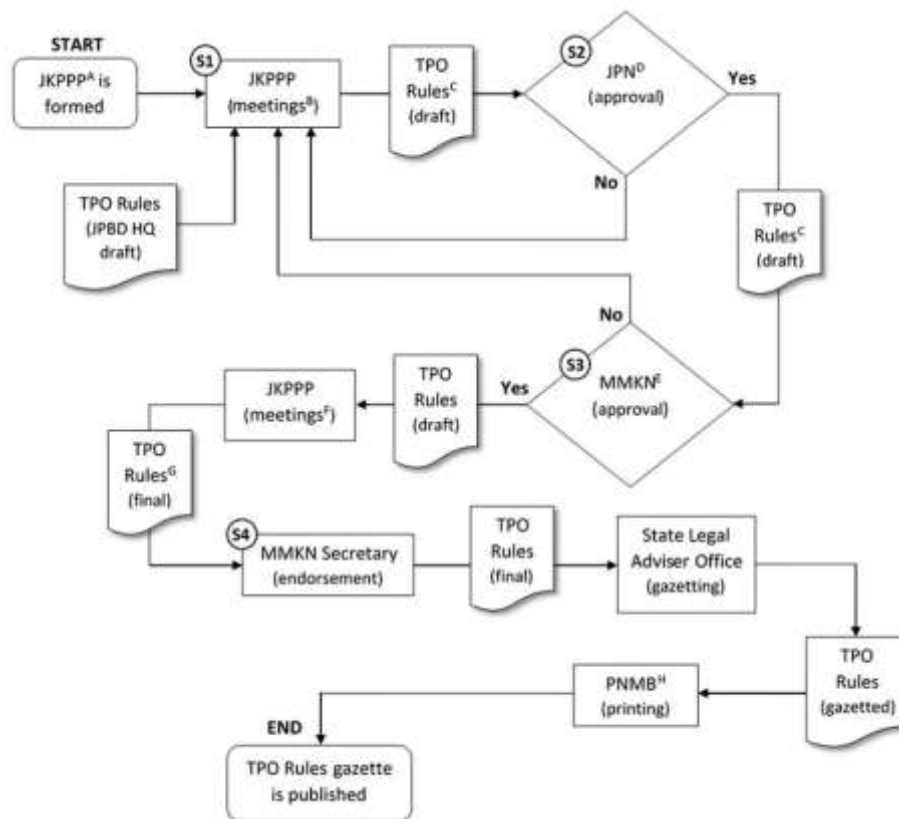
Table 5: Details of events in TPO Rules formulation process within PLANMalaysia

ID	Event/Activity	Date	Source*
F1	Development of ToR to formulate TPO Rules	1996	AR01
F2	JPP Meeting approved the ToR	ca.1996/97	N/A
F3	Formulation of TPO Rules draft	1997	AR02
F4	JPP Meeting endorsed TPO Rules draft	Mar 1998	AR03
F5	Submission of TPO Rules draft to the stakeholders	1998 onward	AR03

Notes: *Refer to Table 2 and Table 4. Notations follow for Table 6, Table 7 and Table 8. N/A = not available

TPO Rules Adoption Process within State JPBDs

Due to the fact that Melaka was the latest state adopting TPO (Act 172), i.e., in 2017, we decided to contact the JPBD Melaka first, assuming that they would face the least difficulty in gathering the information. The agency official (O02) replied to our correspondence with a chronology of activities and events that took place during the state TPO (Act 172) adoption process (OC01). Using the information provided, we then came up with a flowchart as shown in Figure 4. The details of the activities and events are summarised in Table 6.



- A. JKPPP = Jawatankuasa Kaedah-kaedah Perintah Pemeliharaan Pokok (TPO Rules Committee)
- B. Discussion/technical meeting/workshop to draft TPO Rules paperwork for approval
- C. This TPO Rules paperwork must be vetted by the State Legal Adviser Office representative
- D. JPN = Jawatankuasa Perancang Negeri (State Planning Committee)
- E. MMKN = Majlis Mesyuarat Kerajaan Negeri (State Government Council)
- F. Discussion/technical meeting/workshop to draft TPO Rules for gazetting
- G. This TPO Rules gazette final draft must be vetted by the State Legal Adviser Office representative
- H. PNMB = Percetakan Nasional Malaysia Berhad (A printing company)

Figure 4: TPO (Act 172) adoption process activities within a State (based on OC01)

The process (Figure 4) starts with the formation of the JKPPP or *Jawatankuasa Kaedah-Kaedah Perintah Pemeliharaan Pokok* (TPO Rules Committee) in January 2016 (OC01). The committee, chaired by the Director of JPBD Melaka, were comprised of officials from within the JPBD Melaka Development Division (Corporate and Secretariat Unit, Development Planning Unit and Land Use Information Unit) and reps from Melaka Chief Minister department (Local Government Unit and Landscape Department), the State Legal Adviser Office, the city and town councils (mixture of Legal Unit, Town Planning Department, City/Town Beautification Department, and Landscape Department), and Green Technology Corporation of Melaka (DR02).

According to DR02, on 3rd of February 2014, the MPA172 or *Mesyuarat Pelaksanaan Akta 172* (Act 172 Implementation Meeting) of JPBD Melaka decided that rules for TPO (Act 172) implementation should be formulated for the state. This decision followed the resolution of JPN or *Jawatankuasa Perancang Negeri* (State Planning Committee) in its meeting on 9th December 2013 to endorse the implementation guidelines produced by PLANMalaysia (JPBD, 2012) for adoption by the state. JPN, established under section 4 of Act 172, is a committee that advises the State Government on planning matters and is the approving authority for development plans. The JPN is chaired by the Head of the State Government (Chief Minister or *Menteri Besar*) and comprises not more than 18 members including the chairman (JPBD, 2011). Other members of the JPN from the state agencies are the State Director of Lands and Mines, the State Director of Public Works, the State Director of Environment, the Director of the State Economic Planning Unit, the State Legal Adviser, and the State Financial Officer.

The Melaka TPO Rules proposal had to be brought up to a JPN meeting for approval and the matters were further discussed in the next MPA172 which was held on 19th of August 2014 (B02). The JPBD Melaka took another 16 months before JKPPP was formed. During that period of time, the department publicised information on TPO (Act 172) in its bulletins (B01, B02, and B03), probably as a means to enhance the awareness and knowledge amongst the agency's workforce, especially those who would be appointed as JKPPP members. The JKPPP met (S1) in four separate occasions during 2016: 1st of March, 26th of April, 10th of August, and 17th of November (OC01). The meetings were to discuss matters towards achieving the main objective of the committee, i.e., gazettment of Melaka TPO Rules. The activities included preparation of Melaka TPO Rules proposal based on the draft by PLANMalaysia in 1998 and to present the draft document during a JPN meeting (S2) held on 15th of Dec 2016 (B04). This JPN meeting was to approve the appropriateness of the Melaka TPO Rules draft document to be brought up to the MMKN or *Majlis Mesyuarat Kerajaan Negeri* (State Government Council) which would decide whether or not

the document was apt for gazettment (S3). The MMKN, in its session on 19th of April 2017, approved the document with some amendments which was verified on 26th of April 2017.

Next, the final version of Melaka TPO Rules document was presented to the Secretary of the MMKN for endorsement (S4) of which the date of its signature marked the commencing of Melaka TPO Rules gazettment and accordingly, the adoption of TPO (Act 172) by the state. In JKPPP, the State Legal Adviser Office rep was given a mandate to vet the TPO Rules document formulated in S1 before it could be brought into S2, S3, and S4. After S4, the activities were merely the formalities being carried-out by the State Legal Adviser Office to ensure that the Melaka TPO Rules gazette is notified to the public. These activities included printing of the document for publication. The flowchart is applicable to Perak and Selangor, with details of the events are as shown in Table 7 and Table 8, verified by the officials O03 and O04, respectively.

Table 6: Details of events in TPO (Act 172) adoption process within JPBD Melaka

ID	Event/Activity	Date	Source*
S1	JKPPP to draft Melaka TPO Rules	Mar-Nov 2016	OC01
S2	JPN approved the TPO Rules draft	15 Dec 2016	B04
S3	MMKN approved the TPO Rules draft	19-26 Apr 2017	OC01
S4	Melaka TPO Rules endorsed/gazetted	31 Aug 2017	SG03

Table 7: Details of events in TPO (Act 172) adoption process within JPBD Perak

ID	Event/Activity	Date	Source*
S1	JKPPP to draft Perak TPO Rules	2010	ARP01
S2	JPN approved the TPO Rules draft	12 Dec 2011	ARP02
S3	MMKN approved the TPO Rules draft	14 Dec 2011	ARP02
S4	Perak TPO Rules endorsed/gazetted	30 Dec 2011	SG02

Table 8: Details of events in TPO (Act 172) adoption process within JPBD Selangor

ID	Event/Activity	Date	Source*
S1	JKPPP to draft Selangor TPO Rules	After Mar 1998**	N/A
S2	JPN approved the TPO Rules draft	31 Dec 1998	DR03
S3	MMKN approved the TPO Rules draft	16 Jun 1999	DR03
S4	Selangor TPO Rules endorsed/gazetted	29 Mar 2001	SG01

Notes: ** After the TPO Rules Draft was approved by MNKT for adoption by the states

Post TPO Rules Formulation and Adoption

In response to our quest No. 4 in Table 3, the PLANMalaysia O01 stated that after the TPO Rules draft task had been completed, there were no further activities or committees within the agency dedicated to ensure the successful implementation of TPO (Act 172). However, there are meetings, namely, *Mesyuarat Pengarah Negeri* (State JPBD Directors meeting), scheduled up to thrice in a year and chaired by the Director General of PLANMalaysia, in which discussion on Act 172 implementation is part of the meeting agendas. Through the meetings, PLANMalaysia is able to get information on the current status of TPO (Act 172) implementation in the states.

At the state level, the JPBD Melaka O02 revealed the fact that the TPO Rules committee was dissolved after the Melaka TPO Rules was gazetted. He also added that there were no TPO (Act 172)-dedicated activities conducted and committees formed afterwards. We cross-checked his statements with the agency's annual bulletins for 2017 (B05), 2018 (B06), and 2019 (B07) and found out that there was no information regarding TPO (Act 172)-related activities reported except a publicity on the TPO (Act 172) offences and penalties (B05).

SUMMARY OF FINDINGS AND CONCLUSION

The study has put forward the flowcharts of TPO Rules formulation and adoption process, developed through consultations with the officials from PLANMalaysia and state JPBD of Melaka, Perak, and Selangor, and by reviewing the agencies' documents. The flowcharts reveal that the TPO (Act 172) was successfully adopted by the three states, whereby the process was done in an orderly manner and followed the procedures common to the National Planning Development Framework. Furthermore, looking at the membership of the committees involved throughout the process, we can conclude that the importance of TPO (Act 172) has been well-comprehended at all levels of planning, including the ministers, director generals, state directors, and LPA heads, as well as the staff of the implementing agencies. Unfortunately, considering the fact that the number of TPO notices issued by LPAs has been very small, TPO (Act 172) implementation can be considered very unsatisfactory and this assertion was agreed by all the officials we had consulted. Subsequently, due to this implementation status, questions could be raised to doubt the effectiveness of the whole process of TPO (Act 172) adoption by the states. Perhaps, as a nation, we have to put TPO (Act 172) implementation on high priority in our work plans, hence our trees that are meant to be preserved will be protected from damaging elements, especially those originated from the construction industry.

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The authors would like to extend their sincere gratitude towards PLANMalaysia, and the JPBD of Melaka, Perak, and Selangor that through their very cooperative officials, have provided information and inputs crucial to this paper. Special thanks to Che Rasid Che Seman, a Senior Assistant Director at PLANMalaysia for a much-needed guidance at the very beginning of this research.

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THE TRANSFORMATION FROM RESIDENTIAL TO COMMERCIAL SPACE TOWARDS DYNAMIC SPACE FORMATION IN CENTRAL JAKARTA

Ragil Haryanto¹, Indriastjario², Khuruin Saidah³, Agung Sugiri⁴

^{1, 3, 4}Department of Urban and Regional Planning,

²Department of Architecture

Faculty of Engineering

DIPONEGORO UNIVERSITY, INDONESIA

Abstract

This research was conducted to examine dynamic space formation using urban space converts from housing to Small and Medium-size Enterprise (SME) commercial space in the street corridors of major cities in Indonesia. The study is necessary due to the rapid increase in population, observed to be affecting the urban socio-economic and physical aspects as evident with the sporadic growth of small and medium businesses in potential locations of urban street corridors where many plots of land for residential space have converted for commercial activities. The driving factors include business climate change, global economic crisis, democratic development, and decentralization of the economic sector. In-depth field research was conducted concerning the changes in space use in Bendungan Hilir area of Tanah Abang, Central Jakarta as a sample. Deductive thinking with purposive strata area sampling and natural settings without manipulating the subjects studied were applied as the methods. Meanwhile, data were collected quantitatively and qualitatively from one collector street corridor in the residential area observed to have shifted and changed to an SME commercial area. The results, therefore, showed a dynamic pattern of commercial activity leading to a "spatial democracy" pattern.

Keywords: land-use change, urban space shifting, sporadic growth, dynamic space, spatial democracy

¹ Assoc Professor at Diponegoro University. Email: ragil.haryanto@pwk.undip.ac.id

INTRODUCTION

The physical development of big and medium cities in Indonesia has been very fast as observed in the changes in old spaces to perform modern functions and lateral expansion of the city (Passoneau in Roger, 2005; Haryanto, Soetomo, Bukhori, 2017). There are also other relatively rapid changes which are beyond the expectations of the original plan for the spatial functions as observed with the emergence of commercial activities in the areas initially planned for housing and settlements, especially along the main corridors and interconnected street lanes being used as residential space (P, Acero, K. Cabas, C. Caycedo, P. Figueroa, 2020; Lazim & Said, 2020). The same phenomenon has been apparent in the downtown area of Jakarta, especially in Bendungan Hilir including Tanah Abang district located behind the main street corridor of the city – Jenderal Sudirman street.

RESEARCH BACKGROUND

Research Approach

This research intends to determine the fundamental link between urban spatial patterns and the phenomenon of developing commercial areas in the main urban street corridor dominated by retail small-medium businesses (Kostof, 1991; Lazim & Said, 2020)). From the perspective of the scientific framework, the study ontologically presents objectivity but focuses on historical realism through observed or virtual reality which is considered pseudo in evaluating city development due to social, cultural, political, and economic forces (OECD, 2007, Cuervo, 2007, Venkataraman, 1997, and Fazal, Geertman, & Toppen, 2012; Lazim & Said, 2020). Meanwhile, epistemologically, the understanding of objectivity is modified, interactive, neutral, and also estimated to be dependent on criticism, therefore, this research was more inclined to the post-positivistic approach conducted deductively to implement the Critical Theory built based on previous research. This study is considered necessary due to its objectivity and reliance on the criticism of the transformation of socio-economic changes in society to determine the actual conditions (Tashakkori, 2003, Salim, 2006, and Creswell, 2007).

Research methods

The research was conducted as deductive thinking using purposive sampling with natural settings without manipulating the subjects. Data were collected at a collector's street corridor in the Bendungan Hilir area of Central Jakarta where space has massively converted to an SME Commercial area.

Research Stages

This research's Stage I was Field observation (Gold, 1958, in Tashakkori, 2010, and Turner and Johnson, 2003), which is a direct observation of all participants

including small and medium businesses participating socially in a natural or built environment. The object of observation was the implication of using residential space along the urban collector lane for small, medium-sized retail, commercial activities. The homogeneity of these activities was, however, considered by deepening "field observations" in several areas with relative specific and unique characteristics including historical and philosophical value developed due to the influence of growth centres with specific activities, such as education and industry (Lazim & Said, 2020). Moreover, existing activities were estimated to have the ability to support each other or relatively have a similar consumer market or mutual interaction, thereby, leading to their selection as areas with high potential as a spatial analysis unit for further research.

Stage II: Open interviews were conducted by "purposive sampling" using non-probability techniques such as the selection of directed samples not based on statistical formulations including a) convenience, b) judgment and c) snowballing which is a semi-structured interview activity with selected retail business actors in each cluster group. The results of the analysis, related to the field facts, were likely to raise further questions such as 'are there any dominant factors affecting the development of the spatial/spatial aspects?' 'Are there other factors such as ease of doing business, political system and administration of local governance to provide a sense of security and comfort to the community affecting small and medium retail businesses development in line with the spatial patterns to provide business opportunities? These questions, therefore, led to the mixture of qualitative historical into descriptive analysis to obtain complete results.

Stage III: This is the synthesis stage through which the results were formulated with due consideration for field reality and the theories related to the synthesis of expected spatial patterns in each city.

LOCATION ORIENTATION

Bendungan Hilir is one of the essential areas in Jakarta which is strategically located around Semanggi Bridge and included in Tanah Abang District, Central Jakarta. It covers an area of 1.58 km² which is approximately 16.99% of the whole district and directly bordered by three main street corridors including Jalan Jenderal Sudirman, Jalan Penjernihan, and Jalan Gatot Subroto and on the northern part by the Krukut River. The research area is surrounded by national-scale commercial areas including trade-services and offices such as the Sudirman-Thamrin Prospective Economic Zone, Tanah Abang Industrial Center, and Kuningan-Sudirman-Casablanca Integrated Trade Center. Bendungan Hilir Zone is also designated as a supporting area for commercial and industrial activities in the Jakarta Capital City Design Guide.

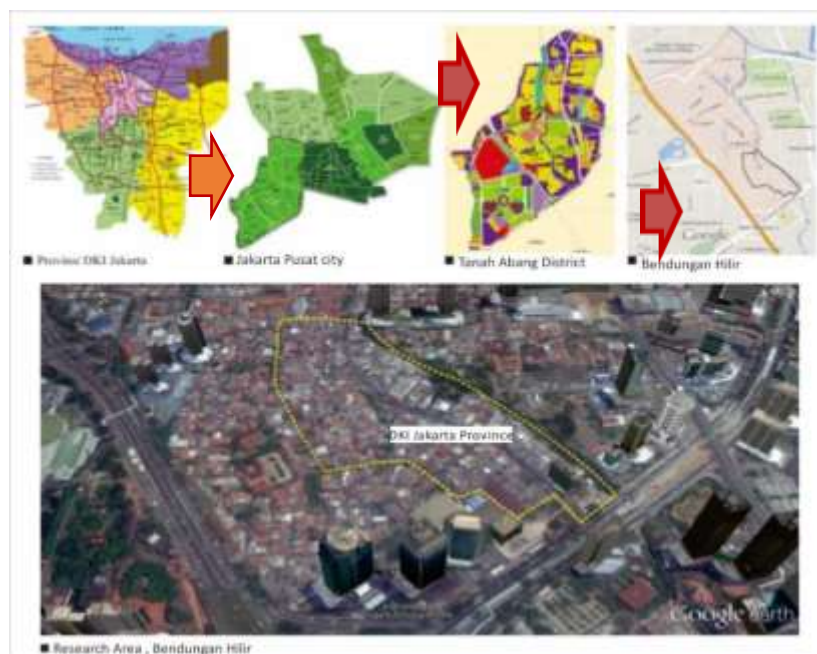


Figure 1: Research Location in Bendungan Hilir Area
 Source: Digitized on the Google map by the research team, 2019



Figure 2: The Commercial corridor in Bendungan Hilir Street
 Source: Digitized on the Google map by the research team, 2019

Table 1: Land use, FAR, Elevation and BCR at the Special Area for Jakarta

Land Use	Floor Area Ratio (FAR)		Elevation		Building Coverage Ratio (BCR)	
	Min	Max	Min	Max	Min	Max

Mixed-Use	0.8	1.6	2	4	20 %	40 %
Office Buildings	0.8	3.5	2	8	20 %	60 %
Commercial Buildings	0.8	2.4	2	4	20 %	60 %
Government centres	0.4	2.4	2	4	10 %	60 %
Public Green Space	0.1	0.2	1	2	2.5 %	5 %
Educational Institutions	0.4	3	2	8	5 %	40 %
Sport Centre	0.05	1.6	1	4	1.25 %	40 %
Cultural Buildings	0.8	1.6	2	4	20 %	40 %
Worship facilities	0.4	2	2	4	10 %	50 %
Health Institutions	0.8	1.6	2	8	10 %	37.5 %
Single House Building (large)	1.2	2	1	4	20 %	60 %
Residential (medium)	1.2	1.2	1	3	20 %	60 %
Residential (small)	1.2	1.2	2	2	60 %	60 %
Vertical Housing	0.8	3.5	8	8	3.33 %	31.25 %

Source: Special Area of The Capital Province, 2019

Land Prices at the Research Location

The following land price map is the result of a survey conducted by the National Land Agency in Bendungan Hilir area based on prevailing market prices at the time. The comparison of the two maps showed the price of the lands located on the edge of Bendungan Hilir street corridor is higher than those in Bendungan Hilir zone and an increase has also been there between 2013 and 2018 with variations based on respective locations.

Table 2: Land price in Bendungan Hilir Area, 2013 - 2018

No	Area	Land Price Rp/m ²	
		2013	2018
1	Front side Bendungan Hilir Street corridor	22,213,000	26,140,000
2	Streetside Bendungan Hilir Street corridor	17,496,000	26,640,000
3	Inside the area	8,651,000	16,540,000

Source: BPN SPECIAL AREA OF THE CAPITAL Jakarta in 2015, and reprocessed in 2018

Land Price Map 2013



Land Price Map 2018



Figure 3: Land Price Map, Bendungan Hilir Area, 2013-2018
Source: Land Price Map BPN

Spatial Planning at the Research Location

The land allotment policy was studied to determine the development of spatial use planning by the Special Area of The Capital Jakarta Government in Bendungan Hilir area and four planning products were found to be relevant and considered to have a relationship between spatial use and research location. They include:

A. Spatial Planning of Special Area of the Capital Jakarta for 2010 - 2030

Bendungan Hilir area was found to have been selected for trading, office, and service activities while a housing system for low-income people, rejuvenation of the old market, and regulation of public transportation modes were also designed to be implemented. The land-use plan for the stipulated period was as a *residential area* to support the prospective economic zones and also designated as a public building area in places intersecting with Jalan Sudirman and Jalan Gatot Subroto.

B. Revision of Spatial Detailed Plan for the Sub District of Tanah Abang 2010-2030

This spatial planning product is a revision of the Spatial Detailed Plan for the Sub District of Tanah Abang for 2000-2005 under the spatial regulations for the 2010-2030 Special Area of the Capital Jakarta. This revised product has not been legalized but has become a material to prepare for the 2014-2034 Spatial Planning and Zoning Regulations for Special Area of the Capital Jakarta as stipulated in the Regional Regulation of Special Area of the Capital Jakarta Number 1 of 2014. Bendungan Hilir Area was planned in this regulation to serve as work and residential uses with their respective facilities.

C. Detailed Spatial Planning and Zoning Regulations for Special Area of the Capital Jakarta 2014-2034

The Spatial Detail Plan and Zoning Regulations are the operational provisions of Spatial Planning for the Special Area of the Capital Jakarta 2030, which regulates the utilization and control of space, based on zoning and designation of sub-zones. It covers all the sub-districts in five Administrative Cities and one Administrative District in Special Area of The Capital Jakarta. It establishes through the Provincial Regulation of Special Area of the Capital Jakarta Number 1 of 2014 concerning Detailed Spatial Planning and Zoning Regulations.

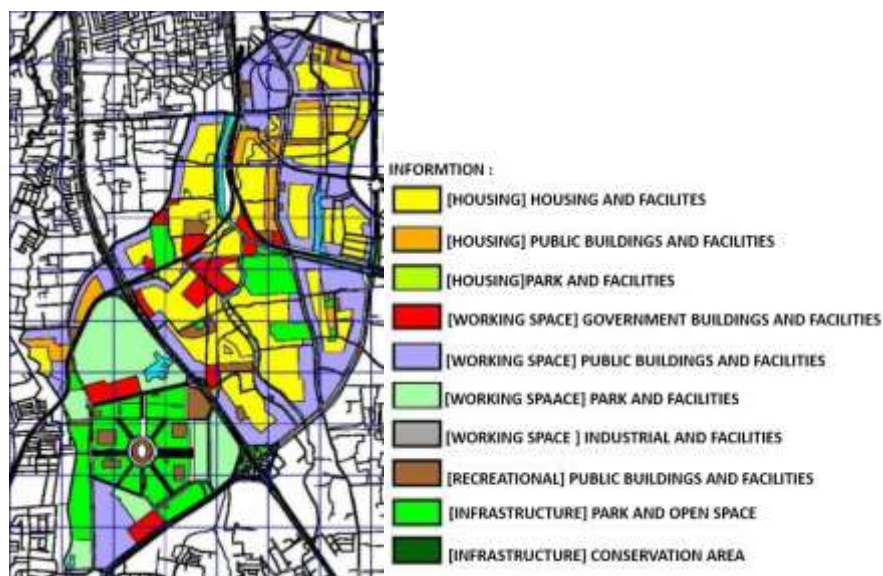


Figure 4: Spatial Zoning Regulations of the Special Area of the Capital Jakarta
Source: Special Area of the Capital Province Attachments, 2013



Figure 5: Spatial Detailed Plan for Bendungan Hilir Area, the Sub District of Tanah Abang

Source: *Special Area of the Capital Province Attachments*, 2019

D. City Design Guide for Bendungan Hilir - Mas Mansyur for 2012-2022

This design was determined in line with the Governor Regulation Special Area of Capital Jakarta number 176 of 2012 based on the following considerations:

- Space is to be used as the centre of trade, offices and services, especially for business and shopping centres according to City Design Guidelines.
- The strategic position of Bendungan Hilir - Mas Mansyur as an area passed by two main corridors including Sudirman which connects Thamrin and Sisingamangaraja streets as well as K.H corridor which connects Mas Mansyur with Prof. Dr Satrio street

The Design Guide shows a difference in the magnitude of the outbreak intensity values between the plans set out in the 2005 Sub District Spatial Detailed Plan and the existing conditions in 2008 as related with the spatial use in the Tanah Abang District. The section majorly affected are, therefore, offices, trade, education, sports, social culture, places of worship, health facilities, and flats as indicated by the ratio of maximum building heights.

The differences observed in the plan and current real conditions indicate the freedom of the people in utilising their properties as well as the dynamic spatial conditions (Anwar, 2002; Wang, 2012) shown in the appearance of the building function. This situation is understandable because different people own the properties, and this means the land values and the period of construction differ (Zainuddin & Yusof, 2020).

RESULTS AND DISCUSSION

The building intensities of the plan for trade, office, and residential functions in the Bendungan Hilir area was found to have a maximum FAR value of 60% while the value for buildings located on the edge of the street at 2008 when the Sub District Spatial Detailed Plan was revised was found to be up to 80%. The findings show the planning efforts at the time paid less attention to the real conditions in the field, and this led to the fear of applying the plan. Another aspect, the suitability of the FAR values between the plans and field conditions in 2008 can be seen in the following table:

Table 3: Scheme and Existing Floor Area Ratio

Land Use	Floor Area Ratio (FAR) Maximum	
	Sub District Spatial Detailed Plan 2005 (Scheme)	Existing
Office Buildings	>5.0	3.5
Commercial Buildings	>5.0	2.4
Government centres	3.0	2.4
Educational Institutions	2.4	3
Sport Centre	1.2	1.6
Cultural Buildings	1.2	1.6
Worship facilities	1.2	2
Health Institutions	1.6	2.4
Single House Building (large)	3.0	2
Residential (medium)	1.2	1.2
Residential (small)	1.2	1.2
Vertical Housing/Flat	3.0	3.5

Source: Authors' Analysis, 2019

Table 4: Scheme and Existing Elevation Maximum

Land Use	Elevation Maximum	
	Sub District Spatial Detailed Plan 2005 (Scheme)	Existing
Office Buildings	>32	8
Commercial Buildings	>32	4
Government centres	4	4
Educational Institutions	4	8
Sport Centre	2	4
Cultural Buildings	2	4
Worship facilities	2	4
Health Institutions	4	8
Single House Building(large)	2	4

Residential (medium)	4	3
Residential (small)	2	2
Vertical Housing/Flat	4	8

Source: Authors' Analysis, 2019



Figure 6: Land Use, Building Condition Bendungan Hilir Street

Source: Authors' Analysis, 2019

The utilization of space and building along the Bendungan Hilir Street corridor has been a mix, with several buildings performing different functions such as office, trade, household, photocopy and printing, culinary and restaurant as well as hospitals and mosques. This situation means that most of the buildings along the corridor have changed from being used for residential functions to non-residential or commercial functions. Moreover, the average FAR value was included in the high category at approximately 80% while the building height conditions ranged between 1 to 5 floors with those used for trades and services having 2 to 4 floors. Meanwhile, the other street in the area also has buildings which are used for trading and services with small lots having 1-2 floors while those on Jatiluhur Street perform a residential function with an average height of 2 floors.

The field facts and secondary data showed significant differences in the function of the utilization and activities, land values, and building height required in line with the regulations. The variations can be associated with:

- (1) the difference in the ownership status of the properties and purpose or objectives of the businesses;
- (2) the utilization of properties has not been considering the regulations, mainly due to the difference in economic capabilities and time needed for the development process.

It, therefore, means there is a possibility of changes in the function of any city at any time depending on the economic support (Elhorst, 1996) provided by the owners or tenants of the property and most importantly the strength of the applicable spatial planning regulations.

The utilization of residential space located close to the commercial area of the city was, therefore, observed to be quickly affected by changes in functions, thereby, tending to lead to the freedom and dynamic use of space, especially in situations where spatial regulations are not strongly set.

Democratic Spatial Pattern: A Concluding Remark

There is a dynamic shift in the development of city space which seems to be static in reality (Anwar, 2002 and May & No, 2015). The data used in this study is static or secondary, and this means primary data obtained from the field was required due to its continuous change. Moreover, spatial arrangement is directly related to the land or earth, which is static, never shifts an inch but has the ability dynamically generate community activities. In line with the principle of democracy being politically practised in Indonesia, reference was made to previous research by Haryanto, Soetomo, and Bukhori (2017) where *the democratic spatial pattern* means that the space creations are through democratic processes and observed to be different from those created by non-democratic actions such as social processes where there is no individual ownership or equal use of space by individuals. *Democratic spaces* are, therefore, usually used for public or democratic activities.

Field analysis and the emergence of the development of commercial activities along the Bendungan Hilir Street corridor as well as the number of small and medium commercial business activities paying rents instead of owning place showed the lack of permission to erect buildings for businesses in the area. Some were also discovered to be using old licenses and building permits for housing. Business spaces were, however, found to have been developed freely due to the difference in spatial utilization direction compared to the development, and this further indicates people's democratic spaces in business. Therefore, there is a need to democratize spatial arrangement, especially in terms of ownership and use of land.

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PROFILING OF ISLAMIC CALLIGRAPHY SCRIPTS USED FOR ARCHITECTURAL DECORATION OF MASJID IN PENINSULAR MALAYSIA

Zumahiran Kamarudin¹, Ziad Baydoun², Nik Ahmed Mazlan Nik Mahidin³

^{1,2}Kulliyah of Architecture and Environmental Design
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
³I-NAI Venture Holdings Sdn. Bhd.

Abstract

In Malaysia, the introduction of the Islamic calligraphy, especially after the spread of Islam in the 14th century has impacted on the further development of decorative art in the built environment. While Islamic calligraphy has witnessed significant developments in the past decades, it still lacks a profiling classification system of calligraphy scripts that give impact to the contemporary mosque. The objectives of the study are to analyse the visual qualities of the calligraphy scripts in the mosque components and its compositional categories and to determine the relationship between the calligraphy placement and the mosque architecture within the interior and exterior fabrics of the buildings. This research involved an analytical review of the Islamic calligraphy found in the 10 selected mosques in Selangor and Kuala Lumpur, Malaysia and their depiction in various components. Face-to-face interviews with the mosque authorities and local calligraphers on the types and styles of scripts used in the mosque components were conducted as a complementary measure to the analytical method. The analysis reveals the application of cursive and angular style of scripts, fabricated in specified shapes, sizes and dimensions of the mosque components. Selection and depiction of calligraphy, especially in Thuluth and Kufi scripts suggest their strong preference to the traditional major styles ranging from its composition to the determination of its positional layout regardless of differences in the mosque architecture style.

Keywords: Islamic calligraphy, mosque architecture, calligraphy scripts

¹ Lecturer at International Islamic University Malaysia. Email: zumahiran@iium.edu.my

INTRODUCTION

Islamic calligraphy is prevalent in Islamic art and architecture and has become one of the central features in the Muslim religious buildings, especially in *the masjid*. This gives escalation and appreciation to the idea that forms of calligraphic writing script can be applied as aesthetic units in its own right for specific places. The versatility and qualities of the calligraphy afford further development in the ornamentation of mosque architecture reflecting innovativeness in design yet in line with the Islamic world views. Many mosques, in general, are adorned with the calligraphy scripts that has become an essential decorative element since it adds the Islamic values to the buildings apart from giving aesthetic pleasing. The beautifully-written sacred text of Islamic calligraphy ties primarily with Divine words of God (Hamidon & Ishak, 2015). However, the origin of the decorative scripts and how it was selected and developed for the specific mosque is not widely known. Many contemporary mosques are adorned with the calligraphic scripts, yet there is very little known about the decorative calligraphic scripts that have become part and parcel of its architectural significance.

Furthermore, little research was conducted on the categorisation of calligraphic scripts and is still not reaching to the fine and modest way of classifying its usage as architectural decoration due to its complexity in styles and scriptwriting. Development of different kinds of Islamic calligraphic scripts throughout the historical periods leads to the difficulty in recognising the scripts. Traditional calligraphers used different methods in writing the scripts, and it depends on their origin and personal background. Also, there are many cases of engaging various scripts to enhance works of art whilst supporting a range of functions of its usage and application. Jainal (2005) states that calligraphers need to maintain their artistic skill and to practise writing regularly. This certainly demands a high level of skill and specialised workmanship to achieve coherence, avoiding complication, muddles and mistakes.

In masjid, the same phenomena can be observed and therefore, there is a need to identify and categorise the application and placements of the scripts through a systematic approach. Developing a profile of Islamic calligraphy scripts used for mosque beautification will assist in identifying categories of calligraphy scripts, which are significant for its further sustainable development. Therefore, the objectives of this research are: to analyse the visual qualities of the calligraphy scripts in the mosque components and its compositional categories and to determine the relationship between the calligraphy placement and the mosque architecture within the interior and exterior fabrics of the buildings.

ISLAMIC CALLIGRAPHY AND ITS MEANINGS

Calligraphy is a type of visual art, and the term was derived from Greek, kallos "good" and graphē "writing". The term is generally defined in Webster's

dictionary as beautiful or elegant handwriting. According to (Campedelli, 2010), all works of calligraphy shared a common feature of the text, which is in good form of letters. As such, calligraphy can be described as an art of writing in using letters stylistically and exquisitely. Meanwhile, Khatibi and Muhammed (1994) posit that the Islamic calligraphy is a beautifully-written sacred text since it deals primarily with Divine words of God. The calligraphy which is based on Arabic script is interpreted according to the cultural and aesthetic systems of a particular Muslim community (Abd Rahman, 2007) which shares a common Islamic cultural heritage hence it is also known as Arabic calligraphy. Arabic is a language of Islam due to its status as a vehicle of revelation (Mohamed, 1979). Hence, both terms Islamic calligraphy and Arabic calligraphy are considerably related and applicable. As such, the Islamic calligraphy is an art of beautiful writing that is an abstract expression of Islam.

Islamic Calligraphy and Styles of Scripts

Calligraphy is considered the quintessential art form of the Islamic world with Arabic letters decorating objects ranging from bowls to buildings (Othman, Aird, & Buys, 2015). The art of writing has gained wide popularity throughout the Muslim world due to its profound characteristics. The calligraphy is often considered as the most profound Islamic art because it is inspired by the verses in Qur'an (Sulaiman, 1997; Hamzah., 2012). Furthermore, among pious Muslims, the act of writing calligraphy is considered as a form of spiritual purification (Khatibi and Mohammed, 1994). As calligraphy is the artistic exercise of handwriting, it is created upon the alphabet in the lands that sharing a common Islamic cultural tradition (Hamidon & Ishak, 2015). Calligraphy has been an essential medium in the arts of the Muslim cultures for many centuries because the use of figurative elements is prohibited by Islamic teaching (Mohamed, 1979; Othman, 1995). Likewise, calligraphers were among the most highly regarded artists in Islamic societies, and today, this remains the case in many places (Pedersen, 2014).

The traditional classification of Arabic writing falls into two major styles (Yasin, 1978): (1) Angular script, and (2) cursive script. The first category of calligraphic styles is generally called the Kufi or Kufic, the hardstyle. The second category is the soft style which includes Naskhi, Thuluth, Nastaliq, and many others. The Arabic alphabet developed rapidly after the rise of Islam in the 7th century into a beautiful form of art. On the roles of Islamic calligraphy, Sulaiman (1997: 23) posits that "the physical, visual and psychological ambience that the script pervades is spiritually enriching the souls of those who come into contact with it. In their capacities as a talisman, not only render them protection against evil forces or elements but more importantly, their regular contact with the divine text implicitly constitute a form of dhikr (invocation), which beyond

doubt, is spiritually enriching". Meanwhile, Dzul Haimi (2007) states that the acts of making art or performing duties by Muslims are considered as a form of manifestation of their faith to Allah. As Kornfeld (2018) explains the Dome of the Rock and early Islamic coinage use Qu'ranic quotations to declare Islam as the monotheistic faith. This study proves that the manifestation of traditional ornamentation does play an important role not only in disseminating the symbolic meaning but also representing the history, beliefs and background of the local Malays.

RESEARCH METHODS

This study involved a profound review of related researches and literature and identifying of issues related to the art of Islamic calligraphy concerning its socio-cultural dimension, sustainability issues, especially about its placement as architectural decoration in the masjid. The literature reviews also covered the calligraphy styles and the importance of the calligraphy scripts for the decoration. At this phase of research, a set of research parameters have been formulated to conceptualise the study in the context of the field of knowledge, i.e. Islamic calligraphy, architectural decoration, mosque architecture and Islamic art. The secondary data obtained from local authorities served as initial research techniques which provide shreds of evidence from which the authors were able to construct meaningful inferences and interpretation about the research inquiry concerning the first research objective.

Qualitative Methods of Data Collection

A qualitative approach of data collection was conducted through site visits and direct observation to the 10 selected mosques in Selangor and Kuala Lumpur. The researchers visited a total of 4 mosques with modernistic architectural styles; 1) Masjid Tun Abdul Aziz in Petaling Jaya, 2) Masjid Puncak Alam in Bandar Puncak Alam, 3) Raja Haji Fisabilillah Mosque in Cyberjaya, and, 4) Masjid Negara in Kuala Lumpur. The research also included 3 mosques with the style of post-modern revivalism; 1) Masjid Wilayah, Kuala Lumpur, 2) Masjid Sultan Salahuddin Abdul Aziz (Blue mosque) in Shah Alam and 3) Masjid Al Mukarramah in Petaling, Selangor. Also, the researchers selected the 3 mosques with Modern Vernacular design for the site visit; 1) Masjid Jamek Kampung Baru in Kampung Baru, Kuala Lumpur, 2) Masjid Sultan Abdul Samad in Sepang, and 3) Masjid Al-Hidayah, Taman Melawati, Kuala Lumpur. During this phase of research, visual inspections and photography documentation are important research techniques since this research seeks to analyse and categorise the styles of calligraphy scripts used for the mosque's decoration and its placement within the interior and exterior fabrics of the mosque. The researchers developed selection criteria to determine the eligible mosques for the research, and this includes the status, location, architectural style and availability of the calligraphy

scripts. The researchers had researched with the help of using appropriate research instruments, including a checklist of calligraphic attributes, digital camera and recorder and measuring tools. The research also involved Face-to-face and semi-structured interviews with local calligraphers, municipal authorities, and mosque authorities in obtaining an expert opinion on the development and application concept of Islamic calligraphy scripts in the mosque and policy use for the application of the various scripts. Related authorities, including Jabatan Kemajuan Islam Malaysia, and Jabatan Agama Islam Selangor also involved. The personal interviews with the 3 selected calligraphers from Selangor aimed to obtain information about the art of Islamic calligraphy including the styles of script, roles of the scripts, its application and identification of its traditional and socio-cultural values. The calligraphers also provided information on their perceptions of the calligraphy scripts in the mosque and its application. The researchers used content analysis of the textual and pictorial data obtained from the face-to-face interviews, site visits and field observation. The visual analysis were the primary instruments for the content analysis, and the thematic analysis was in the forms of descriptive and interpretive analysis on the interview transcription. The results and findings from the site visit, visual analysis and interview were useful research components as it helped in developing a profile of Islamic calligraphy scripts used for ornamentation of Malaysian masjid.

ANALYSIS, RESULTS AND FINDINGS

Visual Qualities of the Calligraphy Inscription

The analysis shows that Thuluth script is the most recurrent calligraphy style found in many components of the mosques as highlighted in Table 1. This type of script is extensively prevalent at the *Qiblah* wall and the base of the domes. The result suggests Thuluth script has gained popularity as an ornamental inscription for the mosque decoration as apparent in the selected mosques of Selangor and Kuala Lumpur. According to Maryam (2018), Thuluth that has spectacular flexibility and the readable script remains the most significant of all the ornamental script. Kufi is a secondary type of script found in the mosques. The analysis also reveals that concentration of decorative calligraphy happens in few places of the mosques, especially in the prayer hall, which includes *mihrab* (praying niche) area, *qiblah* (direction of prayer) wall, domes, doorways, interior walls. Apart from these areas, many calligraphic inscriptions are found at the upper part of doorways and entrance archways. Qur'anic verses are dominant inscriptions found at *mihrab*, *qiblah* wall, domes, doorways, interior walls. Apart from the verses, various Islamic phrases and words adorn the places including *Asmaul Husna* (99 names of Allah), *Basmallah* phrase, companions' names, *zikr* (remembrance of God phrases) and *dua* (prayer of supplication quotes). The

results show that *Qiblah* wall is the most ornate part of the mosques but in a moderate way.

Table 1: Visual qualities and compositional categories

Name	Placement/ component	Position	Calligraphic Phrase/word	Style of script	Compositional category
Federal Territory Mosque	Mimbar	Upper part	Al-Baqarah:150	Thuluth	Single image
	Qiblah wall	Upper part	Al-A'araf:206, Al-Muzammil:20, Al-Fatihah: 1-7, Al-Insyirah:1-8	Thuluth (cursive)	Symmetrical position
	Main Dome	Base	Asmaul Husna	Thuluth	Single image
	Iwan/ archway	Arch profile	At-Taubah:18-22	Thuluth	Single image, Linear format
	Ablution area/entrance	Upper part	Al-Kawthar:1-3	Thuluth	Single image, linear horizontal
	Entrance doorway	Upper part	Ar-Rum:3, Ar-Ra'd: 28, Al-Hajj:77	Thuluth	Single image
Tun Abdul Aziz Mosque	Mimbar	Upper part	Annur: 56, Al Imran: 133, Al Hasyr: 18	Thuluth	Symmetrical position
	Qiblah wall/ emblem	Upper part	Kalimah Allah and Muhammad	Thuluth	Symmetrical position/pairing
	Main Dome/ base and inner space	Upper part	Qur'anic verses (Annur:) 99 names of Allah	Thuluth	Single image
	Prayer hall/Wall Facades	Upper part	Qur'anic verses (Al Kahfi:107-109, Al Kahfi: 10, Al Anfal: 1-2, Al Anfal: 3-4)	Thuluth Nastaliq Diwani Kufi (angular)	Single image
	Roof/ Signage	Top part	Name of the Mosque	Kufi (angular)	Single image
Sultan Salahuddin Abdul Aziz Mosque	Prayer hall Wall	Upper part	Salawat -salutation phrase	Thuluth jali	Single image
	Qiblah wall	Upper part	Al-Fatihah: 1-7 Al-Nas, Al-Falaq Al-Ikhlash	Thuluth, Naskh, Diwani, Riq'ah, Nastaliq	Symmetrical position
	Main Dome	Base- exterior	Al-Taubah: 18-19	Thuluth	Linear format
		Interior base	Ya Sin: 1-11	Thuluth	Linear format
	Inner side	Al-Nisa:103	Thuluth	Roundel inscription	

Masjid Puncak Alam,	Qiblah wall	Border of mihrab	Basmallah and Qur'anic verse	Thuluth	Single image,
	Main door of the prayer hall	Upper part	Dua	Thuluth	linear format
	Main Dome	Base	Zikir phrases	Thuluth	Repeat, rotated
	Mihrab wall	Upper part	Al-Shahadah phrase	Square Kufi	Single image
National Mosque	Qibla wall	Upper part	Qur'anic verses Al-Jinn, 72:18 Al-Baqarah, 2:148 Al-Taubah, 9:105 Al-Hijr, 15:9	Thuluth (cursive)	Single image, linear format
	Mihrab	Upper part	Qur'anic verses	Thuluth	Single image linear
	Main dome	Inside the dome	Basmallah and dua	Thuluth	Single image rotary
	Prayer hall/Wall Facades	Upper part	Qur'anic verses	Thuluth	Single image, linear format, horizontal
	wall Signage	Upper part	Name of the Mosque	Kufi (angular)	Single image
Kampung Baru Jamek	Front door	Upper part	Al-Hijr: 46	Thuluth	Single image
	Main Dome	Base	At-Taubah: 18	Thuluth	Linear format
	Mihrab	Upper part	Al-Jinn: 18	Thuluth	Single image
	Main Gate	Top part	At-Taubah: 18	Thuluth	Single image
Raja Haji Fisabilillah Mosque	Qiblah wall	Frame border	An-Nas, Al-Falaq, Al-Ikhlash, Inscription Allah and Muhammad	Thuluth	Single image and double format
	Main Entrance	Upper part Upper part	Basmallah Inscription Allah and Muhammad	Square Kufi Square Kufi	Single image Double format
	Dome, interior	Base	Al-Zalzalah	Thuluth	Rotary linear
	Roof	Top part	lailahaillallah	Knotted Kufi	Repeated
Masjid Al-Hidayah	Qiblah wall (Mihrab)	Upper part	Al-Baqarah, 2:149 Allah & Muhammad	Thuluth Square Kufi	Single image Double format
	Entrance Signage	On the ground	Name of the Mosque	Thuluth (cursive)	Single image

Masjid Sultan Abdul Samad	Qibla wall	Upper part	Al-Baqarah, 149	Thuluth	Single image,
		Border	Allah and Muhammad	Square	repeated and
		Border	Ayat al-Kursi	Kufi	Linear
				Kufi	Linear
	Main Dome	Base	Qur'anic verses	Thuluth	linear format,
Masjid Al Mukarramah	Qibla wall	Upper part	Al-Baqarah, 2:255	Thuluth	Single image,
			Al imran, :102	(cursive)	linear format,
			Al Haj:77		Rotary
	Mihrab	Top archway	Al-Baqarah, 2:144	Thuluth	Single image,
					linear format,
	Main dome	Base	Asmaul Husna	Thuluth	Single image,
					linear format,

Compositional Categories of the Calligraphic Decoration

The calligraphy found in the mosque performs both functional and aesthetic purposes, and without the calligraphic decoration, the mosque architecture would not be complete. The Islamic inscriptions found in the mosques either derived from Qur'anic verses or other phrases are not only significant for decoration purposes. They also play their roles to spread the message of Islam either to Muslims or non-Muslim visitors. These inscriptions remind the visitors to the greatness of Allah and also remind them of their responsibilities as Muslims. In the areas of *qiblah* (قِبْلَة) wall and *mihrab* (محراب) (praying niche), a variety of calligraphy styles adorn the upper part of the wall. They are often found interwoven as apparent in the qiblah wall of Federal Territory Mosque, Kuala Lumpur (Figure 1). *Qiblah* wall in a mosque faces Mekah, in which the *mihrab* is located at the centre point to the direction of Mekah, or indicates the *Kaaba* (الكعبة). In Islam, the sacred direction is towards the sacred Kaaba in Mekah. Thus, in a mosque, the qiblah wall is sacred for the praying hall, known as sacred space (Norhayati et al., 2014). Thus, the abundance of calligraphic inscriptions found on this wall is due to its significant status. The vivid articulation of calligraphic inscriptions along the wall is an indicative gesture of how important the qiblah wall is as evident in the visited mosques. An interesting feature of the qiblah wall is that it can be directly seen from a distance because all of the mosques keep a single space layout. Nevertheless, because of the common function of the mosque as a place of congregational prayer, the qiblah wall becomes one of the most common architectural features, which appear in all visited mosques.



Figure 1: *Qiblah* walls of Federal Territory Mosque and a doorway at Puncak Alam Mosque with Thuluth inscriptions

An entrance doorway at Puncak Alam Mosque displays a prayer quote or *dua* written in Thuluth script. It shows easy read phrase using simple calligraphy-like thuluth script. The prayer quote means “O Allah, your blesses and prayers to the prophet Muhammad, O Allah forgive me and open to me the doors of your mercy.” In Islam, *dua* is the very essence of worship, and Muslims can make *dua* at any time. The placement of the prayer quoted at the entrance of the prayer hall is significant as it can remind the worshippers to recite the *dua* while entering the place. A mosque should be a place that encourages them to invoke Him and increases their supplications in prostrations.

The analysis of the calligraphic inscriptions suggests that there are two main categories of compositional principles; 1) symmetrical or double image, and 2) standalone or single image. As shown in Table 1, the calligraphy found within the prayer hall has principal variants of phrases including Qur'anic verses, prayer quotes, the religious phrase in praise of Allah, and 99 names of Allah. Depiction of selected verses from Al Qur'an appears pervasively in most of Qiblah wall and mihrab either in a single position or double position. The result implies that the single type of composition is the most popular one, probably since the calligraphic script is complex in character, which should be handled prudently. Sense of sacredness in the calligraphic phrases is the prime thing. This is why the selection of calligraphy inscriptions reveal a deep preference for a religious text as a principal element. Placement of a single and double composition or symmetrical format of calligraphy inscriptions are prevalent at the qiblah wall, mihrab and main dome at the prayer hall. The dome is one of the most dominant

features of the mosque as it seems to cover almost the entire area of the prayer hall; hence the placement of religious phrases in a single format is pertinent as apparent around the dome of Puncak Alam Mosque as shown in Figure 2. The text of Surah Al-Mukminun, verses 1-12 adorns the base of this dome in Thuluth script. It also appears that the mosques embrace the double image of calligraphy inscriptions that dominates the qiblah wall and mihrab as found in Masjid Tun Abdul Aziz, Petaling Jaya.



Figure 2: Single and double image of verses at the dome and mihrab, respectively

The Relationship Between the Calligraphy Placement and the Mosque Architecture

Islamic calligraphy is part and parcel of the language of mosque architecture. "It is a compelling fact that beautifying and decorating mosques, with sharply varying degrees and styles yet with the identical message and philosophy, is evident virtually everywhere from the moment the idea of beautifying mosques had been instituted till today" (Spahic, 2016; p16). This study had analysed the Islamic calligraphy found in the different mosques with different architectural styles. A few prominent mosques with the modernistic architectural styles like Raja Haji Fisabilillah Mosque in Cyberjaya and National mosque of Malaysia in Kuala Lumpur have a good collection of Arabic calligraphy at their praying halls. "National mosque is by far the best example of a building imbued with the technological and spiritual qualities of an architecture with a truly Malaysian identity classification of mosque styles" (Mohamad Tajudin, 2007; p30). Regardless of the differences in the forms and architectural style, the placement of the decorative calligraphy is in control and moderate manner because Islam prohibits extravagant mosque decoration and space beautification. The mosques, in its many forms, is the archetypal of Islamic religious building because of its sharing spiritual qualities. Similarly, regardless of the many local forms and styles of mosque architecture, the placement of calligraphy scripts as mosque decoration remain consistent. Raja Haji Fisabilillah Mosque and Tun Abdul Aziz mosque (Figure 3) portray the subtle use of calligraphy inscription although in its

modernistic architectural style. The traditional Kufi scripts blend harmoniously with the contemporary-styled architecture of the mosques in an appropriate manner.



Figure 3: Signage position with different styles of Kufic script

Since masjid means place of prostration, the placements of decoration components at the interior and exterior of the mosques follow its meaning. This is in consonant with Spahic (2016), which emphasises the mosque decoration in the Muslim world should reflect the fundamental principles: 1) appropriateness and 2) purposefulness- serve for the spiritual goods. Even though the architecture of the mosque is shaped most strongly by the regional traditions of the place where it was built, the placement of decoration follows these fundamental principles. Likewise, Utaberta et al., (2012) in their study found that the manifestation of traditional ornamentation does play an important role not only in disseminating the symbolic meaning but also representing the history, beliefs and background of the local Malays.

In short, the selection of calligraphy inscriptions, the styles of scripts and their placements have no big difference between the mosques since they have the same objectives, that is to achieve the principles of appropriate and purposeful mosque decoration and space beautification. The findings show that the selection of calligraphy styles for each mosque remain consistent, but the varieties reflect on the use of religious phrases. Among the preferred ones are the inscriptions of Quranic verses, the prayer of supplication quotes, and 99 names of Allah. The finding of this research suggests a preliminary framework that regulates mosque decoration with Islamic calligraphy emphasising the decoration of the praying hall, especially at the *mihrab* (محراب) (praying niche) area and the *qiblah* (قبلة) wall as observed in most of the mosques.

CONCLUSION

The finding suggests that the Arabic calligraphy-inspired decoration found in the selected mosques were principally concentrated in certain areas, which includes the qiblah wall, mihrab, iwan and main entrance, doorways, walls of a prayer hall, domes, and front signage. The results suggest Thuluth script has gained popularity as an ornamental inscription for the mosque decoration as apparent in the selected mosques of Selangor and Kuala Lumpur, however it is not restricted to the cursive styles of calligraphy script. The angular script, namely Kufi, is prevalent in several mosques but not as extensive as the cursive script. Findings of this research offer a preliminary framework of the profiling that regulate mosque decoration with Islamic calligraphy. The profiling would assist in identifying categories of calligraphy scripts in mosque decoration. Also, this will aid comprehension among users, designers and authorities, and contributing to the sustainability of calligraphy as Islamic heritage. The versatility and qualities of the calligraphy afford further development in the embellishment of mosque architecture reflecting innovativeness in design yet in line with the local guidelines, regardless of the differences in architectural style. The presence of Islamic calligraphy in the religious spaces would affect the physical and spiritual wellbeing of the users as well as the places.

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TRAVELLERS' PERCEPTION OF WORSHIP FACILITIES FOR MULTIMODAL USERS OF MRT SBK LINE

**Nur Athifah A. Kadir¹, Muhammad Rijal Mohamad², Oladejo Aliu Olabayonle³,
Mohammad Zarif Mohd Zahari⁴, Syahriah Bachok⁵, Mariana Mohamed Osman⁶**

^{1,2,3,4,5,6} Kulliyah of Architecture and Environmental Design
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Abstract

The complete opening of the new Mass Rapid Transit System (MRT) Sungai Buloh - Kajang (SBK) of Klang Valley, Malaysia since July 2017 has been supported positively by transit researchers and public transport advocates alike. Multimodal public transport users make trips, usually involving transferring at interchanges. These interchanges are provided with several amenities facilitating each trip leg. This research recorded the perception of users of worship facilities provided at an interchanging node where several rails, bus, taxi, and other paratransit systems meet. This new rail system intersects with the other systems at Muzium Negara station. Using intercept off-board face to face questionnaire survey method, perception of the quality of worship facilities was captured between May and August 2019. Several explanatory variables such as socio-economic and trip characteristics were set against the perception to identify factors influencing the perception. Results of the correlational analysis showed that both socio-demographic and trip characteristics influenced perception to various statistical significance degrees. Findings suggested that worship facilities were most utilised by passengers of MRT who relatively lower income, engaged in the public, specifically educational sector. Usage of MRT for commuting within the Klang Valley on monthly basis. The improvements in ventilation systems, prayer hall size and design, floor cleanliness, lighting and mirror design as well as shoe rack/clean area design were most sought by these passengers. As such, these should be the focus of strategies to be promptly adopted by interchanging nodes building managers to increase the quality of worship places provision.

Keywords: Mass Rapid Transit, Travellers' Perception, Worship Facilities

¹ Master Student. Email: nurathifahkadir@yahoo.com

INTRODUCTION

Mass Rapid Transit (MRT) Sungai Buloh – Kajang (SBK) system's Kajang – Semantan section began commercial operation on 17th July 2017. Before this, Sungai Buloh- Semantan section has begun operating on 16 December in the previous year. It is aligned along 53 km route linking neighbourhoods around 31 stations in north-westerly and south-easterly directions. A four-car system, with a headway of 3.5 minutes (in peak hours) had been adopted with a capacity of 1,200 passengers. The system was estimated to carry 400,000 daily riders. Eight interchanging stations link this line to other rail systems in Klang Valley, Malaysia. One of these is Muzium Negara station where passengers may transfer to the other seven rail and various other public transport systems in the conurbation. The corresponding interchange station for Kelana Jaya Light Rail Transit system, KLIA Ekspres system, KLIA Transit system, two KTM Komuter systems, KTM Intercity system, KTM ETS system and Monorail station is KL Sentral station.

Figure 1 overleaf shows the integrated rail system in Klang Valley. The Figure also depicts how the distance between Muzium Negara and KL Sentral stations can be bridged by walking, hence the shared interchanging facilities for the multimodal users. A comprehensive system is expected with the completion of the second MRT system (SSP MRT) and the third light rail system (LRT3), facilitating many travellers in the region.

For multimodal travellers, some of the journeys made were cross-states, cross-region in nature, and sometimes internationally bound. Journeys can be long and exhausting, for example, those traversing borders of urban conurbations, regions, states and nations. Travel time of these trips can be long and a minimum of one transfer need to be performed. For these trip makers, amenities while interchanging can be very important to facilitate and accommodate the wide-ranging needs of passengers in transit.

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Figure 1: Klang Valley Integrated Public Transport Map
 Source: <https://www.klia2.info/rail/mrt-sbk/> (cited on 18 August 2020)

Specifically, those who are culturally or religiously inclined among these travellers would be obliged to perform spiritual activities including yoga, meditations and prayers. The performances would either be bound by physical space or time window or unique diet requirements or even distinctive physiological undertakings. As such, building managers of public transport interchanges or nodes or termini need to engage in quality assessment of their assets and facilities from time to time to ensure consistency and continuity of quality improvement.

Among the facilities provided is the worship place. This research singles out this facility due to the limited explanation of the factors affecting the perception of users on the quality of such provision (Ref). Besides, longer trips necessitate journeys to be broken into legs. For journey made beyond certain time windows, worshipping activities may need to be performed en-route the journeys. Malaysia is a multi-cultural, multi-religion nation, with tourism as one of the largest GDP contributors. Many of these tourists originated from other nations with similar multi-cultural, multi-religion population composition. To increase the attractiveness of public transport to existing and prospective users, an assessment on this narrowed and specialised section of interchanging nodes is essential.

The Conceptualisation of Facilitation of Muslim Travellers Conceptually, journeys made using public transportation can be less attractive than those of private vehicles. Various strategies have been mooted to increase the attractiveness of public transportation and ease those travelling on these modes. Long journeys, fatigue resulting from transfers and the lack of amenities are some of the challenges faced by users of public transportation.

Malaysia is highly ranked as a tourist destination, with nearly 30 million visitors travelling into the nation on annual basis. Having tourism is one of the major GDP contributors, the Malaysian government also advocated the facilitation of tourists at various tourism locations and journeys along with these destinations. Various efforts had been made to attract Muslim tourists from all around the world which has led to an increase of Muslim tourists' arrivals in the country. Malaysia has become a top halal-friendly Muslim destination worldwide (CRaHFT, 2014). Among those travellers are those coming from the regions where the Muslim population are the majority. These travellers are obliged to perform prayers as stipulated by the teaching of their religion. These prayers follow strict rules and prescriptions. **Table 1** below shows how Malaysia fared in the league of Muslim tourist destinations. a benchmark for other destinations to target Muslim tourists and/ or to market the destination as "Muslim friendly destination". The number of shariah-compliant transit area is growing in some destination. Muslim friendly transit area delivers Muslim guests with the availability of prayer facilities at tourist spots and public premises (transit area, R&R, shopping malls, theme parks, hotels).

Table 1: The top ten Holiday Destinations in OIC Category (*OIC: Organization of Islamic Cooperation)

Holiday Destination (OIC Countries)	Ranking
Malaysia	1
United Arab Emirates	2
Turkey	3
Indonesia	4
Saudi Arabia	5
Morocco	6
Jordon	7
Qatar	8
Tunisia	9
Egypt	10

Source: Crescentrating's Halal Friendly Travel (CRaHFT) Ranking 2014

Salman and Hasim (2012) found that only a very small number of Muslim tourists have an image of Malaysia as an Islamic country and an element of evaluation included satisfaction with worship facilities. A provision must make the user comfortable and convenient to perform prayer.

Conceptually too, several components of worship or prayer facilities have been propagated by the respective researcher of religious studies. For Muslims specifically, four of these components played major roles in quality setting of worship facilities. They are design, cleanliness, distance and capacity as well as latent aspects such as comfort, convenience, safety, security and timeliness. In Malaysia, most buildings were obliged to subscribe to the Guideline for Planning Mosque and Prayer facilities (Plan Malaysia, 2000). The general and specific guidelines covered rules and regulations on the placement of the mosque and the layout for space utilization. Similarly, four important criteria for transit area's prayer facilities were categorised as design, number and location, cleanliness and convenient (PlanMalaysia, 2000). The requirement of performing prayer five times a day is taking into consideration by providing Muslim tourists with prayer facilities and the Islamic call to prayer which are necessary for the development of Islamic oriented tourism standards and as the identified Islamic attributes of destination that may attract Muslim tourists.

RESEARCH BACKGROUND

Worship and Worship facility

Subscribing to the second pillar of Islamic beliefs (Islam-world.net, 2011), performance five times' act of prayer or 'Solat' which include before dawn (Subuh), noon (Zuhur), afternoon (Asar), after sunset (Maghrib), and evening (Isyak) respectively is obligatory. In Malaysia, the warrant for provision of places or facilities to perform these prayers is ruled for public buildings or buildings utilised for public use (Planning Guidelines for Worship and Prayer facilities, 2000). Mohsin and Mohammed (2011) found that users were highly attracted by the availability of mosques and this facility was rated as the most attractive pull travel motivations for the destination's attributes. Weidenfeld (2006) suggests that proximity to a mosque may influence Muslim tourists' preferences when making hotel reservations. Mohsin (2005) concluded that the selection of the Northern Territory of Australia as a holidaying tourism destination for Muslims was influenced by the availability of mosques. Syed (2001) also suggested that the availability of mosques at tourist destinations may increase satisfaction levels. The mosque itself may be considered a tourist attraction if it is unique and outstanding (Henderson, 2003). Mohsin and Ryan (1997) further recommend that ease of access to Islamic services are important upon exploring Malaysian and Indonesian business people's attitude towards the possibility of holidaying in Australia. It is also suggested that Middle Eastern countries take concrete steps to develop Islamic tourism internally by having prayer rooms at tourism sites (WTM, 2007).

The teaching of Islam advocates cleansing of oneself before going for prayers (including cleaning their private parts water from urine and stools, after answering the call of nature) (Quran At-Taubah: 108). To support the overflowing of worshippers during congregational prayers especially Friday prayers, most Masjid has provided sufficient large areas for ablution and toilets. It is understandable for architects to design Masjid' ablution area and toilets to be situated at ground level or one level under the prayer hall, and this is because to cater large usage capacity, space zoning and ease of cleaning purposes for the prayer hall (Guideline for Planning Mosque and Surau PlanMalaysia, 2000). According to the guideline, there are three fundamentals in preparing places of worship for Muslims namely placement of mosque and the layout for space utilization. The guideline on selecting a suitable site for prayer facilities at transit area focused on four important criteria which included the design, number and location, cleanliness and convenience. By law, building owners providing prayer room for building approval must fulfil requirements of placing an ablution area, adequate lighting, fans or air-conditioning, facilities for the disabled and segregation area for both men and women (NST, July 2013).

The Conceptualisation of Satisfaction and Perception

Perception of utility or disutility of a product or a service can be expressed as satisfaction level. Satisfaction is defined as the customers' post-purchase comparison between pre-purchase expectation and performance or experience received (Oliver, 1980; Zeithaml et al., 1990, Oliver 1999). The psychological state of pleasure or displeasure, feeling of well-being or disappointment when comparing and contrasting would also feed into such perception and satisfaction (Pizam and Ellis, 1999; Kotler, 2000; Kim et. al, 2003).

The satisfaction level is an essential yardstick for the assessment of quality services. For service industries including the tourism sector, satisfaction level reflects customers' experience and expectation which will lead to loyalty, repeat use, willingness to recommend and would influence other future behaviour (Young, 2000; Barsky and Nash, 2003; Chang and Chen, 1998; Oliver, 1999; Pullman and Gross, 2003). For businesses and firms including building and transit area managers, satisfaction levels are important due to the capability of image creation and revenue increment (Baker, 1987; Bitner, 1986; Boom and Bitner, 1982; Kotler, 1973; Shostack, 1977; Upah and Fulton, 1985; Zeithaml, Parasuraman and Berry, 1985). Hence, three important aspects to be emphasised when describing perception are customer satisfaction, expectation and experience.

Factors influencing satisfaction and perception have been researched by many. Gender has been proven to influence the perceived image (Chen & Kerstetter, 1999). Other socio-demographic factors such as age and marital status had a role in determining users' behaviour (Hwang, Kim and Hyun, 2013). Baloglu and McCleary (2000) supported the notion that age influenced the perceived image of a particular destination.

Hwang, Kim and Hyun (2013) proved the existence and extent of geographical origin and travel attributes' influence on satisfaction and perception. Views towards trip attributes can be heterogeneous among travellers. Likewise, tourists of different cultures (Mayo & Jarvis, 1981; Mill & Morrison, 1985) or different countries (Mill & Morrison, 1985; Calantone, Di Benedetto, Hakam, & Bojanic, 1989; and Chen & Kerstetter, 1999) may perceive the destinations differently.

Perception and satisfaction influenced the user's behaviour. Perception and satisfaction also played a role when a user assesses the quality of a destination (Heung & Quf, 2000; Etchner and Ritchie (1993). Research (Goodrich, 1977; Holloway, 1986; Shih, 1986; Van Raaij, 1986) emphasised that due to the imperfect information about a destination, users depended on media or social groups (Mok and Armstrong, 1996) to compensate for this lack to evaluate attributes related to the destination (Baker & Crompton, 2000; Kozak, 2002; Yoon & Uysal, 2005; Alegre & Garau, 2010).

Therefore, this paper attempts at explaining how prayer facilities assist in making the break(s) along a single journey comfortable and ease the passengers' search for obliged conducts of yoga or meditation or prayer in between their journeys. Furthermore, this paper also aims at explaining parameters influencing passengers' perception of the prayer facilities' quality that may enhance their overall experiences travelling as multimodal public transport users.

METHODOLOGY

Intercept off-board questionnaire survey method has been employed from May 2019 until August 2019. Prospective respondents were approached based on convenient sampling due to logistic issues and minimal disturbance to passengers' comfort level being conditioned by the building management's approval. Screening involves determining that the samples consisted of MRT users who made multimodal trips with travel time extending beyond the shortest prayer time of one hour (i.e. Subuh and Maghrib prayers have the narrowest time window). Some 200 users were approached but only 80 performed their prayers in the facilities provided at the interchanging station.

The questionnaire was divided into three sections. The first section captured socio-demographic characteristics, followed by travel and trip attributes. The final section dealt with the perception of prayer facilities provided. The assessment of satisfaction level was divided into four intervals (very satisfactory, satisfactory, dissatisfactory and very dissatisfactory).

The Design elements evaluated were the size of the prayer hall, floor marking for the congregation, ablution area, shoe rack/clean area, lighting and mirror. Space for praying, floor, ablution area, shoe rack, ventilation are elements to be assessed for their Cleanliness. Distance from toilet or ticketing counter/platform, between male and female areas, between ablution and praying areas, directional signage, congregational standing space were items related to qualities of Distance and Capacity. Other Latent components, for instance, safety, comfort, timeliness, sense of direction, manoeuvrability can be referred to as the levels of safety of belongings, timely announcement and display for the prayer time window, qiblah direction, fixtures and fittings as well as convenience for a person with disabilities (PWD) and universal design.

FINDINGS AND DISCUSSION

Female and male users surveyed were equally distributed (50% respectively). The majority (62.5%) of MRT passengers intercepted had an average monthly household income of below RM2000. Some 26.3% reported bringing home between RM2000 and RM3999. About 8.8% earned RM4000 to RM5999 on

average monthly as a household. The remaining 2.5% fall under the RM6000 and above income category.

More than 62% were employed in the public sector while 26.3% were in the private sector. About 8.8% were self-employed. The majority (52.5%) of users surveyed were either employed in the educational sector or students. Some 12.5% respectively were employed at executive or professional levels and in the sale or retail sector. About 8.8% were administrative or managerial employees and some 1.3% were housewives.

About one third (33.8%) users surveyed reached or departed from the station by rail, followed by a bus (31.3%). A quarter (25%) of the respondents used e-hailing and taxis as egress and access mode from and to the station. The remaining multimodal users reported the use of flight (6.3%) and pedal power (3.8%) to reach and leave the station.

The majority (73.8%) of users intercepted were short distance travellers. About 18.8% made local trips traversing the Klang Valley while some 6.3% were international travellers. The remainder were regional travellers from or to outer Klang Valley.

Correspondingly, 35% made commuting trips to and from workplaces, with some 18.8% attending their appointments or meetings and 2.5% made trips either to or from educational institutions. Some 43.8% were making trips for leisure, shopping or touristic purposes.

Some 35% of respondents were first time users of MRT SBK line. About one third (33.8%) made the trip on MRT on monthly basis, while one eighth (12.5%) made MRT trip on weekly basis. Some 11.3% used the MRT once in a year. Daily MRT commuters formed some 7.5% from the total passengers surveyed.

Users intercepted expressed their overall satisfaction with the four variables tested. The table 2 below depicts the distribution of satisfaction levels.

Table 2: The distribution of satisfaction levels

Users' overall perception of design, cleanliness, distance and latent qualities (n=80)

Assessment level	Overall design	Overall cleanliness	Overall distance	Overall latent aspects
Yes agreeable	92.5	88.7	71.3	82.5
Not agreeable	7.5	11.3	28.7	17.5
Total	100.0	100.0	100.0	100.0

From the above **Table 2**, it can be seen that high levels of overall satisfaction for each quality of prayer facility, with an overall agreement of 71.3%

and above. The highest agreement was with overall design (92.5%), followed by cleanliness (88.7%) and latent aspects (82.5%).

Meanwhile, the following set of Tables provide further details about the satisfaction level towards each item of the four main qualities of prayer facilities under assessment.

Table 3: Users' perception of prayer facilities quality (Design and Cleanliness) n=80

Assessment level	Design					Cleanliness				
	Prayer hall size	Floor marking for congregation	Ablution area placement	Shoe rack/clean zone	Lighting and mirror	Praying space	Floor	Ablution area	Shoe rack/clean zone	Ventilation system
Very dissatisfied	3.8	0.0	0.0	1.3	1.3	0.0	0.0	0.0	1.3	1.3
Dissatisfied	13.8	5.0	5.0	8.8	10.0	17.5	17.5	6.3	12.5	18.8
Satisfied	66.2	85.0	85.0	78.7	77.4	66.2	68.7	83.7	76.2	72.2
Very satisfied	16.2	10.0	10.0	11.2	11.3	16.3	13.8	10.0	10.0	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

From the above **Table 3**, an overall positive pattern of perception towards prayer facilities was captured for Design and Cleanliness components. High dissatisfactory (0%) was not found for items such as floor marking for congregational prayer (design), placement of ablution area (design), praying space (cleanliness), floor (cleanliness) and ablution area (cleanliness). Dissatisfaction was highest for ventilation system (cleanliness, 20.1%), prayer hall size (design, 17.6%), praying space (cleanliness, 17.5%), floor (cleanliness, 17.5%), shoe rack/clean zone (cleanliness, 13.8%), lighting and mirror (design, 11.3%) and shoe rack/clean zone (design, 10.1%).

High levels of satisfaction for items prayer hall size (design, 16.2%) and prayer space (cleanliness, 16.3%) were captured. Other items with high levels of satisfaction included floor (cleanliness, 13.8%), lighting and mirror (design, 11.3%) and shoe rack/clean zone design (11.2%).

The **Table 4** below shows an overall satisfactory perception of Distance and Latent components. From this Table, it can be assumed that high satisfaction levels for almost all items, with none (0% respectively) high dissatisfaction

recorded for the distance between ablution and prayer areas (distance) and qiblah direction (latent).

Dissatisfaction was captured by items by such as perceived distance as indicated by directional signage (43.8%), the distance between other interchanges facilities and the prayer hall (41.3%), standing distance available when praying in the congregation (30.1%), timely display and announcement of the start prayer time (30.1%), PWD and universal design comfort and convenience (27.6%) and distance between male and female sections within the prayer hall (21.3%).

Table 4: Users' perception of prayer facilities quality (Distance and Latent) n=80

Assessment level	Distance					Latent				
	To and from toilet/ticketing/platform	Between male and female sections	Between ablution and prayer areas	From directional signage	Between users (standing congregation)	Safety of belongings	Timely display and announcement of prayer time	Correct qiblah direction	Siting of fixtures fittings	PWD and universal design
Very dissatisfied	7.5	5.0	0.0	3.8	6.3	1.3	16.3	0.0	7.5	21.3
Dissatisfied	33.8	16.3	1.3	40.0	23.8	6.3	13.8	0.0	11.3	6.3
Satisfied	53.7	66.2	71.2	53.7	67.4	76.2	58.7	80.0	67.4	65.0
Very satisfied	5.0	12.5	27.5	2.5	2.5	16.2	11.2	20.0	13.8	7.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Inferential Analysis

The **Table 5** below highlights the results of correlational tests carried out on the parameters.

Table 5: Spearman correlation results

Independent variable	Dependent variable	p-value (significance)	Spearman-rho coefficient
Gender	Prayer hall size (design)	0.000**	0.456
	Ventilation (cleanliness)	0.057+	-0.214
	Prayer hall to transit facilities (distance)	0.000**	-0.624
	Male and female sections (distance)	0.007**	-0.301

	Ablution and prayer sections (distance)	0.006**	0.307
	Indicative directional signage (distance)	0.000**	-0.472
	Standing in congregation (distance)	0.006**	-0.307
	Distance (overall)	0.000**	0.414
	Safety of belongings (latent)	0.000**	0.396
	Qiblah direction (latent)	0.000**	0.438
	Latent (overall)	0.079+	0.197
Income	Floor marking for congregational line (design)	0.089+	-0.192
Employment type	Floor marking for congregational line (design)	0.027*	0.247
	Prayer hall to transit facilities (distance)	0.013*	0.277
	Male and female sections (distance)	0.025*	0.250
	Ablution and prayer sections (distance)	0.088+	-0.192
	Indicative directional signage (distance)	0.070+	0.204
	Distance (overall)	0.013*	-0.276
	Safety of belonging (latent)	0.063+	-0.209
Traveller type	Prayer hall to transit facilities (distance)	0.002**	0.338
	Ablution and prayer sections (distance)	0.000**	0.433
	Indicative directional signage (distance)	0.020*	0.259
	Distance (overall)	0.006**	-0.304
Trip frequency	Cleanliness (overall)	0.080+	-0.197
	Ablution and prayer sections (distance)	0.012*	-0.281
	Directional signage (distance)	0.003**	0.325
	Distance (overall)	0.099+	-0.186
Access/egress mode type	Male and female sections (distance)	0.015*	0.272
Trip purpose	Prayer hall size (design)	0.032*	-0.240

	Shoe rack/clean zone (design)	0.087+	-0.192
	Lighting and mirror (design)	0.056+	-0.214
	Qiblah direction (latent)	0.054+	-0.217

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

+ Correlation is significant at the 0.1 level (2-tailed).

From the above Table 5, it can be seen that gender has an impact on 11 out of the 24 items tested. It was anticipated being female perception can differ especially with regards to privacy, security, walking distance and cleanliness. This has been depicted by correlational significance (at various degrees of confidence) of prayer hall size, ventilation, distances to bridge from the facilities of the interchanges to the prayer hall, distances between facilities within the prayer hall, the safety of personal belongings, qiblah direction and the overall comfort and convenience.

Floor marking for congregational prayer was significantly influenced by income. Meanwhile, it can be established that perception regarding distances to bridge from the facilities of the interchanges to the prayer hall, distance between facilities within the prayer hall and safety of personal belongings was related to the employment type.

Trip characteristics such as traveller type, trip frequency, access and egress mode as well as a trip purpose were influential on various prayer facilities quality. The assessment showed a significant correlation (to a varying degree) between traveller types and perception towards distances between interchanges facilities and prayer hall as well as between facilities provided within the hall.

Frequency of travelling by MRT has an influence over perception regarding cleanliness as well as three items of distances to be covered on foot when journeys were broken for praying intention. The separation between male and female sections within the prayer hall was differently perceived by users accessing and egressing the station using different modes.

The trip purpose has an impact on items such as prayer hall size, designs of shoe rack/clean zone and lighting and mirrors placement as well as qiblah direction.

Site Observation and Analysis

A thorough site observation and study have been conducted during non-peak hour with minimal users of the *musolla* located at both Kuala Lumpur Sentral transit hub and Kuala Lumpur International Airport, Sepang. This is mainly because to seek the best preparation or quality of the facility that the users will get.

The observation was recorded through the pictures taken:

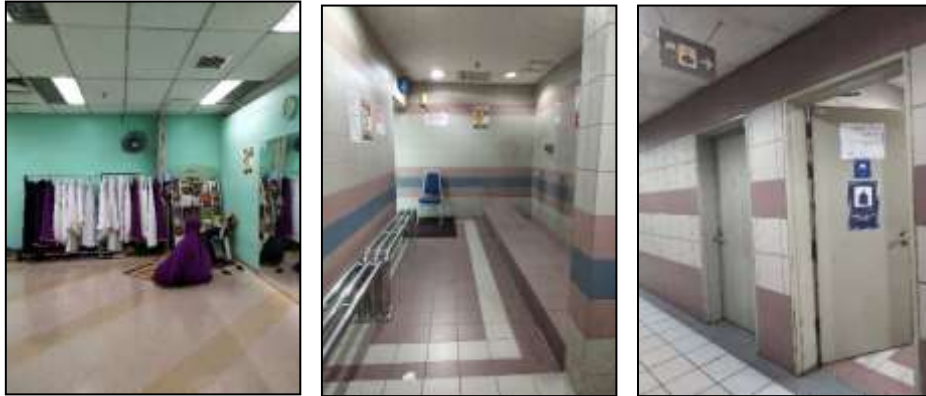


Figure 2: The worship facility, *musolla* of KL Sentral before peak hour.



Figure 3: The clean ablation area and neat worship hall of KLIA, Sepang.

Figure 2 and **Figure 3** both demonstrated that the place was regularly cleaned by staff in duty to maintain the hygiene and quality of the praying hall. Each facility is accommodated with good signage, directions and universal design.

RECOMMENDATION AND CONCLUSION

This paper is instrumental in extracting the factors influencing perception towards interchanges facilities, in particular the worship amenities for multimodal travellers using the MRT SBK system of Klang Valley. From the survey, the majority of passengers intercepted using the facility come from a relatively lower income group, working in the public sector or studying in various educational institutions, accessing and egressing Muzium Negara station using other rails, buses and taxis or e-hailing services. These multimodal users were short distance and local (Klang Valley) travellers whose travel time transgressed beyond a single prayer time window and for commuting purpose.

Generally, passengers intercepted were satisfied with the four components namely Design, Cleanliness, Distance and Latent qualities of prayer facilities. Gender, income and employment types were socio-demographic characteristics influencing the users' perception. Traveller types, trip frequency, access egress mode and trip purpose also important roles in perceiving the qualities of worship amenities provided by the public transport interchange building managers.

There are two ways to improve user satisfaction using the prayer facilities at transit area. The first is service improvement to enhance the user experience and the second is to efficiently provide support amenities such as cleanliness and comfortable prayer cloth, ablution area, prayer area and shoe area. However, the first approach is widely used in management and achieved great success. In the future, transit area needs adjustment like continuous improvement namely number, location and design of prayer facilities as well as manageable walking distances between facilities especially for the already physically fatigue users who had to transfer between various modes to reach their final destinations. Other latent items such as comfort, safety and convenience may add value to the quality of the facilities, thus decreasing the disutility associated with multimodal travel.

In conclusion, this paper has explained the relationships between the satisfaction of the facility provided at public transport interchange of a newly operational MRT system in Klang Valley and various socio-demographic characteristics and trip attributes. The issues of quality must be addressed by focusing on the items significantly correlated to the perception as having been discussed in this research.

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MASJID'S ADMINISTRATOR PERCEPTION ON CHILDREN AT MASJID IN MALAYSIA – SOCIAL AND PHYSICAL ASPECTS

Aniza Abu Bakar¹ & Zur Atiqah Zulkifely²

^{1,2}Kulliyah of Architecture and Environmental Design
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Abstract

Masjid is the symbol of the greatness of Islam. It is the focal point of the life of every muslim. As such, the administration of masjid acts as its backbone and plays a vital role in ensuring the purpose of the masjid is holistic and comprehensive in reaching the community, including the interest of children. Their needs must be fulfilled spiritually, physically, and socially. This study aims to identify the perceptions of the masjid's administrator on children at the masjid. Data were collected through a semi-structured interview. Nine representatives from nine masjids in the Peninsular Malaysia (7 in Kuala Lumpur, 1 in Selangor and 1 in Pahang) were interviewed. The NVivo software was used to analyse the in-depth interview data to explore and understand the issues and challenges of handling the masjid's community socially and physically when it comes to having children at the masjid, as well as initiatives taken by the masjid's administration in accommodating children at the masjid. The findings suggest that the masjid's administrators are optimistic towards the presence of children in the masjid but faced some challenges - physically and socially. Some of the masjids are in the process of realising the children-friendly masjid aspirations. They provide spaces and activities/programmes for children in the masjid. The perception of masjid's administrator is important to be understood as these are the people responsible in managing and engaging the people with masjid.

Keywords: children-friendly masjid, masjid's administrator, semi-structured interview

¹ Assistant Professor at International Islamic University Malaysia. Email: aaniza@iiium.edu.my

INTRODUCTION

Masjid has been representing the greatness of Islam since the era of the Prophet Muhammad (saw). Islam is manifested to be a complete code of practice, and masjid plays a vital role to signify it (Imam, 2000). The role of the masjid is diverse as demonstrated by the Prophet Muhammad (saw) since his (saw) migration from Makkah to the city of Medina (Movahed, 2014). According to Omer (2010), the *Al-Masjid An-Nabawiy* was the nucleus in various affairs of the expanding muslim community in Madinah, and this has been the epitome of muslim and Islam. The masjid seemed to be accommodative of every beneficial activity concerning worship, education, politics, economy, and social relations which enabled the society to move forward. Therefore, the way the Prophet Muhammad (saw) administered masjid is the most excellent example of how a masjid should be in accommodating various walks of life.

Masjids nowadays are often affiliated with adults while children rather seem to be left behind in certain aspects. Some masjid may seem to be “exclusive” for adults that children and families with young children may appear to shy away. In December 2019, a ten-year-old boy sent a letter to a masjid's administrator, and it went viral (Abdul Lajis, 2019). He inquired the authority to explain the ruling of children to be in the same *saf* (prayer row) with the adult. This is because he was instructed by other *jamaah* to move from the first row of the *saf* simply because he was a child. This is an example of how children tend to be treated in a masjid. This might have happened because of lack of understanding on the rulings of children's *saf*. This incident attracted the attention of the *Mufti* (a Muslim legal expert who is empowered to give rulings on religious matters) of Wilayah Persekutuan and the Minister of Islamic Affairs to respond on the incident. The Mufti himself wrote a lengthy explanation on this issue and its rulings in Islam in his official website (Mohamad Al-Bakri, 2016). At the same time, the Minister advised for every masjid to set up a special committee to treat children with a prudent approach while they are at the masjid (Wan Salleh, 2019). Therefore, masjid's administrator must play the role as a mediator in delivering such ruling to its *jamaah* so that the practice is in line with Islamic teaching.

Some parents have been sharing on social media and blogs on the downside experiences of theirs and their children at masjid (Shameem, 2012; Ghafar, 2018 and Azmi, 2019). Hence, the feeling of unwelcome at certain masjids seems to exist among children and their families. These are among the challenges faced by the masjid's administrator in balancing their judgement, and treatment in order to accommodate the *jamaah* including children.

Thus, this study aims to explore and understand the issues and challenges of handling the masjid's community socially and physically when it comes to having children at the masjid, as well as initiatives taken by the masjid's administration in accommodating children at the masjid. Understanding and identifying the root

of the issues may help towards improving the situation in the future so that masjid can be the place for all.

LITERATURE REVIEW

Masjid plays a vital role in the muslim community as Islam is a complete code of practice (Imam, 2000). As a centre of spiritual contents, masjid's functions seem to be expanded as a platform of communication to develop solidarity among the muslim communities. The main role of masjid in facilitating congregational prayer has grown to many other activities in favours of the daily life of the muslim community such as educational activities, marriage activities, recreational activities and many more. Hence, the changes of time and expanded functions of masjid make the role of masjid's administration increasingly challenging with the number of masjids is increasing (Mustari & Jasmi, 2008).

Masjid administration in Malaysia

Masjid in Malaysia is governed by the State Islamic Religious Department (Jabatan Agama Islam Negeri-JAIN) of every state under the division of masjid's management (Bahagian Pengurusan Masjid-BPM). Generally, this division functions as the coordinator by providing guidelines, advice, and sustaining the management of masjid. The overview of the functions of the BPM is outlined in Table 1 by taking the examples from the Jabatan Agama Islam Wilayah Persekutuan (JAWI), Jabatan Agama Islam Selangor (JAIS), and Jabatan Agama Islam Pahang (JAIP) as these three states are included in the study.

Table 1: The example of the functions of BPM

JAWI (source: http://www.jawi.gov.my/index.php/my/bahagian-jawi-3/pengurusan-masjid)	JAIS (source: https://www.jais.gov.my/v2/page.php?s=pengurusan-masjid)	JAIP (source: http://jaip.pahang.gov.my/index.php/bahagian/pengurusan-masjid-surau)
Creating an effective organizational structure in the administration of masjids and surau	Making the masjid as a safe zone, free political involvement, conducive, and congregational friendly.	Managing matters related to administration and management
Building a society that respects, appreciates, and loves masjids and surau	Improving the quality and professionalism of masjid management is always effective, efficient, dynamic and productive.	Supervising matters related to the upgrading of masjids and surau
Producing trained and informative officers and staff	Strengthen and update methods, rules, guidelines and procedures as the main reference of masjid management.	Monitoring the administration of the masjids and surau
Improving the level of cleanliness of masjids and surau	Enhancing the charm of the masjid through the organization of programs that are contemporary, holistic, and interactive.	Coordinating the programs and activities for masjids and surau

In the structural organisation of a masjid, there are a group of religious officers appointed by the religious department and also a group of committee members among the people residing within the area. The latter is also endorsed by the religious department. Altogether there are between ten to fifteen committee members. They work together in planning, managing, and organizing all the activities of the masjid. The State Islamic Religious Department provided them with allowance (Mazlan, Che Ani & Mohd Sarman, 2018).

METHODOLOGY OF RESEARCH

In order to identify the perception of masjid administrators on children in the masjid, in-depth interview with prepared semi-structured questions is applied.

A semi-structured interview is a protocol with inquiries and follow-up questions. The researcher becomes a listener in the interview process and acts to reduce any researcher bias. According to Yin (2014), for a semi-structured interview predetermined questions is set towards certain degree to ensure the researcher covers all related questions. The nature of the interview conducted is more to a talk based. The recorded audio during the interview results in a verbatim transcript.

In getting the opinions of the administrator of the masjid, a semi-structured interview was conducted in the Malay language with the administration representative of nine selected masjids namely:

- i. Masjid Al Akram (AA), Kg. Datuk Keramat, Kuala Lumpur
- ii. Masjid Ar Rahimah (AR), Kg. Pandan, Kuala Lumpur
- iii. Masjid Jamek Kampung Baru (KGB), Jalan Raja Alang, Kuala Lumpur
- iv. Masjid Abu Ubaidah al-Jarrah (AUJ), Taman Sri Rampai, Kuala Lumpur
- v. Masjid Imam Al Ghazali (IAG), Bandar Menjalara, Kepong, Kuala Lumpur
- vi. Masjid Muadz bin Jabal (MMBJ), Taman Setiawangsa, Kuala Lumpur
- vii. Masjid Saidina Abu Bakar As-Siddiq, Bangsar (SAB), Kuala Lumpur
- viii. Masjid al Khairiyah, Taman Sri Gombak (AK), Batu Caves, Selangor
- ix. Masjid Taman Temerloh Jaya (TTJ), Temerloh, Pahang

Initially, only eight masjids were planned for the study. However, the Masjid Taman Temerloh Jaya came into the picture as it became famous due to a high number of congregational *jamaah* especially during the fajr prayer, which includes children. Thus, it is deemed appropriate that this masjid is included in the study to identify their approach that leads to their success story in enlivening the masjid.

A set of major open-ended questions are prepared covering on topics such as noise by children, facilities, the behaviour of children and other *jamaah*, awareness in the importance of children going to the masjid, children's safety, and the roles of the masjid management concerning children at the masjid. These

topics are based on the findings from the literature review conducted. Respondents are encouraged to communicate their underlying attitudes, values, and beliefs to obtain a more detailed and rich understanding of children at the masjid. Through the nature of an in-depth interview, respondents are allowed to communicate more freely and to provide more detailed descriptions. Further questions are asked based on the response and development throughout the interview. The data from the interview can be regarded as qualitative. Hence, the NVivo software is used as the tool to analyse the data. The interviews were recorded using Sony IC Recorder (ICD-PX440)- refer figure 1. Later, the interviews were transcribed using <https://otranscribe.com/>.



Figure 1: Sony IC Recorder

Data Analysis

In order to analyse the qualitative data, the NVivo 12 software is used. It helps to organise, retrieve, and present data effectively and more systematically.

Analysis strategy

According to Gulati (2009), deductive analysis is an analysis from specific terms or themes to create some general ideas. Codes or themes are usually prepared in advance, and data collected will be sorted to the particular codes. Since the nature of the semi-structured is with predetermined questions, the deductive analysis approach can be applied. Figure 2 shows the summary of deductive analysis process involved in the study.

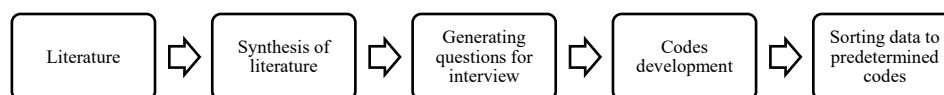


Figure 2: Deductive analysis process

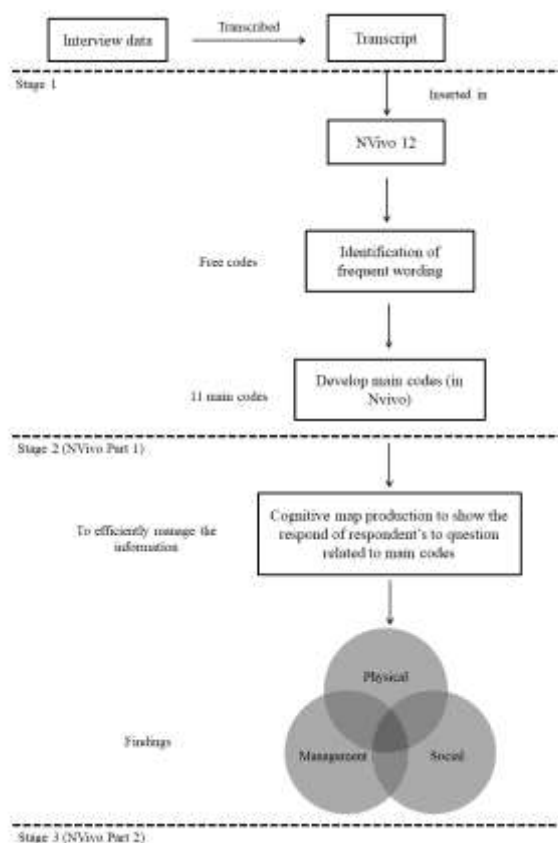


Figure 3: Flow of analysis

Figure 3 demonstrates the flow of analysis. In stage 1, the interview transcripts were inserted in the NVivo 12. These were later listed as free codes before the related child codes (sub-nodes) were clustered to the main codes (main themes) in stage 2. Stage 3 involves the result of the analysis is then presented using cognitive mapping and diagram that served to identify the perceptions of masjid's administrator on children-friendly masjid.

Figure 4 is an example of the coding development used in the analysis process. The analysis of the content was done by filtering the transcript and to capture only significant statements (code) that represent the idea or information derived from the early literature review done (deductively).



Figure 4: Summary of codes development

Accordingly, the detail analysis method shown only for the main codes. There are **11 main codes** identified in the study which are:

1. Activities for children at masjid
2. Noise
3. Facility
4. Children's attendance
5. Awareness
6. Safety
7. Children friendly masjid
8. Masjid's development
9. Ramadhan
10. Islamic school (KAFA/SRA)
11. Behaviour (children, parents and other *jamaah*)

Figure 5 shows part of the analysing process for the code: Noise, and further developed under child code: Complaint of *Jamaah*.

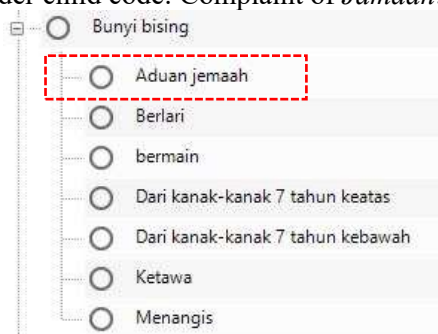


Figure 5: Sub codes (child codes) for Main code: Noise

Framework matrix is created to help the data to be summarised concisely. Table 2 shows part of the detail responds of each respondent under sub-code: Complaint of *jamaah*.

Table 2: Example of framework-matrix for child code: Complaint from *jamaah*

	A : Aduan jemaah
1 : AJK ABU UBAIDAH AL JARRAH	Setakat ini pihak masjid tidak pernah mendapat aduan ataupun rungutan secara terang-terangan yang mana jemaah mengadu kanak-kanak berlari contohnya waktu solat.
2 : AJK AL KHAIRIYYAH	Komen-komen dan aduan daripada jemaah yang tidak berapa setuju dengan kanak-kanak yang berlari-lari, bisung dimasjid. Memang itulah antara masalah yang kita belum boleh selesaikanlah setakat ini.
3 : AJK AL-AKRAM	Ada
4 : AJK AR RAHIMAH	Tiada aduan mungkin kesan daripada ibubapa yang menjaga dan mengawasi anak mereka dimasjid ini
5 : AJK IMAM AL GHAZALI	Sudah lima tahun saya menjadi ahli jawatankuasa dan tidak pernah lagi menerima aduan daripada jemaah berkaitan kanak-kanak bisung

The framework matrix helps to outline each respondent’s perceptions to be further compared and contrasted. Table 2 shows that some respondents provide specific details of the *jamaah*’s complaint. This can assist in concluding the category or pattern of complaint received by the masjid’s administrator. These processes involved in stage 2 of the analysis.

Cognitive mapping

According to Eden and Ackerman (1998), cognitive mapping is used as a method to structure disorganised or complex data as well as to structure ideas and relationship identifying. The detail analysis process of the interview data using the NVivo 12 resulted in the cognitive mapping structure. The structure is based on each code identified from this study. Figure 5 shows the example of cognitive mapping under the main code: Noise (*bunyi bisung*).

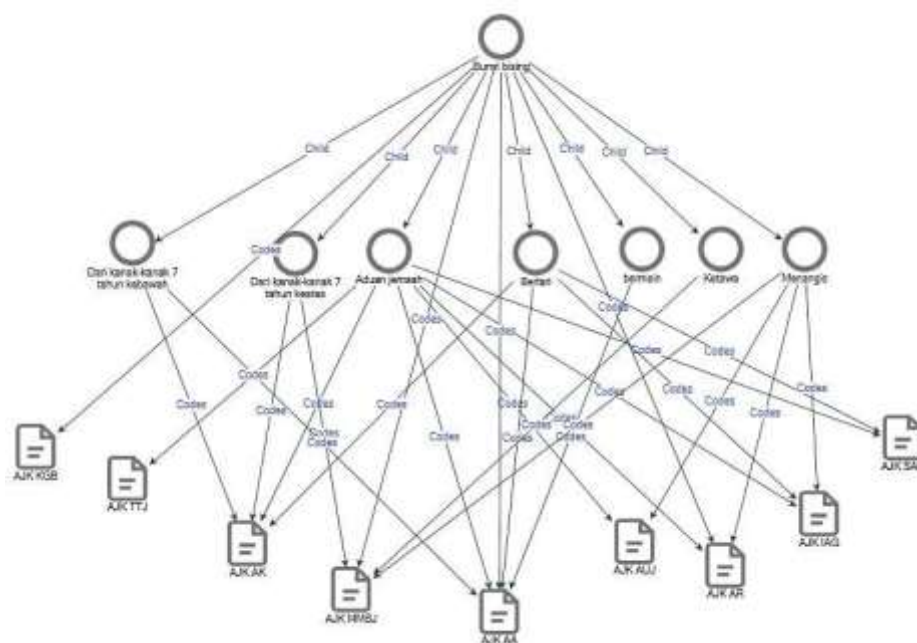


Figure 6: Cognitive map of main code: Noise
 Note: altogether there are eleven cognitive maps

Figure 6 gives an overview of how each respondent responds to questions related to noise. It can be seen that some respondent's further explanation leads towards more specific types/source of the noise. As for this study, the particular noise is from activities such as running, playing, laughing, and crying. Some respondents even provided detail on children category of age who created the noise in the masjid. The majority of the respondents also mentioned about the complaint on noise by the *jamaah*.

FINDINGS

Based on the eleven cognitive maps generated from the interview analysis, the results are summarised. It leads towards identifying the administrator's perceptions of children at the masjid.

Based on the analysis, it is found that the development of the code can be categorized into three themes, which are physical attributes, management of masjid, and social elements. This categorisation resulted from the analysis in NVivo 12 based on the main codes and the child codes. These codes can be associated with one, two, or three themes. Figure 7 shows the result of the overlaying codes with the themes categories.

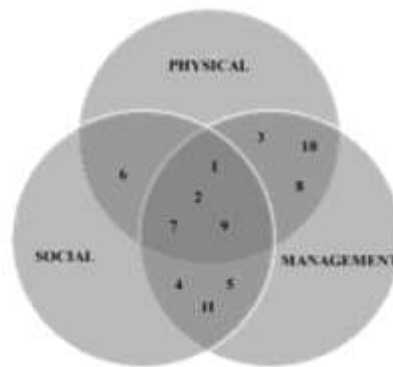


Figure 7: Summary of the 11 main codes categorization

From figure 7, it can be seen that code 1, 2, 7 and 9 are related to all the themes while code 4, 5 and 11 falls under the theme of social and management. Codes related to physical and management are 3, 8 and 10 while code 6 categorised under theme physical and social. None of the codes are found to be under ONLY one theme.

CONCLUSION AND RECOMMENDATION

In conclusion, the primary concern and challenges faced by the masjid's administrator regarding children at masjid can be categorised into three themes or areas which are the physical aspect of the masjid, management of the masjid, and social aspect. These three themes are somehow related to a certain extent, which requires careful considerations in addressing the identified issues on children at the masjid. The findings indicate that in addressing the said issues, a holistic approach must be applied. For instance, code 2 (noise) must be looked from the effectiveness of the management in handling situations whereby specific physical space for children may help them to have social interactions among them and also with other *jamaah* in a more conducive environment. The findings also can be used to guide the management of masjid towards planning and administering the masjid physically and socially.

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RISK FACTORS TOWARDS PUBLIC-PRIVATE PARTNERSHIPS (PPP) PROJECTS IMPLEMENTING BUILDING INFORMATION MODELLING (BIM) IN THE UNITED KINGDOM (UK): A LESSON LEARNT FOR MALAYSIA

Siti Nora Haryati Abdullah Habib¹, Syuhaida Ismail², Sharifah Mazlina Syed Khuzzan³

^{1,3}Kulliyyah of Architecture and Environmental Design
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

²Razak Faculty of Technology and Informatics
UNIVERSITI TEKNOLOGI MALAYSIA

Abstract

Public Private Partnership (PPP) projects involve stakeholders engaged in various contract structures in a lengthy contract duration. Such situations expose the projects to risks related to collaborative working and information integration. Building Information Modelling (BIM) is seen as a mechanism to improve the collaboration and integration in the PPP projects. However, BIM also exposes its users to additional risk when the barriers in sharing information are reduced. Therefore, the aim of this paper is to investigate the BIM risk factors that have significant impact towards PPP projects implementing BIM. Since the United Kingdom (UK) is considered advanced in practising PPP and BIM, this study investigates the UK industry players' views on what they considered as significant BIM factors in PPP projects. Consequently, the study has identified six (6) most significant BIM risk factors through questionnaire and experts' interviews. The findings provide a lesson learnt for Malaysia to consider the BIM risks in implementing BIM in PPP projects.

Keywords: Building Information Modelling, Public Private Partnership, Risk Factors, Construction Procurement

¹ Assistant Professor at International Islamic University Malaysia. Email: ctnora@iium.edu.my

INTRODUCTION

Public Private Partnership (PPP) is a strategic approach for a government to provide public infrastructure and services to the public users by using private sector resources and expertise. PPP is either it uses private finance to reduce the financial burden of the government, or both the public and private entities sharing the financial investment in the PPP project with the aim to deliver better products or services to the users, thus providing more value for money (Hodge and Greve, 2007; Khanom, 2010). The concept of PPP was introduced in the United Kingdom (UK) since 1970s (Gamble, 1988) however in Malaysia, PPP scheme started since 1980s through privatisation followed by Private Finance Initiative (PFI) in later years (Abdul Rashid, 2007). Through PPP, Malaysia has able to procure projects such as Teaching Hospital for IIUM Kuantan, Second Penang Bridge, West-Coast Highway and Damansara-Ulu Kelang Expressway (DUKE). In addition, 24 government projects worth RM5.2 billion under Budget 2019 are to be procured via PPP whilst another RM50 million allocated in Budget 2020 to stimulate PPP in the construction industry (BNM, 2019a, 2019b).

Even though PPP is a great alternative for the government to benefit public users, the facts that PPP normally entails with lengthy contract duration involving a myriad of parties and affecting the interest of public users have exposed PPP to many risks (Li, Akintoye, Edwards, and Hardcastle, 2005; Ismail & Harris, 2014). The emergence of Building Information Modelling (BIM) in the construction industry is an immense phenomenon that can potentially assist the industry players to mitigate risks in PPP projects (Lehtinen, 2012; Ganah & John, 2013; Ren & Li, 2017). BIM has the capability in facilitating information sharing and data integration in three-dimensional (3D) data-rich digital platform while offering for a more collaborative and integrative working environment that well-suites to the nature of PPP. Notwithstanding such potentials, the risks associated with BIM are also myriad and inevitable. Thus, based on the UK's experience which considered among the pioneers and advanced in implementing PPP and BIM, the present study is conducted to investigate the significant BIM risk factors that can potentially impact PPP projects. The outcome of the study is considered relevant as a lesson for Malaysia in taking measures to ensure the success of PPP projects implementing BIM.

RESEARCH BACKGROUND

For almost thirty years, Private Finance Initiative (PFI) has become the most Public Private Partnership (PPP) variant that being used in the United Kingdom (UK), which is later in 2012 has been reformed to Private Finance 2 (PF2) to make it 'less private' as alternative to the original PFI. Despite the evolution, both PFI and PF2 remain as a collaborative contracting method for the public and private entities to work together in delivering public infrastructure and services.

The characteristics of PPP include ‘bundling’ contract, which is the combination of the design, construction, finance, operation and maintenance of the facility contracted out to a private consortium. It involves complex contractual structures, myriad of parties with different roles and interest that need to sustain for 20 to 40 years contract duration (Eaton & Akbiyikli, 2009; Athias & Saussier, 2010). Figure 1 shows the typical contractual structures in PPP projects.

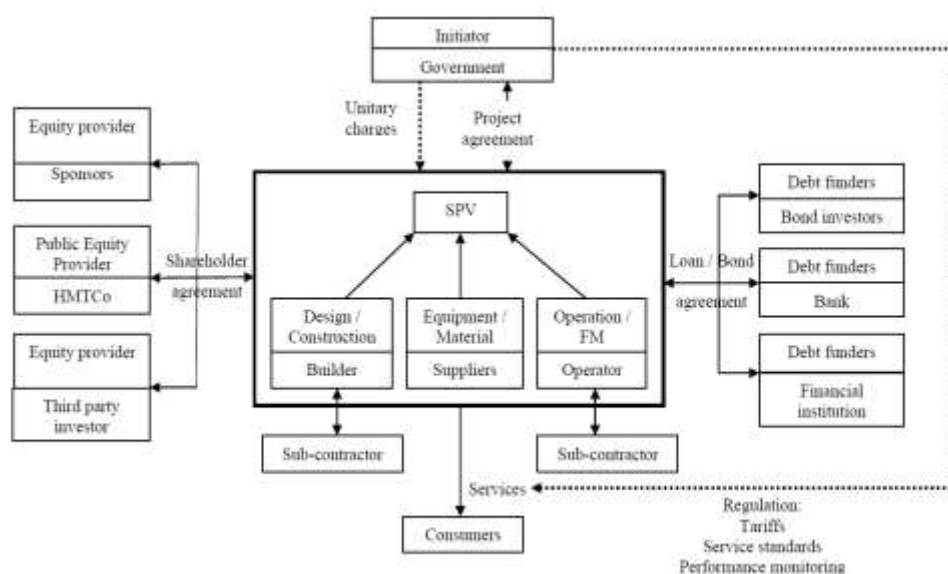


Figure 1: Typical contractual structures in PPP project
 Source: Sundaraj (2012)

The complexity of PPP structures leading to the exposure of risks mostly related to the collaborative arrangement, unpredictable future changes and demands; and the expectations on the ability to deliver the project and services with value for money. Therefore, procuring public infrastructure and services via PPP is not always successful (Soomro & Zhang, 2015). Despite the fame of PPP, critics and issues surrounding PPP also being voiced, mostly regarding the real fact of value of money which PPP is supposed to offer (Pollock et al., 2007; Shaoul, 2009); public accountability issue related to public expenditure and changes in risk allocations (Price & Pollock, 2008; Asenova & Beck, 2009); and profiteering by the shareholders (Chinyio & Gamesan, 2009).

Therefore, some scholars encourage the use of BIM in PPP projects to mitigate the risks (Laishram, 2013; Quinn, 2014; Ren & Li, 2017). BIM is defined as “a modelling technology and associated set of processes to produce, communicate, analyse and use of digital information models throughout construction project life-

cycle” (CIDB, 2016, p.3). Even though it is not expected to completely overcome the uncertainty and complexity of the PPP projects, BIM may encourage the parties to closely collaborate and integrate as well as facilitate possible changes that might happen during the course of the project life span. Impact on future costs and other possible constraints can also be projected which can improve the financial viability. Furthermore, BIM can potentially aid in forecasting and appraising value for money, hence excessive profiteering by the shareholders can be avoided.

St Helens and Knowsley Hospital Project delivered three months ahead of the original schedule is one example of a PFI-BIM project that confirmed the benefits of BIM in PPP projects. Although the adjacent hospitals’ buildings need to stay operational throughout the construction period, coordination through BIM enabled off-site construction to be carried out with waste reduction, 60–70% time savings to find documents and 75–80% savings in design coordination (BuildingSMART, 2010). Another PFI-BIM project, £1 billion Barts and Royal London Hospitals Project, also experienced 10% cost reduction via design coordination, construction monitoring and planning (Harty, Throssell, Jeffrey & Stagg, 2010). Notwithstanding such potentials, the risks associated with BIM is inevitable, where 24 risk factors were identified as presented in Table 1.

Table 1: BIM risk factors

Risk Level	Risk Subgroup	Risk Factors	Authors						
			A	B	C	D	E	F	
Macro	Social	Resistance to change					✓		
		Lack of available skilled personnel			✓		✓		
	Legal	Existing legal system poorly equipped to regulate multiparty, collaborative relationship		✓					
Meso	Political	Change of BIM policies	✓						
	Technological	Lack of BIM standards and guidelines			✓		✓		
		Contractual	Liability issues	✓				✓	✓
			Ownership of information / model	✓			✓	✓	
			Status of BIM model	✓				✓	
			Unclear position, duty, responsibility, and liability of Information Manager	✓			✓	✓	✓
			Lack of guidelines for contractual agreements	✓				✓	
			Intellectual property rights						✓
			Unclear allocation of risks				✓	✓	
			Privity of contract and third-party reliance				✓	✓	✓
			Integrity of BIM model				✓	✓	
			Data security					✓	✓
Financial			High initial cost to implement	✓		✓		✓	
Process			Time consuming to be proficient	✓				✓	
			Increase short-term workload			✓			
Micro	Process	Lack of collaborative work processes					✓		
		Inadequate top management commitment			✓				
		Technical	Defective integration between software tools/	✓		✓		✓	
			Interoperability not guaranteed	✓	✓			✓	
			Errors in the model	✓	✓			✓	
			Little knowledge and experience	✓		✓			
		Model management difficulties	✓		✓				

References:

A = Talebi (2014)	D = Simonian and Korman (2010)
B = Ness (2011)	E = Azhar et al. (2012)
C = Chien, Wu, and Huang (2014)	F = Boyes (2014)

RESEARCH METHODOLOGY

Survey research with structured questionnaire and semi-structured validation were carried out to investigate the BIM risks factors that have significant impact on PPP projects based on “significance” 5-Likert scale. Due to the absence of database on the number PPP projects implementing BIM in the UK, convenient sampling of organisations and persons involved in PPP and BIM projects and research was employed, where 700 questionnaires were distributed to 128 organisations and 60 academicians. A total of 88 valid questionnaires were used representing 12.57% response rate. The low response rate is anticipated as BIM is considered new in the construction industry. This is also due to some of the companies have a policy of prohibiting participation in any surveys or questionnaires received from external sources. The respondents were divided in three categories as shown in Table 2.

Table 2: The categories of the respondents

Categories of the Respondents	Frequency	Percentage
Involve in PPP projects only	10	11.4
Involve in PPP and BIM projects	44	51.1
Involve in BIM projects only	34	37.5
Total	88	100.0

The data collected were analysed using the Statistical Package for Social Sciences (SPSS) V23 to calculate the mean score and mean score ranking to obtain the relative significance of each factor for PPP projects implementing BIM. The differences in the opinion among the three groups of respondents were then investigated via Kruskal-Wallis H test and subsequently followed by Mann-Whitney U test for pairwise testing.

RESEARCH FINDINGS AND DISCUSSION

Demographic data of the respondents

Despite the low response rate, the number was considered appropriate for the study since 70% of the questionnaires were answered by a very experienced and knowledgeable group with more than 10 years of experience in the construction industry. Figure 2 presents the demographic data of the respondents.

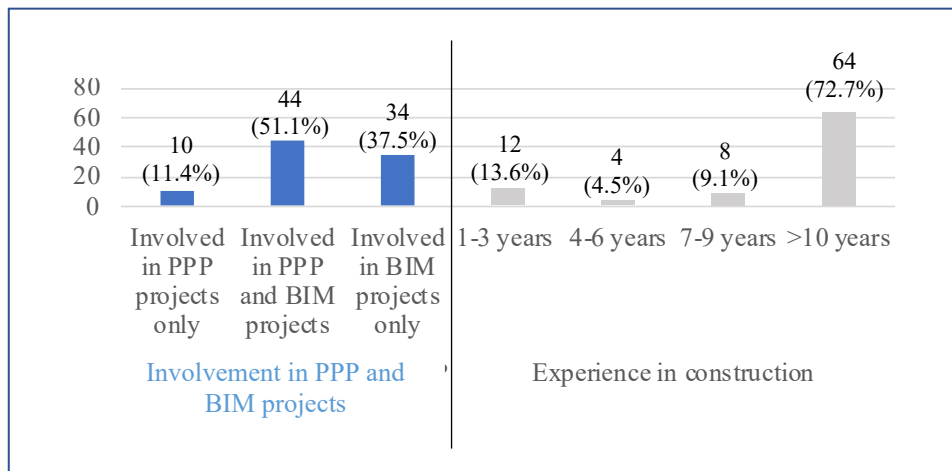


Figure 2: Demographic data of the respondents

Results and Discussion

Table 3 shows the mean ranking based on the opinions of the respondents on the significance of BIM risk factors on PPP projects. Risk factors with mean values over 4.00 are regarded as the most significant risk factors and in this case, there are two most significant risk factors, which are “*lack of available skilled personnel*” and “*resistance to change*”. On the other hand, risk factors which scored mean values of less than 3.50 are considered as moderate risk factors. Subsequently, the data were analysed using Kruskal-Wallis H test to evaluate the differences of opinions among the three categories of respondents. The categories were coded with 1, 2 and 3 respectively.

Table 3: Respondents' opinions on the significance of BIM risk factors on PPP projects

No	BIM risk factors	PPP projects only		PPP + BIM projects		BIM projects only		Overall	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
1	Lack of available skilled personnel	4.20	2	4.20	1	4.18	2	4.20	1
2	Resistance to change								
3	Little knowledge and experience	3.60	4	4.11	2	4.30	1	4.13	2
4	Lack of collaborative work processes	3.50	9	4.02	4	4.00	8	3.95	3
5	Integrity of BIM model	4.40	1	3.89	7	3.88	11	3.94	4
6	Defective integration between software tools	3.80	3	3.91	6	4.03	6	3.94	5
7	Inadequate top management commitment	3.00	18	4.02	3	3.88	12	3.85	6
8	Ownership of BIM model	3.40	11	4.02	5	3.76	18	3.85	7
9	High initial cost to implement								
10	Lack of BIM standards and guidelines	3.00	19	3.70	10	4.06	4	3.76	8
11	Liability issues	3.20	14	3.73	9	3.91	9	3.74	9
12	Data security	3.60	6	3.52	17	4.00	7	3.71	10
13	Existing legal system not equipped support BIM	2.60	24	3.57	12	4.18	3	3.69	11
14	Lack of guidelines for contractual agreement	3.40	10	3.57	14	3.88	10	3.67	12
15	Model management difficulties	3.60	5	3.55	15	3.79	16	3.64	13
16	Time consuming to be proficient	3.40	12	3.55	16	3.85	14	3.64	14
17	Status of BIM model	3.00	17	3.73	8	3.67	19	3.62	15
18	Unclear position, duty, responsibility and liability of Information Management	3.20	15	3.34	20	4.00	5	3.60	16
19	Unclear allocation of risks	3.60	8	3.36	19	3.85	13	3.57	17
20	Errors in the model	2.80	23	3.59	11	3.67	21	3.53	18
21	Increase short term work-load								
22	Change of BIM policies								
23	Priority of contract and party reliance	3.00	21	3.57	13	3.52	23	3.48	19
24	Intellectual property rights	3.60	7	3.50	18	3.42	24	3.48	20
		3.20	13	3.20	21	3.82	15	3.44	21
		3.00	16	3.18	22	3.79	17	3.39	22
		2.80	22	3.16	23	3.55	22	3.26	23
		3.00	20	3.00	24	3.67	20	3.25	24

As seen in Table 4, Kruskal-Wallis H test revealed that six risk factors showed significant values of less than 0.05. The low significance values indicate that the opinions of the three groups of respondents regarding the significance of BIM risks towards PPP projects vary significantly. The data were then underwent Mann-Whitney U test in order to test pairwise differences of opinions among the three groups. The values which are statistically significant are marked in bold;

(Asymptotic Significance is less than 0.015. This provides that the opinions between the groups of respondents when being compared vary significantly.

Table 4: Difference of opinion of the respondents on the significance of the BIM risk factors on PPP projects

Risks factors	Kruskal-Wallis H	Mann-Whitney U (at sig. 0.015)		
		Respondents' category		
	Sig.	1&2	1&3	2&3
Defective integration between software tools	0.037	0.011	0.037	0.511
Liability issues	0.000	0.053	0.001	0.001
Time consuming to be proficient	0.004	0.962	0.002	0.001
Increase short term work-load	0.029	0.560	0.218	0.008
Change of BIM policies	0.005	0.849	0.046	0.002
Intellectual property rights issue	0.014	0.782	0.601	0.002

Based on the responses received from the survey, eighteen (18) BIM risk factors considered to have significant impact to PPP projects were identified (overall mean score above 3.50). Since respondents' opinions vary significantly, validation with six industry experts was undertaken as shown in Table 4.

Table 4: Experts' background

Experts	Designation	Work background	Years of experience	Experience in PPP projects	Experience in BIM projects
IV-1	Director	Construction Lawyer	21 years	12 years as legal advisor	5 years in research on BIM
IV-2	Chief Executive; Professor	Construction Lawyer; Academician	26 years	25 years as legal advisor	6 years in research on BIM
IV-3	Director	Construction Lawyer	30 years	15 years as legal advisor	4 years as legal advisor
IV-4	Senior Lecturer	Construction Lawyer; Academician	11 years	2 years as legal advisor	5 years in research on BIM
IV-5	SPV and Investment Manager	Quantity Surveyor, Project Manager	22 years	15 years	5 years use BIM in design and data
IV-6	Quantity Surveyor	Quantity Surveyor, Developer	17 years	17 years	7 years

Two of the BIM risks factors, which are '*lack of available skilled personnel*' and '*resistance to change*' are social-related risk due to unfamiliarity with the new norms of working with collaborative and integrative BIM (Arayici, Egbu, & Coates, 2012; Lindblad & Vass, 2015). These are also the reasons of technical competency-related risks which are '*little knowledge and experience*'; and '*model management difficulties*', listed as significant BIM risks to PPP projects. Khosrowshahi & Arayici (2012) claimed that BIM implementation not only requires learning new software applications, but also learning how to reinvent the workflow, how to train staff and assign responsibilities, and the skill in modelling the projects. In the context of PPP, the risks are more severe because the data management has to be sustained for 20-40 years. Two more risks factors which are '*lack of guidelines for contractual agreements*' and '*liability issues*' are related to legal and contractual matters; thus, contractual risks related to collaborative and integrated working (Winfield, 2015, King's College Centre of Construction Law and Dispute Resolution, 2016) need to be addressed in order to eliminate the constraint that hinders having successful PPP projects implementing BIM.

CONCLUSION

PPP and BIM are well-promoted worldwide, and both can be integrated to boost the industry, however studies that integrate these two are very limited. The findings of the present study suggest that despite the massive benefits that BIM can offer to PPP projects, additional risks associated with BIM cannot be underrated. Risks related to technical competencies, social and legal are the most significant risks that can impact PPP projects, thus need to be addressed brilliantly to ensure success. Besides of adding to the limited knowledge in this field, the findings are considered as a lesson learnt for the Malaysian construction industry to consider developing relational-collaborative contractual instruments that can seamlessly integrate parties in PPP projects and acts as risks mitigating strategy in PPP projects implementing BIM.

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DAM RELATED DISASTER FRAMEWORK FOR EMERGENCY PREPAREDNESS

**Rahsidi Sabri Muda¹, Izawati Tukiman², Mohamad Faiq Md Amin³,
Mohd. Ramzi Mohd. Hussain⁴, Ainul Bahiah Mohd Khidzir⁵**

^{1,3,4} Civil Engineering and Geoinformatics

TNB RESEARCH SDN. BHD. MALAYSIA

^{2,4} Kulliyah of Architecture and Environmental Design

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Abstract

Continuous approach and solution in solving resilience over a few decades are yet to resolve the main issue in developing sustainable development, disaster risk reduction and new challenges on climate change. Current frameworks that have been developed tend to be over-generalized which required major changes in developing effective frameworks appropriate for specific disaster phenomena. To address this issue, a clear objective and approach are required to help the community, authorities and government to enhance preparedness and response in case of disaster. The main objective of this paper is to present the theory and analysis in the development of effective disaster risk reduction framework for dam related disaster (DRD). With the intention of strengthening societal capacity for resilience, this paper will introduce the framework for disaster preparedness to bridge readiness among community, agency and dam owners. The methodology employed to develop a framework based on ICBDM model conducted in the study area, utilising surveys questionnaire, FGD and hazard assessment. The framework established detailed flow of response throughout all phases including pre-event, during event and post event which include hazard assessment, community and authority planning, establishment of emergency and safe passage, and aims to minimize loss of life and injury. In practice, this framework poses as an interactive and cohesive community approach to face dam related disasters (DRD) which will enhance overall response in disaster risk reduction programs.

Keywords: Community preparedness, framework, dam related disaster

¹ Principal Researcher at TNB Research Sdn. Bhd. Email: rahsidism@tnb.com.my

INTRODUCTION

Disaster risk governance is important for effective and efficient management of disaster risk which covers many aspects, as well as the participation of relevant stakeholders are needed. Increasing disaster risk governance for prevention, mitigation, preparedness, response, recovery and rehabilitation is necessary through fostering collaboration and partnership across mechanisms and institutions for the implementation of instruments relevant to disaster risk reduction and sustainable development.

According to Niekerk (2007), disaster risk reduction (DRR) is a systematic development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout a society, by preventing and limiting the adverse impact of hazards, within the broad context of sustainable development (Niekerk, 2007). On the other hand, the disaster risk management (DRM) was defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as:

“The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.” (UNISDR, 2009; UNISDR, 2018)

Mohammed (2018) defines disaster management as an ongoing process composed of a set of activities before, during, and after an event and it falls into four main stages which are preparation, response, recovery, and mitigation. Each stage involves the management and coordination of a wide range of stakeholders such as government agencies, non-government organizations, emergency response teams, and residents. The preparation phase is the earliest action in mitigating disaster. Preparedness activities such as siren for early warning are designed to plan the unthinkable and increase the readiness of organizations and communities to respond to a catastrophe timely and expertly. Mohammed (2018) also highlighted that training on disaster preparation and response are required such as search and rescue, and some operations to respond with basic or intermediate incident command.

As reported by United Nations (UN), Hyogo Framework (2005-2015) emphasized more on policies, which it does not able to capture the dynamics of hazards, exposure and vulnerability, due to the lack of accountability and multi-level disaster management governance system at the local, national and regional levels (Scolobig et al., 2015; Eltinay & Charles, 2017; Tiernan et.al, 2019). Thus, in order to reduce the impact of a disaster to human life, a systematic approach has been taken through disaster risk management and disaster risk reduction at all level, *Sendai Framework* for Disaster Risk Reduction 2015-2030

(*SFDRM2015-2030*) was introduced in aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years (Tiernan et.al, 2019) The scope of the *SFDRM* is broader than the HFA, which covered disasters caused by natural and man-made hazards and related environmental, technological and biological (Oxley, 2013).

Many Scholars has suggests that continuous effort for disaster emergency frameworks need to be improved, especially on critical aspects such as accountability, vulnerability, exposure, dynamics of hazard and overall disaster management governance system at various levels (Scolobig et al., 2015; Eltinay & Charles, 2017; Tiernan et.al, 2019). Since the 1980s, policies and processes have been developed for disaster risk reduction; the chronology of development is illustrated in **Figure 1**.

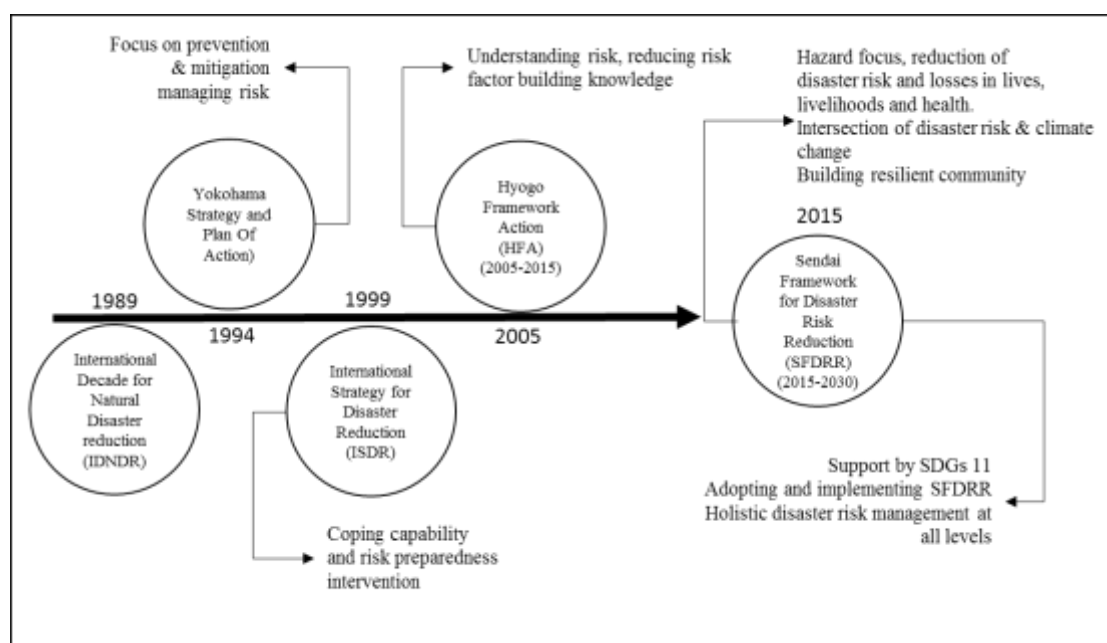


Figure 1: Evolution toward Sendai Framework Disaster Risk Reduction (SFDRR)
 (Adopted from Aitsi-selmi et al., 2015, Tiernan et al. (2019))

DISASTER MANAGEMENT IN MALAYSIA

In Malaysia, the National Security Council (NSC) governs disaster events through monitoring, directing and evaluating processes. Among disaster related guidelines developed under NSC is NSC Directive No. 20 (MKN20) which covers comprehensive guidelines in facing disaster at all levels for government

agencies. NSC is responsible for appointing a task force, managing resources and leading the operation in any related disaster occurrences in Malaysia. The operations of NSC directives has been arranged with considerations of culture, ethics, behaviour at district and local community, and geographical condition which focuses on minimizing on the ground gaps in facing disaster (Maidin et al., 2017).

One of the important roles of NSC is to control Disaster Management and Relief Committee (DMRC) at all levels; district, state and national as shown in **Figure 2** (Khalid & Shafiai, 2015). NSC has the authority in formulating policies related to a disaster, assessment on potential risk areas, enhancing public education in facing disaster, training for selected agencies, providing resources and logistics support and preparing suitable machinery and tools. Apart from operational tasks, NSC developed a comprehensive database containing information about expertise and skills pool in agencies, equipment and tools as part of the disaster management program.

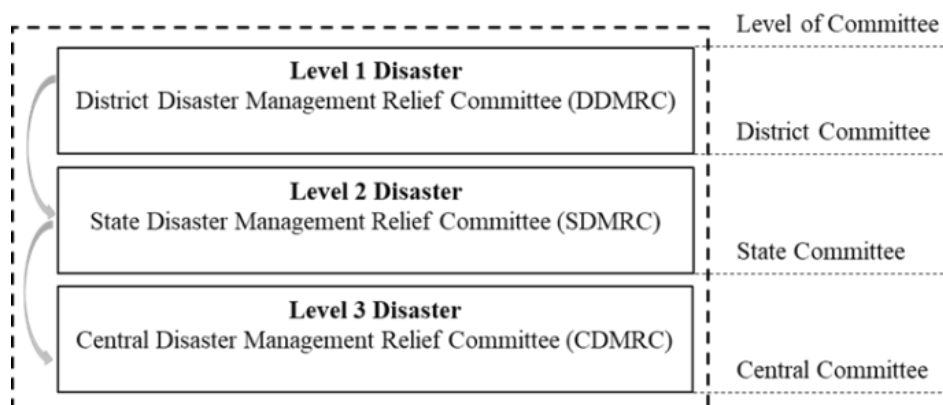


Figure 2: Adopted from Disaster Management Committees (MKN), Jabatan Perdana Menteri, 2012 (MKN, 2012)

INSTITUTIONAL, LEGISLATIVE AND POLICY IN DISASTER MANAGEMENT

Disaster Risk Management (DRM) and Disaster Risk Reduction (DRR) emerged as systematic approaches to reduce the impact of a disaster on human life. Throughout the years, the government is focusing on centered capacity and capability for disaster response and on disaster response and recovery. Recently the focus has shifted to disaster preparedness and management, by introducing the concept of disaster risk reduction in various sectors of the government (Izumi, T., Matsuura et al., 2019). Two important policies in disaster management have been established which are, Directive 19; the Special Malaysia Disaster

Assistance and Rescue Team in 1994 and in 1997 Directive 20; the groundwork for standard operating procedures and organizational framework for disaster response. Malaysia's national agency for crisis and disaster management was established in 2015, known as The National Disaster Management Agency (NADMA). NADMA is the focal point of national disaster management at the federal, state, and district levels. **Figure 3** shows the evolution of disaster management in Malaysia.

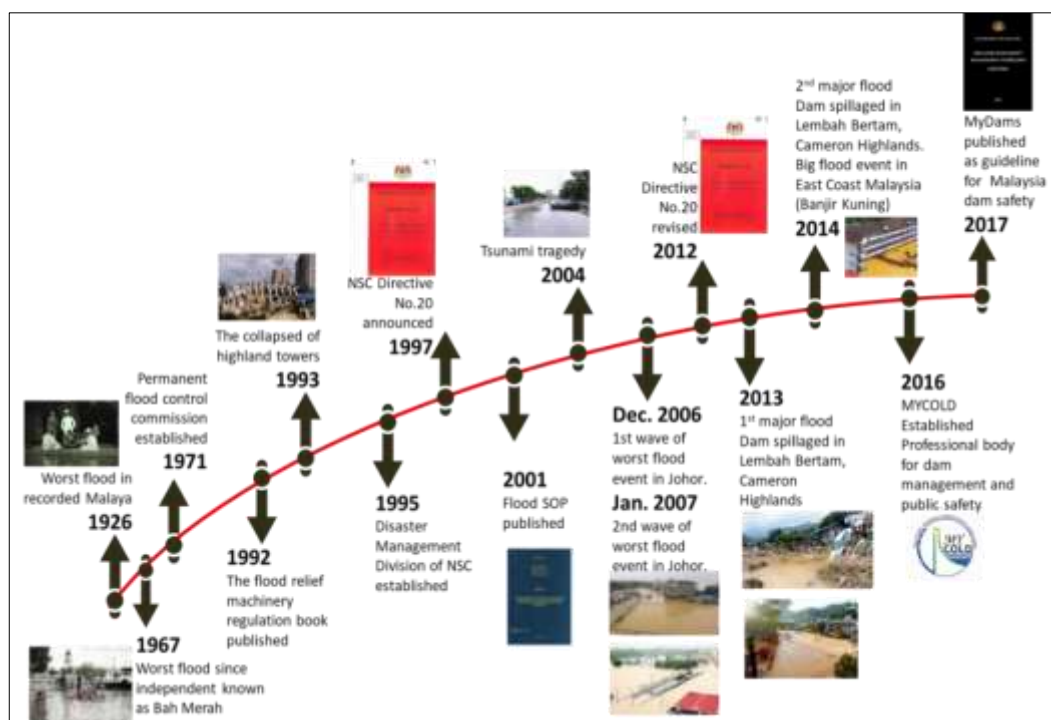


Figure 3: The evolution of disaster management in Malaysia.
 (Adopted from Izumi, T., Matsuura et al., (2019))

FRAMEWORK ON DISASTER RISK REDUCTION

According to Marchezini et al. (2018), most efforts have been concentrated on developing systems, methodologies, and approaches rather than understanding people's requirements or ways of better engaging them in disaster risk reduction programs. Engaging local people is very important because they are the true first responders to mobilize during emergencies and they have a critical role in saving lives and in rendering assistance to those in need (Mickey Glantz & Ramirez, 2018). It was agreed by Pal et al. (2017) mentioned that managing risk is more efficient and effective through sociotechnical systems that incorporate local

people and local authorities. Other researchers also mentioned that framework for emergency preparedness should emphasize on the inter-organizational, and inter-jurisdictional process to increase people readiness to face disaster (Marchezini, Eduardo, et al., 2018; Pal et al., 2017; Quansah & Engel, 2010).

Chang et al., (2016) and Tipler et al., (2017) suggest that preventive steps need to be taken earlier to avoid uncontrolled situations in managing disaster occurrences, unprepared communities have less ability to take control over the disaster event. This was supported by Patrisina et al., (2018) which mentioned that if an individual in the community is familiar and well prepared with ways of coping and precautionary measures, then the disruption by a disaster can be reduced. Furthermore, the implementation of policy and active involvement of local government in DRR enabled to mitigate the risk and potentially to increase preparedness among agencies and communities (Okada, 2012). This was obviously agreed by many researchers the need for a multi-stakeholders' involvement in line with global best practices aimed at reducing disaster risk (Shaw, 2013; Shaw, 2014)

DESIGN OF METHODOLOGY

An integration method of qualitative and quantitative have been applied to develop the proposed framework. Content analysis has been done in the early phase of the research to study the development of effective disaster risk reduction framework for dam related disaster (DRD) from other countries. Primary data were collected through community surveys questionnaire, focus group discussions (FGD) and expert interviews. A survey with 847 community at risk was conducted for obtaining quantitative data regarding community preparedness toward dam disaster in their vicinity area. Questionnaire survey and FGD was designed to gauge respond on respondents' knowledge, awareness and preparedness on facing disaster strike in Cameron Highland. A baseline study was conducted in Cameron Highlands to analyze the initial stage of ICBDM program. It provides basic demographic of the community, potential hazard, local knowledge, physical conditions and potential impact from dam related disaster (DRD). GIS mapping method is used to facilitate hazard assessment and vulnerable analysis, it uses overlay technique using ArcGIS application couple with flood model from secondary data.

The methodology designed is guided by the research questions, study objectives and disaster phases (Jamshed et al., 2018 and Ade Bilau et al., 2018). In developing emergency preparedness framework for DRD, ICBDM approach has been assessed and reviewed to get fully understanding of the overall process involved in the program. Emergency response plan (ERP), mode of notification, communication channel, chains of command system, early warning system and community and stakeholder's engagement program among the focal components

that have been assessed. An assessment approach in development framework as shows in **Table 1.0**.

Table 1: Methodology conducted to develop a framework for disaster

Phase	Method	Assessment	Respondent	Research questions
Pre-event	GIS mapping method	Risk and hazard assessment		
	GIS mapping method	Vulnerable analysis		
	Questionnaire survey	Awareness and knowledge EWS	Community	<ul style="list-style-type: none"> To discover how far does the community aware of the implication of dam-related disaster
	FGD	ERP	Authorities	<ul style="list-style-type: none"> What is the SOP during an emergency? How was the safety measure conducted at the agency level?
Mid-event	Interview	EWS SOP/ ERP	Authorities	<ul style="list-style-type: none"> Early warning Responsibilities of each authority.
	Questionnaire survey	Actions during emergency	Community	<ul style="list-style-type: none"> Do they know the evacuation route and evacuation center? What should be done during an emergency?
Post-event	FGD Questionnaire survey	ERP	Authorities	<ul style="list-style-type: none"> What is the plan that needs to be taken after the event? Steps to improve.
		Risk knowledge Preparedness	Community leaders	<ul style="list-style-type: none"> How was the impact of the aftermath? Steps to be improved.

FRAMEWORK DEVELOPMENT FOR DAM RELATED DISASTER; A CASE STUDY IN CAMERON HIGHLANDS

The community-based organization would be responsible for the overall management of disaster reduction activities; however, this community-based organization does not have sufficient technical skills and knowledge to undertake various disaster reduction tasks. Therefore, local agencies are in a better position in facilitating and coordinating DRR plans to implement and mobilise the resources. They can provide essential technical assistance to the communities for hazard mitigation and vulnerability reduction. Participatory monitoring and evaluation should be made together between the local community and other stakeholders in measuring the progress made and identifying necessary follow-up actions.

In this situation, the DRR program for dam related disaster (DRD) at the downstream community of hydroelectric dam in Cameron Highlands has been conducted in 2019 (TNBR, 2020). This program is known as an Integrated Community-Based Disaster Management (ICBDM) aimed to contribute to disaster awareness and facilitate disaster management planning for a community in a vulnerable area. This people-centred program has been formulated to empower the community on how to take life-saving efforts during flood disasters occurrences induced from dam release. A non-technical based activity such as

drill exercise and engagement program to educate local people and the school children on the importance of the dam safety preparedness has been conducted periodically among dam owners, local agencies and affected communities. The activities were planned together by dam owners, local community and local agencies as a part of participatory disaster risk management planning. **Figure 4** shows the overall flows of ICBDM initiated in Cameron Highlands.

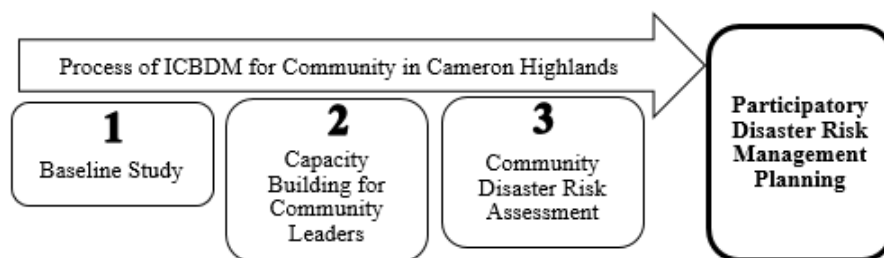


Figure 4: Steps involved in ICBDM (Adopted from Rahsidi et al., 2020)

A baseline study was conducted in Cameron Highlands to analyze the initial stage of ICBDM program. Capacity building for the community is emphasized on the role of the community leaders in the ICBDM program. Community leaders are responsible for becoming a spokesperson on behalf of the community, and at the same time as an agent to relay the message from agencies to their people (Yumagulova et al., 2019). Series of engagement programs have been conducted among dam owners, community and government agencies such as awareness workshops, dam safety seminars and exhibitions, school awareness camp and drill exercises. These programs give input and assess the effectiveness of the DRR program and emergency SOP in the study area.

The framework was outlined by emphasizing on the mode of communication, technical aspect of the dam disaster and EWS chain, and people-centred program. The framework corresponds to the dam owner's effort in supporting government initiatives in the United Nations program specifically for Sendai Framework (2015-2030) and Sustainable Development Goals (SDGs) aims to implement and adopt disaster risk reduction strategies at local community level. **Table 2.0** lists out the basic requirements for DRD framework consists of task and responsibilities, ownership, component, and supporting resources.

Table 2.0 Main elements in DRD framework

Basic requirements for DRD framework			Supporting Resources
Task/Responsibility	Ownership	Component	

<ul style="list-style-type: none"> • Hazard identification and risk assessment (PE) • Impact analysis (PE) • Planning and strategies (PE) 	Organization & Asset management	Dam owner, local agencies and authorities, policy, DSERP, SOP, expertise, Group of logistic, Transport from responder agencies	<ul style="list-style-type: none"> • Human resources: expertise, knowledge and technology • Material; first aid, equipment • Equipment; communication, transportation, audio visual, etc • Facilities; Warehouse, big hall, school, mosque, government buildings for evacuation centre, safe route • Money; yearly government budget, international funding, public funding, private contribution, research grant, institution CSR
<ul style="list-style-type: none"> • Active participation, cooperation (PE) • locally led and support (PE) • CIC (PE)(ME) 	Individual	Thought, effort, skill and time	
	Community & Local institution	Community institutional, leaders, Village program, NGO, School community, community institution can be used for community engagement	
<ul style="list-style-type: none"> • Systematically organized body of knowledge (PE) • Knowledge to practices (PE)(ME) • Medium of knowledge transfer (PE)(ME)(POE) • Warning chain (ME) 	Science & Technology	EWS, Forecasting system, IT & communication, GIS, mapping technology, multimedia, satellite phone, radio armature, signage system	

Note: PE – Pre-Event ME – Mid-Event POE – Post-Event

The framework is divided into 3 phases, which are pre-event, mid-event and post event. Each phase provides systematic flow, quick response and better systems Integration in handling DRD. The framework was bound to strategize, design and prepare emergency response at the community level with consideration on the participation of multi-level stakeholders. The framework emerged a systematic methodology to minimise the impact of a disaster to the community at risk due to dam related disaster. In this case the framework is on flood induced by the dam failure. Proposed Dam related disaster Framework for emergency preparedness as shown in **Figure 3.0**.

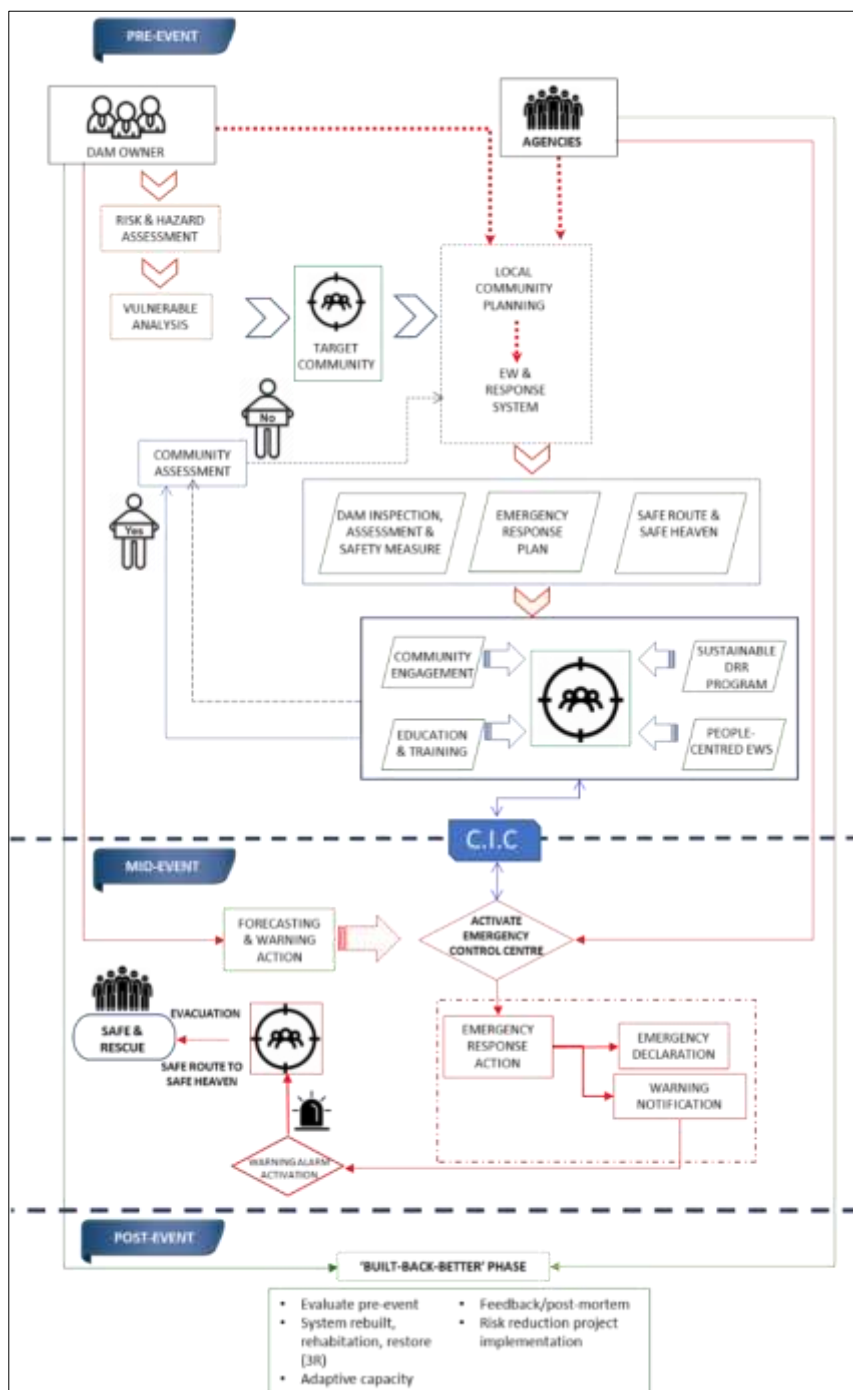


Figure 3.0: Dam related disaster Framework for emergency preparedness

CONCLUSION

This framework highlights the potential application of community resilience through participation and involvement of the community at the early stages of a disaster. The framework provides holistic guidance to dam owners and local agencies on the right actions to be taken during emergency situations. On the other hand, the framework outlines the systematic flow of program and action covered for all disaster phases to strengthen the preparedness of dam owner, local authorities and emergency responders involved with local communities during emergency situations. Continues assessment procedure needs to be conducted in order to sustain the effectiveness of the emergency preparedness. Therefore, it is important for dam owner to strategize a good mechanism to overcome disaster risk through its disaster management strategy. Hence, the scientific and approachable method such as EWS and other communication tools is needed to be operated effectively.

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CRITICAL REVIEW ON SUBURBAN TRANSIT ORIENTATION DEVELOPMENT

Mohamad Sabri Ahmad¹, Robiah Suratman²

*^{1,2} Faculty of Built Environment and Surveying
UNIVERSITI TEKNOLOGI MALAYSIA*

Abstract

Transit orientation development always been associated as the transport solution for traffic congestion especially in the city. Nevertheless, there is a gap in the research in the suburban area. This paper discusses about the possibility to apply the concept in the suburban area as the solution for urban sprawling. Therefore, four principles have been identified in order for a transit orientation development suit in the suburban necessity. The principles are being central area, density and mixed land uses; the connection between the central area and the transit; developed based on need of density and designed by specific development agency; funding mechanism to allow transit orientation development. The conclusion is transit orientation development is not applied for problem solving, but to avoid future issues.

Keywords: Transit Orientation Development, Suburban, Urban Sprawl

¹ Land Administration and Development Postgraduate Student Email: sabrijpbd@gmail.com

INTRODUCTION

Development in suburban is the aftereffect of urban sprawling which emphasize the need for new space for housing. Furthermore, demand for private vehicle, increasing when the urban area expanding. As a result, house and work commuting for an hour become a norm every day because of the congestion and distance. Since 1980, Peter Calthorpe has started the idea of the transit orientation development to reduce pollution in high density development (Calthorpe, 1993). The core idea of the concept is to have a mix development within 400 meters until 800 meters diameter (Cervero, 2019). The combination of housing, commercial and public transport, especially railway within the radius promotes public transport usage and reduce car ownership because the train is easier to move around the city.

In that respect are various interpretations of transit orientation development that explain the concept and its effects. Firstly, transit orientation development required a mixed land use development within 600 meters walking distance of radius (Calthorpe, 1993). Next, the concept focuses on a transit station as to bring public transport location to be near to the user and increase the function of train (Brinckerhoff et al., 2002). Transit orientation development also offers high value on medium density housing because job opportunity and commercial activities nearby (Wilson, 2005). Another view is people will less dependent on cars because changing mode of transportation to the pedestrian, cycling, public transport, carpool and taxi. (Yap & Goh, 2017). Furthermore, the concept encourages housing in the city centre and reduce road users (Rosni et al., 2018). Last but not least, the transit orientation development is concentrating on strategic accessibility and integration of transit station, which will support the mix land use and varying density to be living conducive (Cervero, 2019). However, the concept mostly applied to cities and not the suburban area where it has less density.

This paper wants to discuss on the preparation and suitability of suburban in implementing transit orientation development before it develops and merging with the city centre. Previous researches concentrate on Brazil, especially Curitiba city where transit orientation development concept being implemented using Bus Rapid Transit development (Cervero, 1998; Cervero & Dai, 2014; Macke et al., 2018; Mercier et al., 2016; Miranda & Silva, 2012; Smith & Raemaekers, 1998). Unfortunately, the suburban preparedness for transit orientation development for future planning is never mentioned as the concept seems to be the problem solver for the car congestion issue.

URBAN SPRAWL CREATES SUBURBAN

Suburban emerged when the surrounding of the city boundary becomes more attractive for development, especially housing due to the affordable price and size of land. Urban sprawl started with rural area been converted into urban area

because it is low density and the need for new spaces for city (Cervero & Day, 2008; Rosni et al., 2018). Higher income has created housing in suburban in high demand because of the transport infrastructure network also expanding (Arrington & Cervero, 2008; Duncan, 2011; Moos et al., 2015; Rosni et al., 2018). In addition, less density creates more transport distance movement comparable to the high density development (Rosni et al., 2018). Therefore, urban sprawl creates suburban due to the demand and resource availability; transportation mode also influenced by the distance of the commuting from the home to the city centre.

Accordingly, transportation is very important for the economy development that offer better transaction between two different geographical areas (Deng et al., 2016; Moos & Mendez, 2015; Small, 2013). Still, people who live in the suburban has better quality of life and promote the low density and wide city development (Iseki & Eom, 2019; Papa & Bertolini, 2015; Rosni et al., 2018). This situation creates increasement of the private vehicle as the demand of quick and freedom mobility for people to less prefer the local bus services.

Furthermore, Cervero (2018) stated that density, variety and design of the city affect the accessibility directly. A well-design city is a pedestrian friendly that reduce the private transport on the road. Additionally, income and vehicle ownership are influencing the trip modes (B. Appleyard, 2012). Urban sprawl with the motorised vehicle is hard and nearly unstoppable. Consequently, suburban will have to confront issues such as lack of services in term of quality and quantity for public transport, private transport dominates roads, reduce access to job and necessity in the city.

PRINCIPLES OF TRANSIT ORIENTATION DEVELOPMENT

There are four principles of transit orientation development for city planning purposes such as central area and type of density with mixed land uses, quick connection between the centre and transit, development design for transits and lastly will be the support mechanism for funding the transit development as stated in Figure 1. These principles will be the guide to the concept of transit orientation development core to be applied to the suburban area.

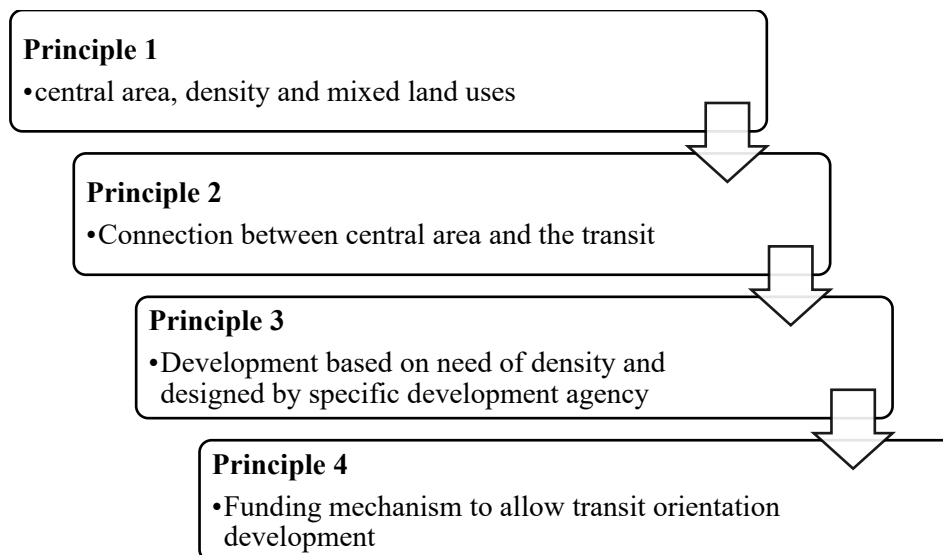


Figure 1: Concept of Transit Orientation Development Principles
Source: Cervero (2018); Cervero & Sullivan (2011)

Principle one has two strategies starting with strategy one focus on the services and amenities within the scale suitable for density and economy. Services are preferable in high density to increase the efficiency and practicality (Pan et al., 2017; Singh et al., 2014). However, private vehicle becomes essential for people to get access to the services even with long range and causes central activity reduce the priority (Cervero & Sullivan, 2011; Jones & Ley, 2016; Singh et al., 2014). Significantly, the ability to understand the minimum of the radius for the central development as to ensure that people will use the public transport and services nearby rather than driving.

Next, strategy two is central area able to reduce private vehicle and retain the charm of suburban area. Expansion of the city can be avoid if the central development become the focus and well planned (Arrington, 2009; Cervero & Sullivan, 2011; Kamruzzaman et al., 2014). Hence, new central area can be used as secondary tier of the services that connect suburban with the main central city. After that, the second principle has three strategies. Firstly, the private vehicle ownership is not encouraging due to the expanse on the commuting and vehicle rather than investing in cheaper public transport. Low income people prefer to own a vehicle because of the impression to reduce high cost rental in the city (Cervero, 2018; Dittmar & Ohland, 2012). However, the hidden cost of maintenance, toll and fuel consumption increase their transportation cost to 40 percent of their income (Storeygard, 2016). Nevertheless, there should be an

awareness campaign or a policy to reduce private vehicle and at the same time increase the quality of public transport.

The following strategy is people want to travel less than one hour (Arrington & Cervero, 2008; Marchetti, 1994) and reluctantly to change mode of transport if the travel time is longer. As a result, considerable travel time through pedestrian or cycling mode is useful in order to attract people to change their behaviour that relying on private vehicle. The final criteria for principle two is the importance of the train. Train become the preferable choice because bus movement will be hindrance in the same congestion with the private vehicles (Cervero, 2016; Chorus, 2009). The train has the capability to move through anywhere in the city regarding the road congestions. Furthermore, the train uses less space and this is one of the reason city develop a light train system for traffic movement (Credit, 2018; Pan et al., 2017; Wang et al., 2019). Hence, train capability to easily move around the city become essential in the transit orientation development, especially in the suburbs that far away from the city centre.

Next, the principle three has two strategies and the lead by coordination and teamwork between local, states and federal authorities in order to implement the concept (Appleyard et al., 2019; Wang et al., 2019). Accordingly, statutory is the main mechanism to increase house ownership capability as the balancing the need for low income people and profit from commercialization in the development (Arrington & Cervero, 2008; Moos et al., 2015; Rosni et al., 2018). Thus, the authorities able to implement the transit orientation development better with less interference from the political influence. The next strategy is to have cooperation between private and government sectors for transit orientation development in the city. The strategy emphasizes the development planning that benefits two parties which is the private sector for value property increment and government sector to utilize the profit for public facilities prioritize the train services (Cervero, 2019; Dittmar & Ohland, 2012). The win-win situation could be an important key to develop the city based on transit orientation development.

In the end, the last principle has two strategies. The first strategy is to concentrate on one of the transportation funding mechanism. There are two systems, centrist road planning and market road planning. Centrist road planning is fully funded by the government (Storeygard, 2016) to develop road system in the country where market road planning based on the demand and income through tolls (Tolley & Turton, 2014). While the second strategy is to convert the whole transportation system into train services (Cervero, 2016; Credit, 2018; Wang et al., 2019). Both strategies seem to be exclusively applicable in the idealistic world where the politician has no power in the financial decision to invest in the public transport and ignoring private vehicle ownership.

SUBURBAN TRANSIT ORIENTATION DEVELOPMENT ELEMENTS

Therefore, based on the literature reviews, the propose of the transit orientation development in the suburban must has four elements which are population density, transit system, economic development and land use potential. Table 1 summarized the elements requirement that suitable for suburban transit orientation development. The first element is the population density where transit orientation development will be implemented on medium to high density development. This density capability to stimulate the local economy (Kamruzzaman et al., 2014). High density, good pedestrian network will offer a variety of transport modes, less car parks, high quality of city design which use less area than urban sprawl (Renne, 2016). In addition, transit orientation development not only create greater access for the people, but also reduce environment maintenance (Dittmar & Ohland, 2012). As a result, small area with medium to high density development will be the main activity to reduce the rural area consumption.

Table 1: Suburban Transit Orientation Development Elements

Elements	Indicator	Measurement	Reference
<i>Population Density</i>	People Density	Population/ sq km	Wang et al., 2019
	Commercial Density	Commercial activity/ sq km	Wang et al., 2019
	Jobs Level	Jobs total/ sq km	Wang et al., 2019
<i>Transit System</i>	Passenger during peak hour	Total passenger/ transport capacity	Pan et al., 2017
	Passenger during outside peak hour	Total passenger/ transport capacity	Pan et al., 2017
	Safety	Safety during waiting and in the vehicle	Appleyard, 2012
	Facilities	Shelter, waiting room, seats, shops, restaurant and lighting	Appleyard, 2012
	Information Panel	Plan and design of the station, disable people access, signage	Chow et al., 2014
	Service Frequency	High frequency equal high accessibility	Appleyard et al., 2019
	Connection between another route	Connection between routes	Iseki & Eom, 2019

	Interchange with another mode	Modes connectivity	Iseki & Eom, 2019
	Station access	Spatial readiness and total population that can afford the transit node	Cervero & Day, 2008
	Parking	User and space ratio	Renne, 2007
<i>Economy Development</i>	Private investment in local authority	Total investment	Cervero & Dai, 2014
	Total existing commercial	Total business/ sq km	Cervero & Day, 2008
<i>Land Development Potential</i>	Mixed land use	Dissimilarity index, activity centre mixture, commercial intensities	Cervero, 2018
	Level of mixed land use	Mixed land use of housing and others	Cervero, 2019

The second component is the transit system that emphasises on the planning the transit system development that able to attract people to utilise it. Lack of planning will lead to the public transportation as the bottom of people's choices which will be a waste of investments (Rosni et al., 2018). A perfect location of transit station, especially in the high density area will be very helpful for people movement with high frequency services (Kamruzzaman et al., 2014; Renne, 2016). Thus, a well-planned of transit system will pull masses to abandon private vehicle and reduce the car dependency.

The next element is the economic development that concentrates on the capability to enhance the local economy in the centre of the transit of development. The mixed land use promotes commercial activity where the supply and the demand stay close to each other. This commercial area also will become the focal point of the area and offer jobs or entrepreneurship opportunity for the residents nearby (Renne, 2009). The short distance between infrastructures will lead to the economic development and as a result, local income also increase (Renne, 2009; Wang et al., 2019). Therefore, without a doubt there is higher possibility that suburban can increase their economy by implementing transit orientation development. Land development potential become the last element in the suburban transit orientation development. This last element focus on the capability of the transit nodes to increase the public transport usage, support local business and create a high quality of life neighbourhood (Dittmar & Ohland, 2012; Renne, 2009). Consequently, the land will be use very efficient and become, the more reliable solution compares to urban sprawling.

CONCLUSION

As the conclusion, transit orientation development is suitable for the suburban especially during the city expands. The land can be maximised utilised to the highest potential with less problematic in the future. Furthermore, this concept not only become the congestion solution but also to be the new type of the city that has good quality of life. So far, the concept has been applied to solve the congestion problems, but there is a potential for planner and researcher to explore or create a transit orientation development starting from the suburbs.

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ENVIRONMENTAL BEHAVIOURS IN THE MODEL GREEN CITY OF MELAKA

Aisyah Abu Bakar¹, Siti Indati Mustapa², Norsyahida Mohammad³

*^{1,2,3}Institute of Energy Policy and Research,
UNIVERSITI TENAGA NASIONAL*

Abstract

Environmental Behaviour [EB] manifests in a person's ability to contribute in his context. It houses behaviours such as engaging with the surrounding, executing roles or tasks, proving skills and aptitude and behaving responsibly. Issue: The past 10 years since the Green City Action Plan [MGCAP] was announced warrant for an appraisal of Melaka residents EB to determine the magnitude to which the citizen have participated towards modelling Melaka as Green City. Purpose: This paper aims to compare the EB of Melaka residents to residents of other states in Malaysia. Approach: One-Way MANOVA was generated to determine the mean distribution of 10 EB items, across Malaysia States. Findings: There were significant differences within subjects of the 10 EB items between-subjects of Malaysia States. The Post-Hoc Test indicated relatively half of the means of EB items for Melaka were higher than other states while the remaining half revealed lower means. In comparison to other states, Melaka has low practices of eco-behaviours specifically relating to energy saving, recycling and waste handling as well as environmental purchasing.

Keywords: Melaka Green City, environmental behaviours, consumption

¹ Postdoctoral Researcher at Institute of Energy Policy and Research. Email: isya.ab@gmail.com

INTRODUCTION

Melaka has embarked on a path towards sustainable urban growth. This journey was driven by the Malaysian Prime Minister's pledge during the Conference of the Parties (COP15) meeting in Copenhagen in 2009 to reduce Malaysia's carbon intensity relative to its GDP by 40% by 2020. Efforts comprise of government led policies and projects on top of private sector and citizen initiatives, sought to improve the liveability of Melaka. The first step towards preparing a holistic approach towards urban sustainability was adopting the Green Technology Blueprint in 2011 and formalized a vision to transform Melaka into a Green Technology City State by 2020. The Green Technology Council was established for the purposes of overseeing efforts to achieve the vision and adopted United Nations Urban Environmental Accords ratings method to assess their green city performance. A wide-ranging approach to Melaka Green City Action Plans (MGCAP) endorsed by the state government, private sector engagement, and citizens on systematic planning have aided Melaka Green City transformation. Public participation in the implementation and monitoring the GCAP is a key enabler. Involvement of citizens in the monitoring the GCAP implementation raise ownership of the GCAP and empower various local communities.

In this paper, the sustainable behaviours of the Melaka citizen in response to the Green City vision is examined in opposition to other states in Malaysia. The third dimension of the 'Human Interdependence with the Environment' model by Abu Bakar, et al., (2017) is adopted to assess environmental behaviours of Melaka respondents in comparison to respondents from other Malaysia states.

LITERATURE REVIEW

Individuals functionality and contributions to their social and environmental contexts which in return enhance the individual's wellbeing is examined under Human Interdependence [HI] (Abu Bakar et al., 2019a; 2019b; 2019c; Abu Bakar et al., 2020a; 2020b; 2020c). In-depth studies on HI discovered 70% of individual well-being is sourced from HI, proposing that passing on well-being to others is an important cause of individual well-being (Abu Bakar et al., 2015; 2016a; 2016b; 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g; 2018). This paper focuses on Human Interdependence with the Environment [HIE].

The World Book of Happiness (Bormans, 2010) which reviews novel findings of well-being research universally implies four dimensions of HIE. In the interest of Malaysia, recent case studies selected Asian articles are reviewed and tabulated to show potential determinants of HI along with their conditional factors. HIE manifests in four interconnected dimensions. This paper focuses on the third dimension of HIE, which is Environmental Behaviour [EB].

Environmental Behaviour manifests in a person’s ability to contribute in his context. The dimension houses behaviours such as engaging with the surrounding, executing roles or tasks, proving skills and aptitude, behaving responsibly and other related behaviours. In the environmental context, examples of HI manifestations are a range of environmentally responsible behaviours such as conscious decision-making, smart consumerism, recycling behaviours, energy-saving initiatives, and waste-handling efforts. The manifestations are observed in the Environmental behaviours [EB]. Studies on environmental behaviours are concerned on individuals’ responsible behaviours towards the environment. Case studies selected from Asian Journals dated from the year 2011 onwards highlighted potential determinants and qualities of EB (refer to Table 1).

Table 1: Conditional Factors to Environmental Behaviours

Conditional Factors	Potential Determinants	References
Urban-rural strata (rural residents tend to practice conservation and waste recycling than urban residents) and education background (science students tend to practice conservation behaviour)	Conservation behaviour (turn off fans, lights, taps; separate waste; use own grocery bags, buy refillable detergents, and purchase energy-saving appliances)	(Asmuni et al., 2012)
Age negatively influence knowledge, household income negatively influences attitude, and community leaders tend to recycle more than community members.	Recycling behaviours (separate food and waste, reduce and reuse of recyclable materials)	(Singhirunnusorn et al., 2012)
Cultural orientations – consumers with high collectivistic values and low materialistic values had higher recycling tendency	Recycling attitude and behaviours (the approach to reclaiming the purpose of used materials)	(Latif & Omar, 2012)
Policies implementation supporting environmental purchasing behaviours such as promotion of energy rating, labelling green appliances, banning hazardous items, rebate, and green procurement practices	Purchase energy-efficient, recycled packaging, and biodegradable products, hazardous free electric and electronic equipment, and green detergents	(Harizan et al., 2013)
Concerns about environment, social influence, accessibility to environmental facilities, monetary motivation, and altruism.	Waste separation, practising buy-back centres and recycling and reusing household items	(Zena et al., 2014)
High income and high education level individuals were more concerned about environment thus tend to favour the green movement and have concerns for food safety	Purchasing and consuming organic food (food and meat grown and raised without chemicals or pesticides)	(Teng et al., 2011)
Concern on solid waste management and readiness to adjust to new practices	Bring reusable bag for shopping	(Zen et al., 2013)
Awareness (familiarity to energy-efficient labels), attitude (standpoint on energy-savings) and social norms (environmental lifestyles)	Purchasing energy-efficient products and appliances based on energy efficiency labels (reduce energy use)	(Zainudin et al., 2014)
Perceived consumer effectiveness (environment related past experience behaviour, environment-related intention-behaviour, willingness to pay, and regulatory support - separating household waste, being a member of environmental groups)	environmentally conscious consumer behaviour (purchasing biodegradable products, energy-saving products, and products that are less harmful to the environment)	(Ramly et al., 2012)
Environmental emotions (feelings and sentiment towards green practices), environmental cognition (well-informed, understanding and knowledge on green practices), environmental attitude (a person’s general sense of favourableness or unfavourableness for green behaviour)	Keeping materials out of the waste stream: reduce (minimize consumption), reuse (repurpose used materials) and recycle (reclaim used materials into a functioning material)	(Nameghi & Shadi, 2013)

EB manifests in the committed positive and responsible behaviours throughout everyday decisions and actions attempted to favour and safeguard the environment. Qualities adhere to EB include (i) energy conservation, (ii) recycling, reusing and waste handling and (iii) purchasing behaviour (Abu Bakar et al., 2020a; 2020b; 2020c).

Table 2: Manifestation and Determinants of Environmental Behaviours

Determinants	Qualities inferred through Indicators
energy conservation	turn off fans, lights and taps, and purchase energy-saving appliances use hazardous free electric and electronic equipment
recycling, reusing and waste handling	separate food and waste, minimising consumption, reduce the use of plastic packages, reuse separated materials, use disposables, recycling attitude and behaviours, practising buy-back centres, recycling and reusing household items, use recycled packaging
purchasing behaviour	purchasing energy-efficient products and appliances based on energy efficiency labels/ biodegradable products/ products made from recycled materials/ energy-saving products/ refillable detergents, bring water tumbler instead of purchasing water, purchase and consume organic food, bring reusable or own bag for grocery shopping

Table 3 Indicators of Environmental Behaviours

Definition of EB	Components	Indicators	Code
The committed positive and responsible behaviours throughout everyday decisions and actions attempted to favour and safeguard the environment	Energy Savings	turning off fans and lights when they are switched on	EB1
		turning off taps when brushing teeth	EB2
	Recycling and Waste Handling	throwing rubbish according to designated recycle bins	EB3
		separating rubbish at home (metals, paper, glass, etc.)	EB4
		reusing grocery bags/ jars/ bottles/ boxes/ cans, etc.	EB5
		using towels instead of tissues	EB6
		using water tumbler instead of purchasing water	EB7
	Environmental Purchasing	purchasing refillable detergents	EB8
		purchasing energy-savings appliance	EB9
		purchasing products that are organically produced	EB10

The indicators were developed into statements in questionnaires to be answered by respondents across states in Malaysia.

METHOD

A sample of 4315 was pooled after the data screening process. The Malaysian respondents were given an 11-point Likert scale to respond to questionnaire items which consist of statements relating to the ten (10) EB items. One-Way Multivariate Analysis of Variance [MANOVA] was generated to determine the multivariate effect of Malaysia States on EB items. That is the difference in mean values of the 10 EB items combined between states. It is hypothesized that different states respond differently towards each of the 10 EB items. The following sections provide empirical evidence on the statistical interaction between Malaysia States and the EB items. The report of the statistical outputs in the following section pay attention to Melaka in opposition to other states.

RESULTS

One-Way MANOVA using Statistical Package for the Social Sciences [SPSS] was generated to determine the mean distribution of the dependent variables which were the 10 EB items, across the subjects of the independent variable, which was Malaysia States.

Prior to the One-Way MANOVA test, the data was screened for (i) missing cases, (ii) unengaged responses ($SD \neq 0$), (iii) univariate and extreme outliers (boxplot and $SD < 3.0$), (iv) normality (skewness < 1.5 , kurtosis < 3.0) and (v) linearity ($r > 0.30$). The data was also screened for (vi) multicollinearity ($VIF < 3.0$) and (vii) multivariate normality and influential outliers (Cook's Distance < 1.0). Since each state consists of more than 30 cases (>200 respondents), the MANOVA test was robust against violations of homogeneity of variance-covariance matrices assumption. It is also to note that the multivariate homogeneity of variance between group assumption using Levene's Test was violated ($p < .001$). Therefore, a stricter alpha level was used ($\alpha = 99.9\%$, $p = .001$) to interpret the univariate ANOVAs (Allen & Bennett, 2008).

One-Way MANOVA was conducted to determine significant differences within-subjects of EB items combined, between-subjects of Malaysia States. The deduced statistical hypothesis was:

H₀: There were no significant differences within subjects of the 10 EB items between-subjects of Malaysia States. That is, Malaysia States have no multivariate effects on the 10 EB items.

The statistical output revealed that **at 99% confidence level there was a statistically significant mean differences within-subjects of EB items between-subjects of states, $F(140, 43000) = 7.560$, $p < .00001$; Pillai's Trace $V = .240$, partial $\eta^2 = .024$. The null hypothesis was rejected.** There were significant differences within-subjects of the 10 EB items between-subjects of Malaysia States. That is, Malaysia States had statistically significant multivariate effects on the 10 EB items, and the effect size was medium.

The One-Way MANOVA outputs, in essence, suggested that residents across the states reacted differently to each of the EB items. That is, the outcome, i.e. the mean values of each of the EB items were distinct from each other due to the different state they were coming from.

Table 4 shows the mean values of EB items across states. A radar chart was generated to demonstrate the difference in means of EB items across states. The chart shows that Melaka had high mean values for EB1, EB3, EB5, EB6, EB7 and EB8 in relation to other states. On the contrary, Melaka had moderate to low mean values for EB2, EB4, EB9 and EB10 in relation to other states. Table 4 tabulates the Tests Between-Subject Effects and Post-Hoc Comparison of Melaka Mean Values for EB items against other states.

Table 4: Descriptive Statistics: Mean Values of EB items

EB	MEL	PUT	KL	SEL	N9	JOH	PAH	TER	KEL	PER	PEN	KED	PERL	SAB	SAR
EB1	9.23	8.15	8.42	8.47	9.13	8.78	8.64	9.02	9.38	8.49	8.00	9.06	9.30	7.31	7.84
EB2	8.35	8.12	7.94	8.17	8.85	8.51	8.35	8.85	8.74	8.35	7.98	8.81	8.97	7.04	7.66
EB3	8.30	7.73	7.36	7.26	8.42	8.17	8.12	8.05	8.15	7.83	7.79	7.88	8.50	7.01	7.28
EB4	7.45	7.83	6.90	6.80	8.29	7.65	7.46	7.80	7.23	7.20	7.53	7.63	7.90	6.89	6.96
EB5	8.27	7.80	7.50	7.24	8.44	8.17	7.64	8.14	8.02	7.45	7.64	7.90	8.55	6.86	7.22
EB6	8.34	8.12	7.37	7.18	8.28	8.06	7.81	8.16	7.94	7.49	7.62	7.89	8.61	7.09	7.26
EB7	8.84	8.10	7.85	7.70	8.58	8.47	7.81	8.09	8.24	7.75	7.80	8.28	8.35	6.97	7.61
EB8	8.63	8.12	7.94	7.82	8.54	8.55	7.66	8.43	8.35	7.72	7.87	8.12	8.40	7.07	7.58
EB9	8.20	8.34	7.57	7.52	8.49	8.13	7.85	8.21	7.99	7.65	7.83	7.83	8.15	6.90	7.45
EB10	8.04	8.12	7.30	7.20	8.17	7.87	7.67	8.15	7.90	7.35	7.60	7.63	8.00	6.76	7.40

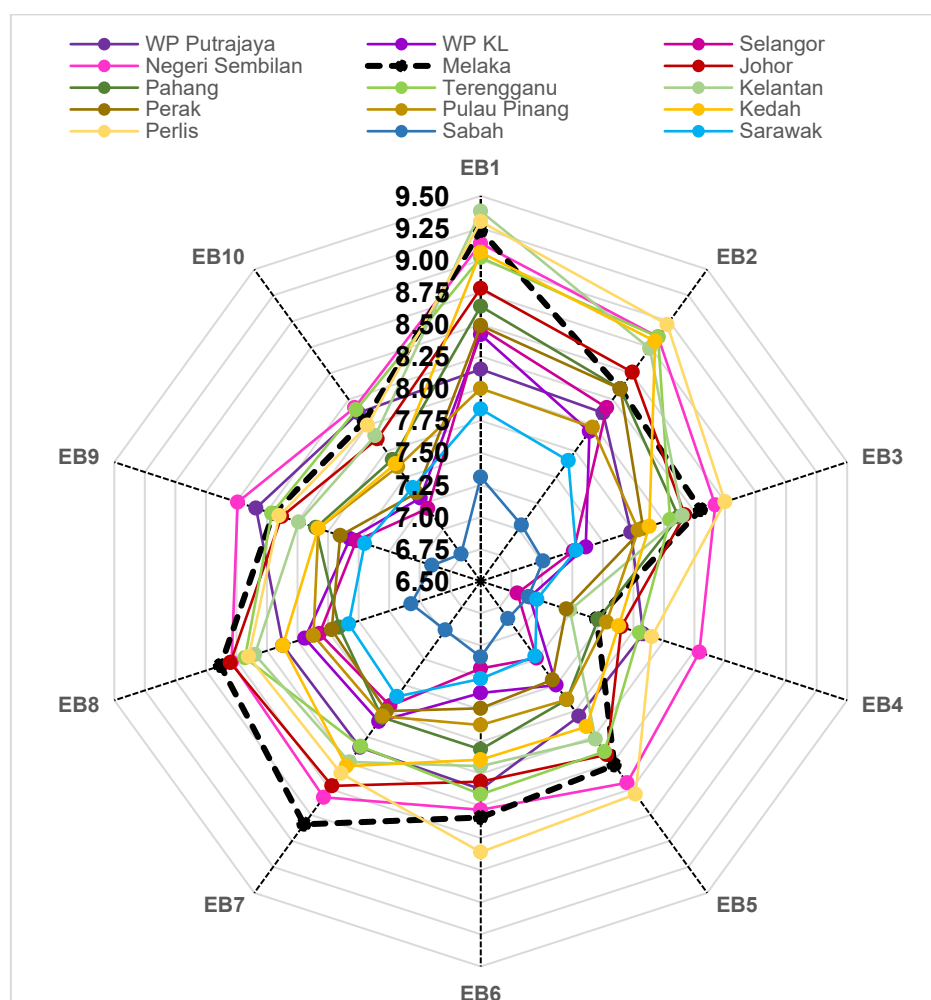


Figure 1: Radar Chart of EB Items Mean Values Across States

Table 5: Univariate ANOVAs and Post-Hoc Comparison of Melaka Mean Values

UNIVARIATE ANOVAs													
DV	Type III Sum of Squares	df	Mean Square	F	Sig.	η ²							
EB1	1514.849	14,4300	108.203	3.823	.000	.091							
EB2	1239.419	14,4300	88.530	23.945	.000	.072							
EB3	936.143	14,4300	66.867	17.550	.000	.054							
EB4	763.026	14,4300	54.502	12.565	.000	.039							
EB5	1032.438	14,4300	73.746	16.349	.000	.051							
EB6	884.382	14,4300	63.170	17.050	.000	.053							
EB7	962.549	14,4300	68.754	2.673	.000	.063							
EB8	882.469	14,4300	63.033	15.363	.000	.048							
EB9	713.634	14,4300	5.974	16.934	.000	.052							
EB10	719.470	14,4300	51.391	19.616	.000	.060							

POST-HOC TESTS: MEAN DIFFERENCE OF MELAKA AGAINST OTHER STATES															
EB	PUT	KL	SEL	N9	JOH	PAH	TER	KEL	PER	PEN	KED	PERL	SAB	SAR	
EB1	MD	1.080	.800	.760	.100	.450	.590	.210	-.150	.740	1.230	.160	-.070	1.920	1.390
	p	.053	.001	.001	.999	.241	.045	.998	.999	.001	.001	.999	.999	.001	.001
EB2	MD	.230	.400	.180	-.500	-.160	.001	-.500	-.390	.001	.370	-.460	-.620	1.310	.690
	p	.999	.642	.998	.331	.999	.999	.318	.728	.999	.784	.312	.080	.001	.006
EB3	MD	.570	.940	1.040	-.120	.130	.180	.250	.150	.470	.510	.420	-.200	1.290	1.020
	p	.933	.001	.001	.999	.999	.999	.994	.999	.256	.282	.507	.999	.001	.001
EB4	MD	-.380	.550	.660	-.840	-.190	-.010	-.340	.230	.260	-.080	-.180	-.450	.570	.500
	p	.999	.242	.007	.004	.999	.999	.934	.998	.986	.999	.999	.677	.081	.319
EB5	MD	.470	.770	1.030	-.170	.100	.630	.130	.250	.820	.630	.370	-.270	1.410	1.050
	p	.995	.011	.001	.999	.999	.079	.999	.997	.001	.108	.821	.994	.001	.001
EB6	MD	.220	.980	1.160	.060	.280	.530	.180	.410	.850	.720	.460	-.270	1.250	1.080
	p	.999	.001	.001	.999	.930	.152	.999	.653	.001	.006	.344	.988	.001	.001
EB7	MD	.740	.980	1.140	.250	.360	1.020	.750	.600	1.080	1.040	.550	.490	1.860	1.220
	p	.539	.001	.001	.987	.585	.001	.002	.041	.001	.001	.052	.296	.001	.001
EB8	MD	.510	.690	.810	.090	.090	.970	.200	.280	.910	.760	.520	.230	1.560	1.060
	p	.980	.023	.001	.999	.999	.001	.999	.984	.001	.006	.227	.998	.001	.001
EB9	MD	-.140	.640	.680	-.290	.070	.350	-.010	.210	.550	.380	.370	.050	1.300	.750
	p	.999	.009	.001	.934	.999	.678	.999	.995	.020	.597	.528	.999	.001	.001
EB10	MD	-.080	.750	.840	-.130	.170	.370	-.110	.140	.700	.440	.420	.050	1.280	.640
	p	.999	.001	.001	.999	.996	.448	.999	.999	.001	.197	.216	.999	.001	.001

Note. MD= Mean Difference; p = p/significant value at 99% confidence level

COMPARISON MATRIX: MEAN VALUES OF MELAKA AGAINST OTHER STATES														
EB	Putra- jaya	K.Lum- pur	Sela- ngor	N.Sem- bilan	Johor	Pa- hang	Tereng- ganu	Kelan- tan	Perak	P.Pi- nang	Kedah	Perlis	Sabah	Sara- wak
EB1	+	+	+	+	+	+	+	—	+	+	+	—	+	+
EB2	+	+	—	—	—	+	—	—	+	+	—	—	+	+
EB3	+	+	—	—	+	+	+	+	+	+	+	—	+	+
EB4	—	+	+	—	—	—	—	+	+	—	—	—	+	+
EB5	+	+	—	—	+	+	+	+	+	+	+	—	+	+
EB6	+	+	+	+	+	+	+	+	+	+	+	—	+	+
EB7	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EB8	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EB9	—	+	—	—	+	+	—	+	+	+	+	+	+	+
EB10	—	+	—	—	+	+	—	+	+	+	+	+	+	+

Note. +* = Melaka has significantly higher mean; + = Melaka has higher mean; — = Melaka has lower mean.

Table 5 shows that at 99% confidence interval there were statistically significant difference in all of the EB items between states and the effect sizes were all medium ($\eta^2 = .010 < .031$ to $.052 < .138$). The Post-Hoc Test exhibits the mean difference in EB items of Melaka in opposition to other states. The Post-Hoc Test on Melaka shows that majority of the mean difference of Melaka compared to other states were positive.

The Comparison Matrix indicates that majority of EB items' means for Melaka were higher than EB items' means for other states, except for EB4 for Negeri Sembilan. Out of the 140 cells, 108 cells revealed that Melaka had statistically higher means of EB items than other states and 37 out of the 108 cells were statistically significant. Table 6 shows the interpretation of the result.

Table 6: Result Interpretation

Items	Statements	Interpretation
EB1	<i>turning off fans and lights when they are switched on</i>	Melaka had significantly higher means of EB1 than (i) Kuala Lumpur, (ii) Selangor, (iii) Perak, (iv) Pulau Pinang, (v) Sabah and (vi) Sarawak.
EB2	<i>turning off taps when brushing teeth</i>	Melaka had significantly higher means of EB2 than (i) Sabah and (ii) Sarawak.
EB3	<i>throwing rubbish according to designated recycle bins</i>	Melaka had significantly higher means of EB3 than (i) Kuala Lumpur, (ii) Selangor, (iii) Sabah and (iv) Sarawak.
EB4	<i>separating rubbish at home</i>	Melaka had significantly higher means of EB4 than Selangor.
EB5	<i>reusing grocery bags/ jars/ bottles/ boxes/ cans, etc.</i>	Melaka had significantly higher means of EB5 than (i) Selangor, (ii) Perak, (iii) Sabah and (iv) Sarawak.
EB6	<i>using towels instead of tissues</i>	Melaka had significantly higher means of EB6 than (i) Kuala Lumpur, (ii) Selangor, (iii) Perak, (iv) Pulau Pinang, (v) Sabah and (vi) Sarawak.
EB7	<i>using water tumbler instead of purchasing water</i>	Melaka had significantly higher means of EB7 than (i) Kuala Lumpur, (ii) Selangor, (iii) Pahang, (iv) Terengganu, (v) Perak, (vi) Pulau Pinang, (vii) Sabah and (viii) Sarawak.
EB8	<i>purchasing refillable detergents</i>	Melaka had significantly higher means of EB8 than (i) Selangor, (ii) Perak, (iii) Pulau Pinang, (iv) Sabah and (v) Sarawak.
EB9	<i>purchasing energy-savings appliance</i>	Melaka had significantly higher means of EB9 than (i) Kuala Lumpur, (ii) Selangor, (iii) Sabah and (iv) Sarawak.
EB10	<i>purchasing products that are organically produced</i>	Melaka had significantly higher means of EB10 than (i) Kuala Lumpur, (ii) Selangor, (iii) Perak, (iv) Sabah and (v) Sarawak.

The positive and higher means of EB items suggests that Melaka residents are relatively agreeable on the EB items. However, Melaka had statistically significant lower mean of (i) EB4, *separating rubbish at home* than Negeri Sembilan and majority of the mean differences compared to other states were negative; similar to (ii) EB2, *turning off taps when brushing teeth*. Although the means were comparably positive, like other states, Melaka respondents were low on (iii) EB5, *reusing grocery bags/ jars/ bottles/ boxes/ cans, etc.*; (iv) EB6, *using towels instead of tissues*; (v) EB9, *purchasing energy-savings appliance*; and (vi) EB10, *purchasing products that are organically produced*.

DISCUSSION

The mainstream economists view consumption level as the measure of economy's fruitfulness. As living standards rise, income payees aspire to lead a more luxurious lifestyle, keeping them in debt and working harder to purchase and consume what everyone else seems to have. Resources depletion and ecosystem destruction are the outcomes of excessive resource consumption surpassing ecosystem's sustainable capacity. Howbeit the counterpart, sustainable consumption behaviour has a lot more than meets the eye.

Adopting and steering sustainable behaviours is unlike dealing with unproductive crops, uninterested buyers, personal debt or even uninsured risks; each of which has the urgency for immediate gains like agricultural productivity, business profitability, financial security and covered losses. Environmental behaviours are not impeded by competing alternatives other than negligence, offer no ephemeral profits and outcomes are difficult to measure. Environmental behaviours have no short-term monetary-gain for those expecting a quick return of investment. Practically any eco-action is overwhelmed by profiteers who benefit from others' eco-actions without partaking the alleviating movements (Montgomery, 1990). Some behaviours are sporadic such as the skip the straw movement in which involve different actors; consumers, retailers, manufacturers and policy makers. Incentives often needed for urgency. Also, green items are expensive because the current demand is low to encourage businesses to rethink their processes to minimize environmental impact.

All things considered, for economically vulnerable groups, environmental behaviours are fiscally inconvenient by the fact that the money they need to save is spent on eco-friendly equipment they cannot afford over investment which may or may not return in response to poorly educated usage patterns (Boudet et al., 2016; Van Leeuwen et al., 2009). The scenario begs the question, is the green living only affordable to middle- and high-income groups? The low-income groups make up 40% of Malaysian population. To date, it takes 3.7 hectares of land and sea to support each Malaysian. As population pressures mount, the larger the demand put on the limited natural resources. Environmental choices are in dire need from all corners regardless of economic status.

After 10 years the vision of Green City was introduced, evidently there is still much room for improvement on Melaka environmental behaviours. With the relatively low practice of eco-behaviours, specifically involving energy saving, recycling and environmental purchasing; Melaka residents have a long journey to embrace the green initiatives and become the endorsed locals of the model green city. The effective way to progress is by investigating the approach in which public policies actually affect public behaviour. The steps include (i) to determine the preconditions of a widespread behavioural change, (ii) to observe current attempts of adopting new consumption habits, and (iii) to deliver the cost and magnitude required towards crossing barriers of behavioural change.

CONCLUSION

This paper compares the Environmental Behaviours, the third dimension of Human Interdependence with the Environment, of Melaka residents in relation to other states. It was discovered that Melaka respondents were more agreeable to one-half of the 10 statements implying eco-behaviours, while they are less agreeable to the remaining half, in relation to other states. Melaka fell short in behaviours implying energy saving, recycling and purchasing culture. Future studies exploring the constructs elaborated in this paper via structural causal modelling and expand the findings through moderation effects of Malaysia States in relation to local environmental policies would be supportive of the current findings.

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EXTERNAL CONDITION TO ECO-BEHAVIOURS IN MELAKA GREEN CITY

Aisyah Abu Bakar¹, Siti Indati Mustapa², Norsyahida Mohammad³

*^{1,2,3}Institute of Energy Policy and Research,
UNIVERSITI TENAGA NASIONAL*

Abstract

External Condition [EC] to eco-behaviours relates to the macro context of a person representing the person's façade towards his context. EC manifests in the perception and attitude towards surrounding circumstances such as the accessibility to conducive natural surroundings, encouragement to pro-environmental behaviours, convenience to be environmentally responsible and favourable law enforcement. **Issue:** 10 years has passed since the Green City Action Plan [MGCAP] and Sustainable Urban Development Framework [SUDF] were introduced. The Melaka EC to eco-behaviours needs to be assessed to determine the impact of the MGCAP and SUDF to EC of eco-behaviours. **Purpose:** This paper aims to compare the EC of Melaka residents to residents of other states in Malaysia. **Approach:** One-Way MANOVA was generated to determine the mean distribution of 10 EC items, across Malaysia States. **Findings:** There were significant differences within subjects of the 10 EC items between-subjects of Malaysia States. The Post-Hoc Test indicated almost all of the means of EC items for Melaka were higher than other states. The MGCAP and the SUDF shows a positive impact on the EC to a sustainable community.

Keyword: Melaka Green City, external condition

¹ Postdoctoral Researcher at Institute of Energy Policy and Research. Email: isya.ab@gmail.com

INTRODUCTION

Melaka state government and Melaka Green Technology Cooperation signed an MoU with Micro-E Holdings on August 10th, 2020, to continue the Melaka Green City Action Plan [MGCAP]. Micro-E Holding, a Malaysian private company promotes the use of clean renewable sources of energy in cutting back carbon emission to slow down global warming. The Green Cities Initiative recommends for Melaka (i) to improve understanding of the underlying causes that influence habitability of urban areas, (ii) enhance planning thereby resources are invested in the right place and correct scale, (iii) gather relevant data for well-informed investment decisions, (iv) pilot test projects to learn what works and what does not work prior to committing to large amounts of resources, (v) prepare better project designs to better the quality of the projects, and (vi) improve the institutions in such way that decisions are coordinated and with buy-in from key stakeholders. As a result of reliable coordination between multiple government agencies, the private sector, and local communities, Melaka city developed a systematic, inclusive and integrated management approach with project monitoring systems, data analysis, and citizen feedback. Accordingly, wastes are better managed and pollution are addressed with fast mitigation measures.

In this paper, the macro influence of Melaka ecological behaviours in response to the Green City vision is examined in opposition to other states in Malaysia. The fourth dimension of the 'Human Interdependence with the Environment' model by Abu Bakar, et al., (2017) is adopted to assess external condition of Melaka eco-behaviours in comparison to respondents from other Malaysia states.

LITERATURE REVIEW

The measures of contributions and functionality of individuals in the contexts of social and which in turn have an effect on the individual's well-being is termed Human Interdependence [HI] (Abu Bakar et al., 2019a; 2019b; 2019c; Abu Bakar et al., 2020a; 2020b; 2020c). Comprehensive studies on HI discovered that HI impart 70% of Subjective Well-Being, suggesting that that instigating well-being on others is a vital cause of individual well-being (Abu Bakar et al., 2015; 2016a; 2016b; 2017a; 2017b; 2017c; 2017d; 2017e; 2017f; 2017g; 2018). This paper focuses on Human Interdependence with the Environment [HIE].

A review was generated from The World Book of Happiness (Bormans, 2010), discussing worldwide findings of well-being and revealing four underlying dimensions of HIE. Summaries of recent studies from selected Asian articles are presented in the attempt to focus on HIE manifestation applicable for Malaysia. Potential determinants and conditional factors of HI are extracted from the articles. Among four interconnected HIE dimensions, this paper focuses on the fourth dimension of HIE, which is External Condition [EC].

External condition is related to the macro context of a person representing the person’s façade towards his context. Thus, place concerns mainly on perception and attitude towards surrounding circumstances. In the environmental context, the instances of HI manifestations include the accessibility to conducive natural surroundings, encouragement to pro-environmental behaviours, convenience to be environmentally responsible and favourable law enforcement. The manifestations are observed in External Conditions [EC]. Studies on environmental surroundings, circumstances and policy enforcement are concerned on individuals’ circumstances influencing responsible behaviours. Case studies selected from Asian Journals dated from the year 2011 onwards highlighted potential determinants and qualities EC (refer to Table 1).

Table 1: Conditional Factors to External Condition

Conditional Factors	Potential Determinants	References
Communal belief: The forest living quarter, subsistence source of living, spiritual realm, physical fulfilment and ancestral sentiment to be defended	Stability of social life (health and spiritual) in relation to natural setting	(Kamarul Zahari et al., 2011)
Unmaintained outdoor space: murky water that provides a place for mosquito breeding, too dense vegetation, and tall and bushy that blocked views.	Emotions and feelings (safety and security) induced in natural elements	(Maruthaveeran, 2012)
Motivation (to experience nature, to enjoy fresh air, to participate in sports, to enjoy natural beauty, to gain knowledge and to build confidence, to unwind, to rest and to gain social network); activities (appreciating nature, trekking and hill climbing, observing sunrise, observing hilltop scenery, making friends, and pampering self).	Feeling the urge to be in the nature, acquiring knowledge and ability to cope with the outdoors, and equipped physically, emotionally and intellectually for staying outdoor	(Zainol et al., 2012)
Housing value depended on a variety of park elements, conceptual or design of the park, distance to the park, views towards the park, and active areas in the park facing the house.	The inclination to be close to natural or outdoor areas, the urge to spend time in the outdoor environment	(Shukur et al., 2011)
Health condition and availability of natural environmental: Views and accessibility partly influenced conducive healing environment to outdoor natural environment facing patients’ window.	Health-related condition, the need to see, hear, notice and experience in nature while being indoor or after being indoors for a while	(Ghazali & Abbas, 2011)
Physical well-being (active living); cognitive well-being (relief emotion, comfort, relaxed, and calmness, sense of privacy, solitude, and safety); and social well-being (social interaction with neighbours, participation, friendliness)	Having pleasant experience in natural setting, feeling relieved and relaxing emotions, and feeling energetic and healthy	(Mansor et al., 2012)
Accessibility to green open space (outdoor natural environment), and corresponding social health and behaviour (physical symptoms, stress, and anxiety disorder)	Health-related condition depending on outdoor environment, and the need for sufficient contact and interaction with nature	(Khotdee et al., 2012)
Stimulation of natural elements to encourage game-playing motivation (connectedness and continuity of green areas and flexibility of spaces and diversity of natural elements)	Sense of curiosity of natural elements and feeling engaged, creative and active in natural setting	(Faizi et al., 2013)
Age, gender, health-related conditions (stamina, health issues) and facilities in outdoor areas	Physical health and capability in outdoor areas	(Inani et al., 2013)
The physical setting of outdoor space: characteristics of groundcovers, open spaces, and tree foliage.	Ability to adapt and adjust to natural surrounding	(Ngesan et al., 2013)

Uniqueness of natural features and distinct character of landscape elements such as tree trunks, water fountain, and presence of animals	Curiosity of natural features (ability to see, hear, notice details of environment)	(Mahidin & Maulan, 2012)
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EC manifests in the contextual circumstances and situational factors that influence and hinder individuals to think and act responsibly towards the environment. Qualities adhere to EC include (i) law enforcement and regulation, (ii) direct and indirect encouragement from the physical and social setting and (iii) convenience to be environmentally responsible (Abu Bakar et al., 2020a; 2020b; 2020c).

Table 2: Manifestation and Determinants of Interaction with Nature

Determinants	Qualities inferred through Indicators
law enforcement and regulation	regulation aspects, available information (campaign) and environmental movement,
direct and indirect encouragement from the physical and social setting	Support from social environment, surrounding health and quality of life, stakeholder willingness, favourable living area, conducive outdoors, stress-free environment, quality of neighbourhood surrounding
convenience to be environmentally responsible	situational factor, financial aspects, civic amenities, availability and proximity to environmental products and facilities, quality of public transportation

Table 3: Indicators of Interaction with Nature

Definition of EC	Components	Indicators	Code
The contextual circumstances and situational factors that influence and hinder individuals to think and act responsibly towards the environment	Surrounding Encouragement	having family members who support eco-friendly behaviours	EC1
		having a supportive, ethical climate at work	EC2
		having reachable conducive outdoors	EC3
		having a favourable neighbourhood that supports green politics	EC4
	Convenience	recognising accessibility to environmental products	EC5
		recognising affordability of environmental products	EC6
	Favourable Reinforcement	recognising favourable waste handling management	EC7
		recognising conducive surrounding and amenities	EC8
		recognising the efficiency of public transport infrastructure	EC9
		recognising legal enforcement on environmental destruction	EC10

The indicators were developed into statements in questionnaires to be answered by respondents across states in Malaysia.

METHOD

A sample of 4315 was pooled after the data screening process. The Malaysian respondents were given an 11-point Likert scale to respond to questionnaire items which consist of statements relating to the ten (10) EC items. One-Way Multivariate Analysis of Variance [MANOVA] was generated to determine the multivariate effect of Malaysia States on EC items. That is the difference in mean values of the 10 EC items combined between states. It is hypothesized that different states respond differently towards each of the 10 EC items. The following sections provide empirical evidence on the statistical interaction

between Malaysia States and the EC items. The report of the statistical outputs in the following section pay attention to Melaka in opposition to other states.

RESULTS AND DISCUSSION

One-Way MANOVA using Statistical Package for the Social Sciences [SPSS] was generated to determine the mean distribution of the dependent variables which were the 10 EC items, across the subjects of the independent variable, which was Malaysia States.

Prior to the One-Way MANOVA test, the data was screened for (i) missing cases, (ii) unengaged responses ($SD \neq 0$), (iii) univariate and extreme outliers (boxplot and $SD < 3.0$), (iv) normality (skewness < 1.5 , kurtosis < 3.0) and (v) linearity ($r > 0.30$). The data was also screened for (vi) multicollinearity ($VIF < 3.0$) and (vii) multivariate normality and influential outliers (Cook's Distance < 1.0). Since each state consists of more than 30 cases (> 200 respondents), the MANOVA test was robust against violations of homogeneity of variance-covariance matrices assumption. It is also to note that the multivariate homogeneity of variance between group assumption using Levene's Test was violated ($p < .001$). Therefore, a stricter alpha level was used ($\alpha = 99.9\%$, $p = .001$) to interpret the univariate ANOVAs (Allen & Bennett, 2008).

One-Way MANOVA was conducted to determine significant differences within-subjects of EC items combined, between-subjects of Malaysia States. The deduced statistical hypothesis was:

H₀: There were no significant differences within subjects of the 10 EC items between-subjects of Malaysia States. That is, Malaysia States have no multivariate effects on the 10 EC items.

The statistical output revealed that **at 99% confidence level there was a statistically significant mean differences within-subjects of EC items between-subjects of states, $F(140, 43000) = 6.423$, $p < .00001$; Pillai's Trace $V = .2052$, partial $\eta^2 = 0.20$. The null hypothesis was rejected.** There were significant differences within-subjects of the 10 EC items between-subjects of Malaysia States. That is, Malaysia States had statistically significant multivariate effects on the 10 EC items, and the effect size was medium.

The One-Way MANOVA outputs, in essence, suggested that residents across the states reacted differently to each of the EC items. That is, the outcome, i.e. the mean values of each of the EC items were distinct from each other due to the different state they were coming from.

Table 3 shows the mean values of EC items across states. A radar chart was generated to demonstrate the difference in means of EC items across states. The chart shows that Melaka had high mean values for all of the EC items in

relation to other states. Table 4 tabulates the Tests Between-Subject Effects and Post-Hoc Comparison of Melaka Mean Values for EC items against other states.

Table 4: Descriptive Statistics: Mean Values of EC items

EC	MEL	PUT	KL	SEL	N9	JOH	PAH	TER	KEL	PER	PEN	KED	PERL	SAB	SAR
EC1	8.62	7.46	7.74	7.58	8.36	8.12	7.77	7.86	8.47	7.73	7.70	7.84	8.59	6.65	7.26
EC2	8.53	7.29	7.56	7.54	8.53	8.01	7.97	7.80	8.46	7.65	7.74	7.80	8.72	6.28	7.17
EC3	8.47	7.24	7.60	7.63	8.53	8.14	7.99	7.67	8.33	7.56	7.76	7.74	8.09	6.71	7.14
EC4	8.48	7.49	7.77	7.63	8.55	8.05	7.96	7.94	8.23	7.64	7.68	7.86	8.32	6.73	7.19
EC5	8.13	7.56	7.29	7.31	8.29	7.84	7.89	7.74	8.04	7.28	7.52	7.45	8.25	6.43	6.94
EC6	8.23	7.56	7.17	7.14	8.15	7.72	7.81	7.70	8.12	7.22	7.58	7.32	8.10	6.32	6.84
EC7	8.43	7.78	7.37	7.43	8.37	7.92	8.01	7.70	8.06	7.46	7.56	7.91	8.11	6.58	7.29
EC8	8.64	7.78	7.50	7.55	8.51	7.96	8.14	7.76	8.22	7.48	7.71	8.04	8.21	6.70	7.25
EC9	8.68	7.93	7.46	7.48	8.53	7.84	8.14	7.71	8.18	7.45	7.69	8.06	8.07	6.55	7.26
EC10	8.81	7.71	7.41	7.38	8.33	7.87	8.14	7.74	8.12	7.51	7.71	8.42	7.99	6.77	7.40

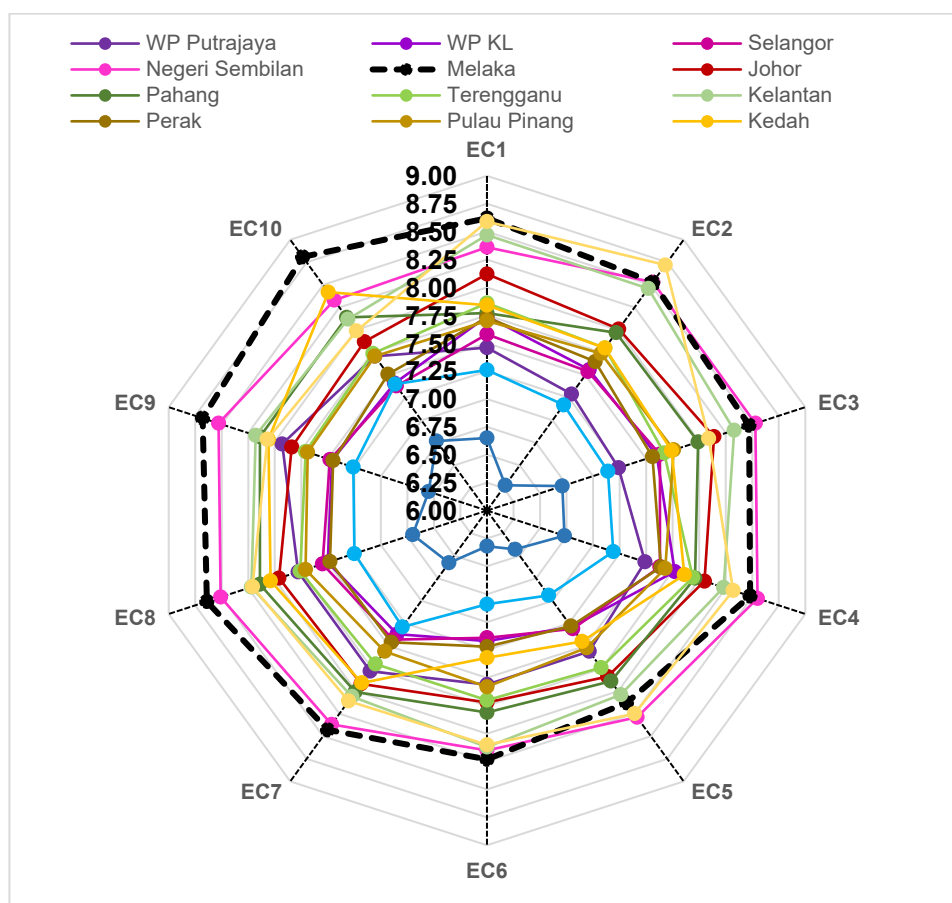


Figure 1. Radar Chart of EC Items Mean Values Across States

Table 5: Univariate ANOVAs and Post-Hoc Comparison of Melaka Mean Values

UNIVARIATE ANOVAs													
DV	Type III Sum of Squares	df	Mean Square	F	Sig.	η ²							
EC1	1183.121	14,4300	84.509	27.951	.000	.083							
EC2	1686.490	14,4300	12.464	34.071	.000	.100							
EC3	1039.088	14,4300	74.221	25.740	.000	.077							
EC4	99.353	14,4300	7.740	24.183	.000	.073							
EC5	1142.516	14,4300	81.608	25.066	.000	.075							
EC6	127.758	14,4300	9.768	26.818	.000	.080							
EC7	1013.125	14,4300	72.366	26.047	.000	.078							
EC8	1094.174	14,4300	78.155	26.922	.000	.081							
EC9	1222.962	14,4300	87.354	24.711	.000	.074							
EC10	1123.564	14,4300	8.255	25.056	.000	.075							

POST-HOC TESTS: MEAN DIFFERENCE OF MELAKA AGAINST OTHER STATES															
EC	PUT	KL	SEL	N9	JOH	PAH	TER	KEL	PER	PEN	KED	PERL	SAB	SAR	
EC1	MD	1.150	.880	1.040	.260	.490	.850	.750	.140	.890	.920	.780	.030	1.970	1.360
	p	.009	.001	.001	.973	.063	.001	.001	.999	.001	.001	.001	.999	.001	.001
EC2	MD	1.240	.970	.990	.001	.520	.560	.730	.070	.880	.800	.740	-.180	2.250	1.360
	p	.009	.001	.001	.999	.078	.075	.005	.999	.001	.001	.001	.999	.001	.001
EC3	MD	1.220	.870	.830	-.060	.330	.480	.800	.140	.910	.710	.730	.380	1.760	1.330
	p	.002	.001	.001	.999	.631	.128	.001	.999	.001	.001	.001	.607	.001	.001
EC4	MD	.999	.710	.850	-.060	.440	.530	.550	.250	.840	.800	.630	.160	1.750	1.300
	p	.048	.001	.001	.999	.160	.058	.066	.969	.001	.001	.004	.999	.001	.001
EC5	MD	.560	.830	.820	-.170	.290	.230	.380	.080	.850	.610	.680	-.120	1.690	1.180
	p	.886	.001	.001	.999	.875	.986	.667	.999	.001	.028	.003	.999	.001	.001
EC6	MD	.670	1.070	1.090	.080	.510	.420	.530	.120	1.010	.650	.910	.130	1.910	1.390
	p	.712	.001	.001	.999	.075	.435	.161	.999	.001	.016	.001	.999	.001	.001
EC7	MD	.650	1.060	1.010	.070	.520	.420	.740	.370	.970	.880	.520	.330	1.860	1.140
	p	.593	.001	.001	.999	.025	.281	.001	.567	.001	.001	.037	.801	.001	.001
EC8	MD	.860	1.140	1.090	.130	.680	.500	.880	.420	1.160	.930	.600	.420	1.940	1.390
	p	.177	.001	.001	.999	.001	.099	.001	.401	.001	.001	.007	.439	.001	.001
EC9	MD	.750	1.210	1.200	.150	.830	.540	.970	.500	1.230	.980	.620	.610	2.120	1.410
	p	.566	.001	.001	.999	.001	.115	.001	.251	.001	.001	.020	.077	.001	.001
EC10	MD	1.100	1.390	1.420	.480	.930	.660	1.070	.680	1.300	1.100	.380	.820	2.040	1.410
	p	.026	.001	.001	.294	.001	.005	.001	.006	.001	.001	.529	.001	.001	.001

Note. MD= Mean Difference; p = p/significant value at 99% confidence level

COMPARISON MATRIX: MEAN VALUES OF MELAKA AGAINST OTHER STATES														
EC	Putra-jaya	K.Lum-pur	Sela-ngor	N.Sem-bilan	Johor	Pa-hang	Tereng-ganu	Kelan-tan	Perak	P.Pi-nang	Kedah	Perlis	Sabah	Sara-wak
EC1	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EC2	+	+	+	+	+	+	+	+	+	+	+	—	+	+
EC3	+	+	+	—	+	+	+	+	+	+	+	+	+	+
EC4	+	+	+	—	+	+	+	+	+	+	+	+	+	+
EC5	+	+	+	—	+	+	+	+	+	+	+	—	+	+
EC6	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EC7	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EC8	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EC9	+	+	+	+	+	+	+	+	+	+	+	+	+	+
EC10	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Note. +* = Melaka has significantly higher mean; + = Melaka has higher mean; — = Melaka has lower mean.

Table 5 shows that at 99% confidence interval there were statistically significant difference in all of the EC items between states and the effect sizes were all medium ($\eta^2 = .010 < .031$ to $.052 < .138$). The Post-Hoc Test exhibits the mean difference in EC items of Melaka in opposition n to other states. The Post-Hoc Test on Melaka shows that almost all of the mean difference of Melaka compared to other states were positive.

The Comparison Matrix indicates that majority of EC items' means for Melaka were higher than EC items' means for other states. Out of the 140 cells, 135 cells revealed that Melaka had statistically higher means of EC items than other states and 81 out of the 135 cells were statistically significant. Table 6 shows the interpretation of the result.

Table 6: Result Interpretation

Items	Statements	Interpretation
EC1	<i>having family members who support eco-friendly behaviours</i>	Melaka had significantly higher means of EC1 than (i) Putrajaya, (ii) Kuala Lumpur, (iii) Selangor, (iv) Pahang, (v) Terengganu, (vi) Perak, (vii) Pulau Pinang, (viii) Kedah, (ix) Sabah, and (x) Sarawak.
EC2	<i>having a supportive, ethical climate at work</i>	Melaka had significantly higher means of EC2 than (i) Putrajaya, (ii) Kuala Lumpur, (iii) Selangor, (iv) Terengganu, (v) Perak, (vi) Pulau Pinang, (vii) Kedah, (viii) Sabah, and (ix) Sarawak.
EC3	<i>having reachable conducive outdoors</i>	Melaka had significantly higher means of EC3 than (i) Putrajaya, (ii) Kuala Lumpur, (iii) Selangor, (iv) Terengganu, (v) Perak, (vi) Pulau Pinang, (vii) Kedah, (viii) Sabah, and (ix) Sarawak.
EC4	<i>having a favourable neighborhood that supports green politics</i>	Melaka had significantly higher means of EC4 than (i) Kuala Lumpur, (ii) Selangor, (iii) Perak, (iv) Pulau Pinang, (v) Kedah, (vi) Sabah and (vii) Sarawak.
EC5	<i>recognising accessibility to environmental products</i>	Melaka had significantly higher means of EC5 than (i) Kuala Lumpur, (ii) Selangor, (iii) Perak, (iv) Kedah, (v) Sabah and (vi) Sarawak.
EC6	<i>recognising affordability of environmental products</i>	Melaka had significantly higher means of EC6 than (i) Kuala Lumpur, (ii) Selangor, (iii) Perak, (iv) Kedah, (v) Sabah and (vi) Sarawak.
EC7	<i>recognising favorable waste handling management</i>	Melaka had significantly higher means of EC7 than (i) Kuala Lumpur, (ii) Selangor, (iii) Terengganu, (iv) Perak, (v) Pulau Pinang, (vi) Sabah and (vii) Sarawak.
EC8	<i>recognising conducive surrounding and amenities</i>	Melaka had significantly higher means of EC8 than (i) Kuala Lumpur, (ii) Selangor, (iii) Johor, (iv) Terengganu, (v) Perak, (vi) Pulau Pinang, (vii) Kedah, (viii) Sabah and (ix) Sarawak.
EC9	<i>recognising the efficiency of public transport infrastructure</i>	Melaka had significantly higher means of EC9 than (i) Kuala Lumpur, (ii) Selangor, (iii) Johor, (iv) Terengganu, (v) Perak, (vi) Pulau Pinang, (vii) Sabah and (viii) Sarawak.
EC10	<i>recognizing legal enforcement on environmental destruction</i>	Melaka had significantly higher means of EC10 than (i) Kuala Lumpur, (ii) Selangor, (iii) Pahang, (iv) Pahang, (v) Terengganu, (vi) Kelantan, (v) Perak, (vi) Pulau Pinang, (vii) Perlis, (viii) Sabah and (ix) Sarwak.

The positive and significantly higher mean differences in EC items of Melaka than other states indicate that Melaka residents are more agreeable on all of the EC items compared to other states.

DISCUSSION

The Melaka Green City Action Plans [MGCAP] coordinate Melaka's commitment in adhering the low-carbon emission, bettering environmental quality, and reinforcing fiscal rivalry. The MCGAP renders a list of guidelines targeting to uphold the competitiveness of Melaka as a well-known tourist and investment destination, minimize environmental problems as well as present Melaka as an inspirational model city for the region's liveability. The MGCAP issues a clear passage towards transforming Melaka into a sustainable community, and it mirrors a holistic approach to muster many but isolated activities that have already begun. It also provides precise and explicit targets on what Melaka needs to do in the years to come.

The Sustainable Urban Development Framework [SUDF] is the entire development and monitoring framework that support the MGCAP. SUDF delivers underlying principles of accessibility, affordability, resilience, and sustainability as integrated approaches towards all-embracing urban development. Inclusive urban infrastructure development is the structured approach covering sustainable, resilient, accessible, and affordable solutions to the issues facing the urban poor and the vulnerable groups by improving access to urban services and infrastructure via targeted investments. The integrated approach fosters an interagency delivery medium to draw all institutions, stakeholders-government, the private sector, civil society and local communities for integrated urban service delivery. The approach suggests that the capacity of the urban poor communities, slum networks, and NGOs should be made more efficient in tandem with the city government and private sector.

Based on the findings, Melaka respondents highly experienced the external influence of (i) supportive family members, (ii) positive ethical climate at work, (iii) conducive outdoors, (iv) favourable neighbourhood, (v) access to environmental products, (vi) good waste handling management, (vii) conducive amenities, (viii) efficient public transport, and (ix) legal enforcement towards promoting environmental behaviours. The MGCAP and the SUDF have a positive impact on the external conditions to a sustainable community.

CONCLUSION

This paper compares the External Condition, the fourth dimension of Human Interdependence with the Environment, of Melaka residents in relation to other states. It was discovered that Melaka respondents were agreeable to all of the 10 EC statements implying macro influence to eco-behaviours. Future studies exploring the constructs elaborated in this paper via structural causal modelling and expand the findings through moderation effects of Malaysia States in relation to local environmental policies would be beneficial to observe the impact of policies on the changing surroundings.

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THE IMPACT OF TOURISM ACTIVITIES ON THE ENVIRONMENT OF MOUNT KINABALU, UNESCO WORLD HERITAGE SITE

Normah Abdul Latip¹, Mastura Jaafar², Azizan Marzuki³, Kamand Mohammadzadeh Roufchaei⁴, Mohd Umzarulazijo Umar⁵, Rehmat Karim⁶

School of Housing Building and Planning
UNIVERSITI SAINS MALAYSIA

Abstract

Tourism contributes to the conservation and protection of mountainous areas, and even the characteristics and activities of tourism also affect the environmental sustainability of an area. This study aims to identify tourist characteristics, their opinion towards a sustainable environment, their activities conducted at the park and environmental impacts. Overall, 383 respondents agreed to participate, and the response has been analysed using the relative importance's of these activities, and environmental impacts were quantified by the relative importance index method. Most of them visited Mount Kinabalu to experience natural sightseeing and hiking activity. Majority of them know environmental concern but feeling that KNP is rather crowded. Overall, the most popular activities were mount climbing and wildlife sightseeing by domestic and international tourist. The result of the study also has shown that noise and air pollution were ranked as the most important environmental impacts factors. Considering mountain tourism is an attraction and contributor to the economy of Sabah, there must be effective preventive measures. Because of that, planning, implementing and strengthening new policies and rules for tourist activities regarding the conservation and protection will help to minimize the impacts of tourism. Through the results of the study using the Relative Importance Index (RII) analysis, it is hoped that it will be able to help provide suggestions and solutions to balance the impacts of tourism in Mount Kinabalu towards sustainability.

Keyword: Tourist activities, environmental impacts, Kinabalu Park, Relative Importance Index Method

¹ Senior Lecturer at Universiti Sains Malaysia Email: norma_abdlatip@usm.my

INTRODUCTION

Mountain tourism has been considered as a best program for sustainable development as it can play an important role to both conservation and development of natural resources (Binns & Nel, 2002; Torres-Delgado & Palomeque, 2012). Tourism can substantially support environmental conservation, protection and sustainable use of natural resources and restoration of biological diversity. Because of their elegance, beautiful sites and natural regions are determined as valuable and the necessity to keep the attraction alive can lead to development of wildlife parks and national parks (Gómez & Gómez, 2017; Martínez et al., 2018). Mountain tourism or national park is categorised as part of rural attraction (Ladki, 1993). Strasdas, (2005) identifies mountain tourism as pure, original and natural monuments in a healthy climate. He associates this concept with many forms of tourism such as trekking, expedition, climbing, cultural and rural tourism, health tourism and classical ecotourism (Jaafar et al., 2019). With the existing cultural and natural environmental settings, mountain tourism can provide a marvellous experience for visitors (Nepal, 2002). Malaysia has great potential for nature tourism and ecotourism (Backhaus, 2005). Its tropical rainforests are among the oldest and the most diverse ecosystems in the world (Khalifah & Tahir, 1997). The development of tourism industry has been a major focus in Malaysia since the 1990s. The Seventh Malaysian Plan (1995–2000) is designed to boost the tourism industry by popularizing natural attractions (Sadi & Bartels, 1997) while in the Eighth Malaysia Plan (2001–2005), the government has started to focus on nature-based tourism (Pimid et al., 2020; Latip et al., 2013) or ecotourism (Karim et al., 2020; Latip et al., 2018a). The crucial importance of biodiversity and environmental sensitivity of mountain regions (Lama & Sattar, 2002) calls for a research on the effect of tourism on the ecosystems. Although, tourism provides substantial economic and monetary benefits to a country, but it also generates adverse outcomes for the environment and the host area (Hall, 2016). Due to tremendous increase in the number of tourists, exposed areas are impacted quickly, and many adverse effects can be seen emerging as a result (Butler, 2018). Tourism will affect physical environment such as air, water and soil as well as social and cultural fabrics (Buckley, 2012). [16]. Besides that, according to UNEP (2002), tourism also can cause the same forms of pollution as any other industry such as solid waste and littering, noise, release of sewage, water, air emissions and even visual pollution. Thus Roxas et al., (2018) call for a need to look into issues on environmental conservation and damages.

RESEARCH BACKGROUND

Mountain Biodiversity

Mountain normally consist of biodiversity attraction which provides a significant and positive correlation with inbound visitor receipts (Freitag & Vietze, 2013).

However, to ensure a balance between environment protection or conservation and tourism is a complex issue (Sunlu, 2003). Many mountain areas in the world have claimed ecotourism projects lead to environmental degradation. On the other hand, from mountain ecotourism perspective, researchers do believe that mountains ecotourism promote responsible tourist activities and behaviour (Agyeiwaah et al., 2017; Adenekan., 2017). Some of the important environmental impacts in many mountainous areas contain of noise pollution, overcrowding, garbage pollution, pack stock grazing, extraction of valuable resources, fire hazards, sewage outflow and introduction of non-native species (Nepal, 2002). Therefore, tourism activities should be the main concern to keep the sustainability of mountains. But it is not easy to achieve the certain standard for mountain sustainability (Nepal, 2002). In addition, tourism activities and their impact on environment are an obscure concept (Merwe and Wöcke, 2007). Thus, research on identification on type of tourism activities and its impact is very essential. Ecotourism in a mountain area requires cautious management and control of tourists' activities to avoid negative effects on the natural environment, socio-cultural setting and visitors' pleasure (Tay et al., 2016). In order to achieve sustainable ecotourism destinations, it needs a wide research on criteria, activities and factors to conservation and protection of mountain area (Nepal, 2002). Otherwise, the destination cannot afford to lose number of visitors as the result will greatly impact the socioeconomic of local population.

Study Area

The World Heritage Site of Kinabalu Park is a centrepiece and oldest site of Malaysia that identified as a biodiversity hotspot with the highest mountain in Southeast Asia (Backhaus, 2005). It is well-known internationally and domestically for its various flora and viability for climbing. Since Kinabalu Park opened to visitors on 1964 till now, the numbers of visitors at Kinabalu Park are increasing year by year because of the tourism activities provided and the attraction of the park itself. In 2010, the number of visitors at Kinabalu Park is 614, 648 increase to 714, 164 or 16.2% in 2014 (The Sabah Parks, 2016). In terms of number of climbers to Mount Kinabalu, there is an increment of 22.7% from 47, 607 in 2010 to 58, 428 in 2014 before declining to 33,414 in 2015. The declining number of climbers is associate to earthquake happened on 5 June 2015 where 137 climbers were stranded on the mountain. However, the number is gradually increase. In future, the Kinabalu Park will be facing issues on the need to sustain the well-being of the environment. As of now, there is no limit in terms of number of visitors visiting the park and they can enter the park and enjoy the activities provided. The management will only limit the number of climbers and requirement for overnight stay in the Kinabalu Park will be determined by number of accommodations available. Based on the given justifications, this paper is conducted to assess the tourism activities and its impact on Kinabalu

Park. The detail research objectives are to identify: 1. Characteristics of visitors and their environment concern level; 2. Activities conducted at Kinabalu park and 3. The environmental impact factors derived from the visitations or activities. The result is hope to provide some information on the tourist characteristics and impact of tourism activities for the future mountain ecosystem

Quality Check

The aspect of ecotourism impact and preservation are constantly intricate and contested (Nelson, 2010). Tourism plays an important role in conservation by offering financial and political support for public protected area agencies and for protection of mountain. According to (Lama & Sattar, 2002), mountain ecotourism is an essential aspect in sustainable mountain development and protection and controlling and managing tourist's behaviour and activities can support to preserve the mountain region. Several outdoor tourism activities include thousands of participants, but fewer facilities and associated expenditure (Buckley, 2011). There is significant overlap both in personal motivations and in the financial requirement for attending ecotourism programs, which usually contain nature-based, adventurous, and cultural features (Stronza & Durham, 2008). Watching wildlife can be exciting as well as educational and a lot of adventure activities take place in magnificent areas. Many various activities are provided as adventure tourism programs (Buckley, 2010). Non-consumptive nature-based tourism consists of all activities based on watching plants or animals or enjoying landscapes (Newsome et al., 2002). Across the globe, these activities rely on national parks and wilderness areas (Hendee & Dawson, 2005; Cater & Cater, 2007). These are visited by independent travellers, local residents, and commercial tour clients (Buckley, 2011). On the other hand, there are several recorded instances where even powerless or single disruptions have generated major and environmentally essential effects on breeding birds (Buckley, 2010). A similar variety of effects arise for plant species. Trampling is the most seriously examined effect (Liddle, 1997; Cole 1995). However, also for trampling, most evaluations between vegetation types have been made experimentally in a single episode. This contains evaluations between several trampling agents, such as horses, hikers, or mountain bikes (Hill & Pickering, 2009). Besides being repositories of high concentrations of endemic species and essential reservoirs of genetic diversity, mountain areas also purpose as crucial corridors for migrating animals and as sanctuaries for plants and animals whose natural habitat have been compressed or improved by human and natural activities. In overall, the major impacts of tourism activities in mountain areas included:

- Damage to vegetation, flora and plants both on a large scale (i.e., for hotel construction, land clearance, roads, etc.) or small scale (i.e., trampling, collection of plants and damage to sensitive plants by uncontrolled tourists), even by good-humoured "eco-tourists" studying plant-life or watching for wildlife.

- Interference to wildlife and decrease of wildlife habitat region: Mountain tourism and tourism infrastructure are going more into remote and isolated high-altitude region.

- Accretion occurrence of grassland and forest fires from tourist activities: A thrown cigarette butt is all it takes. With raised numbers of tourists, unusual to high forest fires, fire dangers are a serious and real effect of tourism in mountain areas.

- Inadequate and improper human waste management and garbage: Tourism makes an excessive volume level of waste and garbage which mountain communities are unsuspecting to development. High temperatures prevent the natural biodegradable of human wastes at base camps. Wrongly sited toilets pollute mountain areas, channels and influencing water resources downstream. Tourist activities have the potential to produce useful effects on the environment by focusing on environmental conservation and protection (Postma & Schmuecker, 2017; Porto et al., 2018). The harmful impacts of tourism development continuously damage all-natural sources on which it depends (Sunlu, 2003). Unproper management of traditional tourism generates possible risks for the whole ecosystem where it can put enormous danger on an area and cause problems such as water pollution, damage local resources, air and noise pollution, land degradation, solid waste and littering, sewage and aesthetic pollution (Sunlu, 2003).

RESEARCH METHODOLOGY

The study data comprises of a mix of literature review, existing research reports and a questionnaire survey. The literature review and a questionnaire survey were adopted to prioritize the tourist activities and environmental impacts factors in the Kinabalu Park. Fellows & Liu, (1997) stated quantitative methods strive to collect and analyse data. Data collection was executed in quantitative techniques and the questionnaires were well prepared and displayed. The research location for this study is at Kinabalu Park, Sabah. 400 questionnaires were distributed and 383 were returns with 95.8% response rate. The research questionnaire was divided into three sections. Section 1 reviewed the respondents' background, experience and their environment behaviour; section 2 assessed legal and illegal tourist activities; and section 3 assessed environmental impacts criteria. The respondents ranked activities on a scale with the rating of '1' representing very little effect; '2' little effect; '3' medium effect; '4' high effect; and '5' very high effect according to the degree of importance on activities and environmental impact in Kinabalu Park. The questionnaire was reliable and added credibility to the remaining study. The gathered data were examined through descriptive and the relative importance indices (RII) method.

DATA ANALYSIS

The background of the respondents developed on necessary section for the beginning of the data analysis. There were more male visitors to the park compared to female visitors of 9.0% with majority of them in the range of age of 18-34 years old. Kinabalu Park is attracting to local visitors with 72.8% of them were Malaysian. In terms of level of education, 30.8% having second level of education while 50.9% were still studying in institute of higher education. They were mostly a working adult and students with high visiting intention were to enjoy the sightseeing, trekking and mount climbing. Having a day trip is popular compared to having a night stay in Kinabalu Park.

Table 1: Characteristics of visitors

	Item	N = 383	(%)
Gender	Male	209	54.6
	Female	174	45.4
Age	18-24	140	36.6
	25-34	130	33.9
	35-44	71	18.5
	45-54	31	8.1
	55-64	11	2.9
Origin	Sabahan	133	34.7
	Non Sabahan (Malaysian)	146	38.1
	International	104	27.2
Education	High school	57	14.9
	Vocational school	13	3.4
	Undergraduate	195	50.9
	Graduate	118	30.8
Occupation	Management/adminis- tration	131	34.2
	Students	107	28.0
	Self-Employ/business	31	8.1
	Others such as farmers, educators etc.	114	29.7
Purpose of visit	Sightseeing	148	38.6
	Trekking	114	29.8

	Mount climbing	86	22.5
	Others	35	9.1
Length of stay	Daytrip	225	58.7
	Overnight	158	41.3

The tourist level of concern on environment has been detailed out in table 2. It is interesting to explore on the tourist concern on the environment since their visit was to experience the mountain environment. Out of 383 respondents, 345 of the respondents stated that environmental protection and biodiversity conservation are very important while the remaining (38 respondents) stated it is less important. All the respondents agreed that the establishment of protection for natural areas does help in the environment protection and biodiversity conservation and majority of the respondents that is 343 or 89.6% of them stated that the conservation work done in Kinabalu Park was handled well. In relation to this, 299 or 78.1% of the respondents agreed that Kinabalu Park is environmentally sustainable while 84 or 21.9% of them disagree. Based on the respondent's opinions, 252 or 65.8% perceived that there were too many visitors in Kinabalu Park. Majority of them (275 or 71.8%) pointed that visitors' activities at Kinabalu Park did not cause environmental impacts.

Table 2: Tourist level of environmental concern

	Item	N =383	Percentage (%)
Environmental value orientation of Kinabalu Park	Very important	345	90.1
	Less important	38	9.9
Establishment of protection & biodiversity conservation	Helpful	199	52%
	Moderately helpful	184	48%
Level of conservation work done	Well handed	343	89.6
	Not well handed	40	10.4

Is Kinabalu Park is environmentally sustainable?	Yes	299	78.1
	No	84	21.9
Number of visitors	Crowded	252	65.8
	Not crowded	131	34.2
Visitors activity create impact to environment	Yes	108	28.2
	No	275	71.8

For a long time, researchers have searched for efficient methods to assess the importance of predictors included in a regression analysis. Current methods, such as relative weights and general dominance weights, have demonstrated fantastic promise for leading assessments of predictor importance. However, questions remain on concerning how one should analyze relative importance in the existence of a multidimensional criterion variable. RII or weight is a type of relative importance analyses. RII was applied for the analysis because it ideal fits the goal to prioritize the tourist activities and environmental impacts in the Kinabalu Park. According to J.W. & LeBreton, (2004), RII assists in getting the contribution a specific variable makes to the prediction of a criterion variable both by itself and in combination with other predictor variables. The RII will be computed as final specified outcomes. These variables will be categorized and ranked based on their RII survey where the formula below was used:

$$RII = \frac{\sum W}{A * N}$$

In this, RII = relative importance index; W = weighting given to each factor by respondents; A = highest weight; and N = total number of respondents. The RII value had a span of 0 to 1 (0 not inclusive); the bigger the RII, the more essential was the cause of activities and environmental impacts. The RIIs were rated, and the outcomes are presented in Table 3 and Table 4. Based on the results, the RIIs and the ranking of all activities that provides impact to environment and environmental impact factors are shown in Table 3 and Table 4 respectively. The RII and ranks of the six factors that are classified under the 'Legal activities factors' are shown in Table 2. Legal tourist's activities factors consist of mount climbing (RII = 0.92), followed by activities at the summit (RII = 0.79), bird watching (RII = 0.67) and sightseeing (RII = 0.49). Illegal tourist's activities consist of smoking (RII = 0.92), followed by littering around the park (RII = 0.80), plucking the plants (RII = 0.52) and disturb the animal (RII = 0.33).

Table 3: RII and Ranking of Legal and Illegal Activities

Legal Activities	1	2	3	4	5	W	RII	Rank
Mount climbing	1	5	14	94	269	1774	0.92	1
Activities at the summit (via ferrata, mountaineering, etc)	15	27	23	198	120	1530	0.79	2
Bird watching	24	35	130	158	36	1296	0.67	3
Sightseeing	48	128	187	14	6	951	0.49	4
Nature education	237	89	32	22	3	614	0.32	5
Photography	338	8	18	15	4	488	0.25	6
Illegal Activities								
Smoking	3	3	12	99	266	1771	0.92	1
Littering around the park	8	34	25	191	125	1540	0.80	2
Plucking the plants	41	123	179	26	14	998	0.52	3
Disturb the animal	228	87	43	19	6	637	0.33	4

Scale: 1 = most impact, 2 = impact, 3 = moderate, 4 = not very impact, 5 = less impact, 6 = lesser impact.

The RII of the twelve environmental impact factors are shown in Table 3. Noise pollution (RII = 0.71) ranked the first significantly factor in environmental impact. This was followed by Air pollution (RII = 0.66), tree root is exposed (RII = 0.6) and soil erosion (RII = 0.59).

Table 4: RII and Ranking of Environmental Impact Factors

Environmental Impacts	1	2	3	4	5	W	RII	Rank
Noise pollution (vehicles, visitors)	47	44	45	137	110	1368	0.71	1
Air pollution (vehicles, smoke)	6	143	114	30	78	1144	0.6	2
Tree root are exposed	4	167	112	41	59	1133	0.59	3
Soil erosion	11	131	149	28	52	1092	0.57	4
Damaged tree or plants	8	184	85	42	56	1079	0.56	5
Garbage accumulation	63	161	109	28	22	934	0.48	6
Bad smell (garbage, toilet and drainage)	8	176	82	34	78	852	0.45	7
Bare ground	67	175	90	34	5	848	0.44	8
Presence of non-native plant	102	153	81	27	6	789	0.41	9
Waste in the drainage	98	165	74	23	8	782	0.4	10
Cleanliness of water	120	153	56	28	11	761	0.39	11
Water turbidity	151	134	62	18	8	717	0.37	12

DISCUSSION AND RECOMENDATION

It has been generally accepted that tourism able to provide positive impacts to rural areas includes mountain region development. However, many organizations and scholars also raise their concern on the environment depredation arise from tourism activities. Mountain tourism has been associated with many types of tourism and is a popular tourist destination Worldwide, the increase popularity of Kinabalu Park brought issues related to park sustainability. In ensuring the place attractiveness, research needs to be conducted in measuring the impact of current activities on the park environment. This paper highlights the findings on survey

done on tourist perception on their travel characteristics, environmental concern and impact of activities to environment and environment impact happened at Kinabalu Park. Overall, Kinabalu Park is very attracting destinations to the local people and the number of visitors is increasing significantly. Most of them were in their young or middle age, consist of career people and tertiary level of education students and they involve in activities such as sightseeing and tracking. So, they were educated people and have good concern on environment sustainability. They perceived that Kinabalu Park was under good management however they feel that KP is quite crowded and these activities will bring impact to the environment.

This study has recognized and, based on the quantified RII, identified the influence ranks of tourist activities causing conservation and protection of mountain in Kinabalu Park. In addition, the environmental impacts factors were recognized and based on the RII, identified the most important factors of environmental impacts in Kinabalu Park. The paper quantified the relative importance of tourist activities and environmental impacts and demonstrated the ranking of the activity's environmental impacts according to their importance level for conservation and protection of mountain in Kinabalu Park. The paper revealed the most significant legal and illegal activities causes of conservation and protection. In addition, the research showed the most significant environmental impacts factors in Kinabalu Park.

Based on the result, smoking and littering are the important illegal activities and noise and air pollution, damage planet and trees, soil erosion and garbage accumulation are the most important environmental factors. These results be consistent with those of prior research that they are studied over uncontrolled and illegal tourism activities which could possibly bring a harmful conception on the ecosystems of the park and sustainability (Jaafar et al., 2013).

Andereck t al., (2005), argued the increase of tourism can adversely effect on national park environmentally sustainable development by contributing to the amount of litter and garbage, damage the planet and smoking. Ko & Stewart, (2002) also asserted tourism damaging ecological effects on environment contain ruin the ecosystem and planet, as well as air, noise and water pollution. These findings are additional correspond with Rabbany et al., (2013), who mentioned that uncontrolled tourism activities posture potential dangers to several natural regions throughout the world. It can insert massive pressure on an environment and generated negative effects such as increased air, and noise pollution and soil erosion. Mowforth & Munt, (2015), deduce in his earlier study that transport is constantly raising in reaction to the increasing number of travelers. One effect of the raising of the tourists in air transportation is that tourism reports for above 60% of air travel and is consequently accountable for an essential share of noise and air pollutions. In addition, Rabbany et al., (2013)

noted in mountain regions, trekking tourists produce a huge deal of garbage and waste.

According to the preceding findings, the following recommendations tourism policies can be made as ways to manage and control tourist activities in conservation and protection of mountain in Kinabalu Park.

- Planning and implementing new policies and rules for tourist activities to conservation and protection of mountain in Kinabalu Park. For example, make achievable guidelines for maintainable utilize of all-natural resources. One of the samples of planning of new rules is Fiji's Koroyanitu National Park Development Program. They focused on protect and maintain cultural heritage and soil, water and natural resources as a result of the advancement of ecotourism in landowning villages (Price et al., 2004). In addition, another example for new rules is investment of tourism income (e.g., entry fees, hunting fees, lodge or concessionaire royalties, etc.) in the protection and conservation of biological and cultural variety at mountain tourism areas. A substantial modify in protected region management plan in the 1980s legislated collect an entrance fee of \$13 from tourists, to be transferred in to conservation and local development through the Annapurna Conservation Area Project (Preston, 1997).
- Support policies target to minimize the influences of tourism by means of policy standards along the lines of limiting the number of tourists, timing of visits, group size, setting operational standards.
- Coordination between authorities, including policy makers for tourism planning and associated subject areas such as protected area management and wildlife conservation, trade and industries, transportation, immigration, finance, etc.

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URBAN DEVELOPMENT AND ADOLESCENT BEHAVIOUR IN SOCIAL PROBLEM: A CASE STUDY OF NORTH EAST PENANG, MALAYSIA

¹Normah Abdul Latip

*¹School of Housing Building and Planning
UNIVERSITI SAINS MALAYSIA*

Abstract

The purpose of the study is to explore a possible connection between urban development and the social problem faced by an adolescent, the group who considered to be a trivial problem and less been discussed detailed in previous studies. The establishment of theory and research procedure to mitigate this subject's exploration leads to the analysis of the relationship of determination factors between adolescent social problems and urban development, the exploration study approach used with the questionnaire that equips with nominal and ordinal scales as a tool. The random sampling method practically implemented to the target group, which is an adolescent from several residential in Penang, Malaysia. George Town, Bukit Jambul, Ayer Itam, Gelugor, Jelutong, Tanjung Tokong and Tanjung Pinang select as areas of study. The preliminary findings show a significant connection between urban development and adolescent behavior pattern. This study's results indicate that the event and the elements of municipal facilities and family ties include the role of parents as a strong influence on youth involvement in social problems. It can also be used as a reference for future research in urban development factors and enrich the study of welfare and social security of adolescents towards sustainable urban communities.

Keyword: Urban Development, Adolescent, Social Problem, Sustainable Communities

¹ Senior Lecturer at Universiti Sains Malaysia Email: norma_abdlatip@usm.my

INTRODUCTION

Urban growth influence by various reasons and factors, namely physical, economic, social, technological, environmental, and others. Previous researchers have conducted various studies on urban development, whether it is a historical city (Latip et al., 2018) or a new city. (Simon, 2015; Vreeker et al., 2008) argue that cities are the focal point of physical and public activity to meet individuals' and organizations' needs and interests according to the process, human (people), and growth (construction) will create a joint. Instead of physical, socioeconomic, and institutional factors, the event also affects the social problem in the urban area. The most vulnerable group that changed is an adolescent.

The period for adolescents (Casey et al., 2008; Ruffin, 2014; Santrock, 2014) begins at the adolescent stage until adulthood and according to the age of development. It coincides with the World Health Organization (WHO) definition that it starts at the age of 10 to 19 years (Diane et al., 2003). According to (Qidwai et al., 2010), adolescents must be seen differently from the average population, and it is imperative to take into account the current reaction of this group in determining the direction of development of a city. This is to provide a conducive space for this group to thrive with good and positive values and norms.

URBAN DEVELOPMENT AND ADOLESCENT

Rapid urban physical development (Simon, 2015; Haughton, 1997) and quality of life (Serag El Din et al., 2013; Theofilou, 2013), primarily involving human resources and physical aspects. It leads to socio-economic development and growth especially in the fields related to the industry, services, tourism, municipalities, and others. The continuity of growth must be adapted to the needs of their population. Especially, consideration for the value-added in social factors involving adolescents and youth. (Michael & Ben-Zur, 2007) quote that the group have different thinking patterns and are always looking for easy ways to meet their needs and wants. Globalization and the process of urban development consistently put pressure on the group who are not ready in terms of maturity of thought and behavior to face challenges. According to (Guidi & Placido, 2015; Lesinskiene et al., 2015; Verma et al., 2014) statistical figures show a definite increase in the problems of adolescents and youth around the world who face social problems, especially those involving big cities.

Generally, adolescents (Casey et al., 2008) and youth's developmental patterns begin through physical and social touch, domains and cognitive skills, morality, and adapt to change. In fact, (Arnett, 1999) states that this group always assumes that living in the city and associating with its heterogeneous population requires excellent communication and decision-making skills.

The phenomenon of social problems among adolescents and youth occurs in parallel and line with the process of modernization, either physically or emotionally. Cultural shock seems to play an essential role in changing the

landscape of adolescent thinking, emotionally and physically. At the adolescent level, an understanding of self-efficacy and self-advantage often leads to an identity crisis among adolescents. As a result, some behaviors are unusual in the norms of life that interpret bad or harmful behavior.

Misinterpretation or confusion in this identity crisis must be handled well to prevent it from getting worse and out of control. This development will directly have a significant impact on the development of the country in the long run.

Therefore, the social problems faced by this generation must be handled well and take into account all the factors that affect the mental and physical development of this group. Planning for their social environment must be the main thrust to monitor and control this group's personality development, which is radical and curious. According to (Fagan et al., 1986; Ballester et al., 2010; Thornberry et al., 1994), those who violated the norms of the community known as deviant group behavior and explained that their abnormal behavior would be known as delinquent when they are in school or youth. (Azmawati et al., 2015) emphasize that risk-taking practices (Leather, 2009) are a hallmark of adolescents that cause them to engage in practices that potentially harm themselves and others. It belongs to the public health problem and significantly requires special attention and action by the relevant bodies. In the urban aspect of adolescents, there are various researchers and discussions from different countries and academic backgrounds to the observed experience of young people in the city. Most of them highlight the most affected group in the urban area and the risk they have to overcome.

RESEARCH BACKGROUND

The whole study discusses social issues and problems among adolescents that occur in the city. Due to the lack of research information related to this group and the effect of rapid urban development towards their behaviour.

Malaysia has been experiencing rapid urbanization since the 1970s and even became the fastest growing country in Southeast Asia in the 1980s. This rapid growth is due to the economic growth of the city under national development policies and strategies in line with the New Economic Policy. With the New Economic Policy initiative, Malaysia has been able to create an excellent municipal network system and meet the people's current needs. It started in the 1970s and is one of the fastest-growing countries in the Southeast Asian region in the 1980s. This rapidity has given many benefits to all groups. There are also adverse effects that must be addressed by all parties. Among them are the social impact and quality of life to adolescents.

The development assumes that the family institutions will play an essential role in providing these groups with the currents of urban modernization. Authentic evidence is needed to support the assumption. However, until now, no

study can be linked between urban growth and social problems of adolescents in the area.

Therefore, this study conducts to explore the relationship between urban development, the utility facilities provided, adolescents, and family institutions in the city. This study will generally evaluate the following questions:

1. Is there a relationship between the structures of adolescent social problems of urban development in the municipality?
2. Is there a relationship between adolescent and family ties in the city?
3. Which family ties, urban structures, and facilities in the town have more influence on teenagers' social problems in the city?

Hypotheses

Hypothesis 1: There are elements of urban development contributing to social problems.

Hypothesis 2: There is no significant relationship between adolescent social problems and urban development.

Hypothesis 3: There was a statistically significant correlation between family ties, urban structures, and facilities in the city closer to the social problems of teenagers in a city

North East Penang is one of the five administrative districts in Penang State. Penang population estimated total out to 1,746,300 with 252,000 from the community is an adolescent ranging from ages 10-19 years old. They were opened in 1786 by Captain Francis Light, George Town, which located in this district and Penang, Malaysia. The area is also the area's most advanced and the most populated in the state of Penang. Penang City Council is the local authority for the study area. It is one of the largest cities in Malaysia supported by other satellite cities, namely Sungai Dua, Tanjung Tokong, Jelutong, Bayan Lepas, Tanjung Bungah, Air Itam and Bayan Lepas. Before the development of Kuala Lumpur, the city of George Town served as a port and financial center in Peninsular Malaysia. It is the oldest city in Malaysia crowned by Queen Elizabeth II on 1 January 1957 as an urban status area.

Formerly the local authority for the city of George Town was the George Town City Council, which established in 1957. However, it was replaced by the Penang Municipal Council (MPP) in 1976. In 2010, it was replaced by the Penang City Council (MBPP) to manage and regulate the rapid development and activities of the growing population.

George Town designated as a UNESCO World Heritage Site in 2008. It has become a significant tourist attraction from within and outside the country. Many shopping malls, namely Gurney Paragon, Gurney Plaza, Prangin Mall, Ist Avenue, Midland, Bukit Jambul Plaza, Queensbay Mall, Penang Times Square, are the focus and interest of the public, including adolescents in the surrounding

area. The growing residential area around the Northeast province of Penang causes teenagers to gather at school or any of their meetings in the city center.

In general, local activities have led to the development of settlements in the surrounding area. It consists of two central districts administered by the Penang City Council, namely the Northeast District, and the Southwest District. This study will focus on the Northeast district area, namely the city center, Tanjung Pinang, Pulau Tikus, and surrounding villages such as Kampung Makam, Kampung Masjid Bagan, Kampung Dodol, Pengkalan Weld, Kampung Rawa, Jelutong and others. The selection of this Northeast area is due to the vibrant economic activities of the population and excellent facilities in terms of infrastructure and utilities that produce an active and harmonious environment. The existence of unplanned and unplanned housing areas, shopping malls, recreation areas, recreational parks has made this area suitable for the characteristics of the study needs.

This environment seems to have a close relationship with the pattern of teenage life (Azmawati et al., 2015; Reijneveld et al., 2010) and contributes to the social problems (Arnett, 1999; Davis & Grier, 2015; Knöll & Roe, 2017) that are increasingly spreading among themselves. This research intends to study the first indicator that is physical changes in urban areas. The continuous increase in population, migration activities, and the expansion of economic and physical space in urban areas have resulted in changes in the urban environment that directly and indirectly affect adolescent activities and their surroundings.

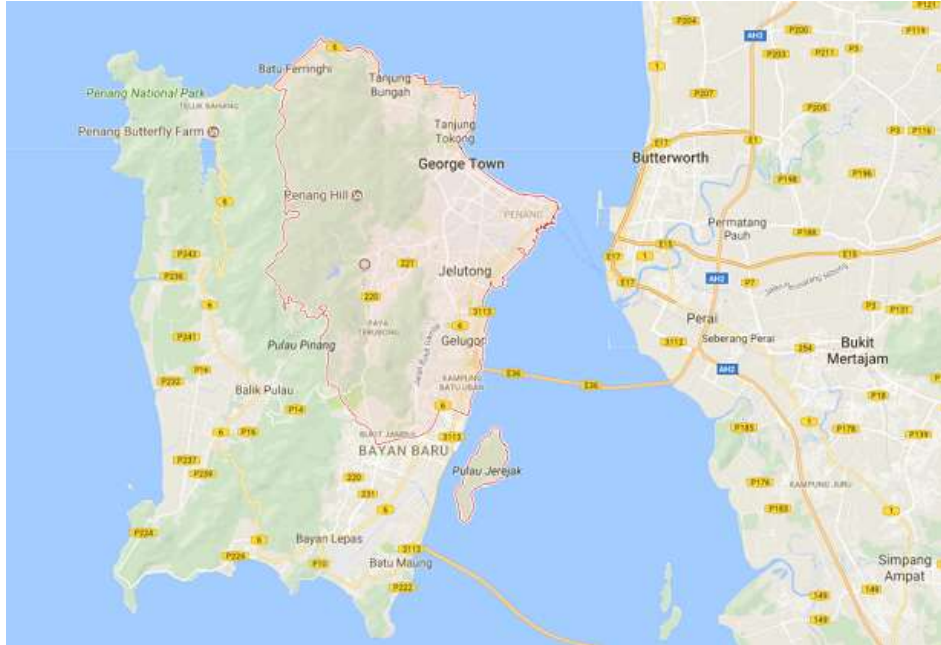


Figure 1: Location Map of North East Penang
Source : Google Map, 2019

METHODOLOGY

The study approach using descriptive analysis (Paul A. Jargowsky, 2005; Henry, 2008; Thompson, 2009) to discuss current situations and circumstances. The purpose of the research design of this study is to answer the central questions of the study and technically to control the variance. The research design's effectiveness and robustness can provide relevant information related to the characteristics and facts of the study population in selected areas. Thus, using the descriptive analysis will provide a more accurate perception of the adolescent and his relationship with urban development and municipal facilities. Therefore, this questionnaire will examine, evaluate, and understand the relevance and relationship of urban development with adolescents who are vulnerable and involved in social issues and problems. For example promiscuity, hanging out, immorality and adultery, alcoholism, smoking and drug addiction (cocaine, marijuana, alcohol, and glue). According to (Babbie, 2015), biases can be reduced with the use of questionnaires as there is no direct influence from the researcher, but the different situations might happen if the researchers are in the same place because they have advantages to ask more specific questions. Interview method can be problematic bias with the times required to interview respondents are very limited.

In this study, the population that determines problem areas needs to be justified. The extent to which and how much data and information should collect and analyzed structurally organized. Random sampling method (Frerichs, 2008; Vitter, 1985) used to levels up the equality and opportunity been to choose in the established cohort. The population of this study includes the high school youth around the Northeast District of Penang Island. There are a total of 37 secondary schools, and their students estimate at 35, 562 people.

A set of questionnaires developed to suit this study—information obtained from a survey containing 53 questions used as the primary data. Likert scales (Likert, 1932) are used for reliability and managed to measure individual characteristics effectively. Also, the instruments used in this study are a questionnaire that divides into four parts; A, B and C, and D.

1. Part A: Consists of subject age, gender, race, religion, educational level of parents, and family income per month.
2. Part B: Consists of the perception of high school teenagers against the city. How often are they go to the town? By whom and how their way into the city? What are they looking for in a town? The number of items is nine items.
3. Part C: This section measures the level of teens' consent on the public structure and its relationship with adolescents itself, namely, infrastructure and facilities that exist in the city, entertainment, and shopping center.
4. Part D: This section consists of the questionnaire related to the profile of the respondents. It is including the measurement of the kid's consent about social problems affecting the youth and its relation to the structure of the municipality. The questionnaire is divided into four parts, as shown in Table 1.

Table 1 : Methods of Data Collection

Section	Variables	Item
A	Background of respondents	9
B	Perception of the city	9
C	The structure of urban development and youth	8
D	Municipal and adolescent	45

Source : Authors 2019

A total of 470 adolescents interviewed for this study. They consist of boys (204) and girls (266) from various schools around the Northeast district of Penang Island aged between 12-18 years. Instrument devices comprise a questionnaire designed to discover the concept of a city public review, urban

setting, and relationship between social problems in urban adolescents, adolescent behaviour, and family ties in the urban community. The questionnaire as a research instrument was done manually to secondary students around the Eastern district of Penang Island. The data collection period took about three weeks to complete. Approximately 470 sets of questionnaires prepared, and interviews conducted at the shopping mall and identified the spot area. At the period, the researcher received and validated only 300 sets of questionnaires. The response rate was 63.8%.

ANALYSIS DATA

Statistical analysis made on the raw data taken through the questionnaire made with the help and using SPSS Version 24. In general, the data analysis made includes descriptive analysis, reliability analysis, and correlation. Table 2 below indicates a response rate of 63.83%. The rest at 36.17% refuse to cooperate because of personal reasons and confidential matters.

Table 2: Response Rate

	Total	Percentage (%)
Questionnaires	470	100.0
Collected Questionnaires	300	63.83
Qualified Questionnaires	300	63.83
Disqualified Questionnaires	0	0
Questionnaires were not collected	170	36.17

Source: Author2019

Table 3 shows the demography profile, namely age group, gender, academic stream, religion, and parental control.

Table 3: Demography Profile (n = 300)

	Frequency	Percentage (%)
<u>Age Group</u>		
12-15	93	25.7
16-18	207	74.3
<u>Gender</u>		
Male	132	43.4
Female	168	56.6
<u>Academic Stream</u>		
Art	67	22.3
Commerce	44	14.7
Science	121	40.3

Vocational	15	5.0
Others	53	17.7
<u>Religion</u>		
Muslim	205	68.3
Cristian	79	26.4
Buddhist	3	1.0
Hindu	13	4.3
<u>Parent Occupation</u>		
General Worker	95	31.7
Government Servant	52	13.3
Businessman	115	38.3
Others	38	12.7

Source: Author 2019

Five comprehensive profile indicates that dominantly 74.3% age group at 16-18 and the rest age at 12-15. As for gender, female respondents at 56.6% extra 13.2% from the male. With an academic stream at 40.3% for science followed by art at 22.3% and the lowest at 5.0% for Vocational. The rest of 14.7-17.7 percent. The religious profiles reveal that more than 50% of the respondents are Muslim, with 68.3% followed by Cristian at 26.4%, the rest Buddhist, Hindu, and others. People in business with 38.3% lead the parent occupation, followed by general workers at 31.7%, and the rest are government servants and others.

Table 4: Relationship Between School and Town (n = 300)

	Frequency	Percentage (%)
<u>Residential Town</u>		
George Town	181	60.3
Bukit Jambul	46	15.3
Ayer Itam	18	6.0
Gelugor	10	3.4
Jelutong	17	5.7
Tanjung Tokong	18	6.0
Tanjung Pinang	10	3.3
<u>School Near to Shopping Complex</u>		
Yes	260	86.7
No	40	13.3
<u>Distance from School to the Nearest Shopping Complex</u>		
More than 1 km	85	28.3
Less than 1 km	77	25.7
Less than 500m	50	16.7

School in the city	46	15.3
Other	42	14.0

Source: Authors 2019

Table 4 revealed that 60.3% of the respondents come from the George Town area, followed by the Bukit Jambul area with 15.3% and the rest from the nearby area. 86.7% admit that the school near to shopping complex and the rest answers is no. Distancing school from shopping complex indicates that 28.3% respondent school is more than 1 kilometers. They are followed by the rest with below 1-kilometer distance from their school.

Table 5: Relationship Between Urban and Youth (n = 300)

	Frequency	Percentage (%)
Time frame to town		
After school hour	83	27.7
At night	54	18.0
Weekend	120	40.0
Other	43	14.3
Companion to Town		
Parent	41	13.7
Relatives	54	18.0
Friends	161	53.7
Couple	44	14.6
Purpose to town		
Personal Accessories	75	25.0
School Accessories	27	9.0
Food	55	18.3
Cloth	24	8.0
Cyber Café	17	5.7
Cinema	48	16.0
Snooker	27	9.0
Bar/Night Club/Disco	27	9.0
Favorite Place in town		
Shopping Mall	186	62.0
Cinema	54	18.0
Cyber Café	42	14.0
Restaurant	13	4.3
Other	5	1.7

Time frame spending at town	142	47.3
Less than 5 hours	158	52.7
More than 5 hours		

Source: Authors 2019

Table 5 indicates the relationship between urban and youth with five indicators to town: time frame, companion, purpose, favorite place, and time spending. 40.0 % of respondents initiate to went to town during the weekend, followed by 27.7% went after school hour, and 18.0 % went at night hour. The rest 14.3% depending on the situation. Half of the respondents went to town with their friends as companions. Relatives followed them at 18.0% and their parents at 13.7%. The rest went out as a couple with 14.6%. The purpose of the outing to the town with various reasons from individual needs to grouping and gathering. 25% of them indicate buying or finds personal accessories, followed by searching for food and beverages at 18.%. 16.0% of the respondent went for cinema, and the rest at 9.0% each go for cyber cafe, snooker, and night club. Approximately 62.0 % or more than half of the respondents go to the shopping mall. Respondents follow them to the cinema with 18.0% and to the cyber cafe at 14.0%. The rest at 4.3% to restaurant and other at 1.7% depends on the situation. Finally, times spending indicates that most of the respondents spend more than 5 hours with 52.7%, and the rest is going back not more than 5 hours.

Table 6: Reliability Analysis

	No Item	Cronbach's alpha
City Development Structure	8	.860
Teen perception on city development	9	.910
Municipal and teen social problems	45	.984

Source: Author 2019

The result from Table 6 indicates that the minimum values of Cronbach's alpha (Christmann & Van Aelst, 2006; Bland & Altman, 1997; Cronbach, 2016) reliability coefficient are more than .8. According to (George & Mallery, 2003) and quote by (Hanafi et al., 2018), following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable”. It should also note that an alpha of .8 is probably a reasonable goal. It should also note that a high value for Cronbach's alpha indicates the good internal consistency for the items in the scale (Gliem & Gliem, 2003)

Table 7: Correlation Analysis between Variable

		Gender	Age	Religion
Gender				
Pearson Correlation		1	-.188**	.237**
	Sig.(2-tailed)		.001	.000
	N	300	300	300
Age				
Pearson Correlation		-.188**	1	.074
	Sig.(2-tailed)	.001		.200
	N	300	300	300
Religion				
Pearson Correlation		.237**	.074	1
	Sig.(2-tailed)	.000	.200	
	N	300	300	300

** Correlation is significant at the 0.01 level (2-tailed)

Source: Author 2019

Table 7 summarises the relationship between the variables in the study. The hypothesis assumes almost no significant differences between the two variable elements, adolescent and municipalities. The result shows that adolescent problems happen to the city have no specific relationship to gender and youth. The average social delinquents nearly the same between boys and girls, and they are young is increasing, i.e., in the range of 12-18 years. However, there are significant differences concerning religion, which shows that adolescent Malay Muslims are most heavily involved in social problems in cities. The results as follows:

Hypothesis 1: There are elements of urban development contributing to social issues.

- The relationship between the aspects of the municipality tested against the involvement of social problems among teenagers. The findings show that urban elements influence the social issues that exist among adolescents. The mean for all questions related to local factors in Part B, C, and D is between 4.14 - 4.78. Hence, Hypothesis 1 accepted

Hypothesis 2: There is no significant relationship between adolescent social problems and urban development.

- The relationship between adolescents, social issues, and urban development. The results indicate a significant relationship between these two variables ($r = 0.156$, $n = 407$). The finding means that there is a relationship between variables on the adolescent with urban development. Thus, Hypothesis 1 accepted

Hypothesis 3: There was a statistically significant correlation between family ties, urban structures, and facilities in the city closer to the social problems of teenagers in a city.

- The relationship between family ties, the building of the city, and the city's facilities closely associated with the social problems of teenagers in a city. The result shows that there is a significant relationship between the two variables ($r = 0.132$, $n = 407$, $p < 0.05$). The relationship between family ties and structural variables municipal adolescents is equally significant, indicating equal contributed to social problems in urban adolescents. Thus Hypothesis 3 also received equally.

CONCLUDING REMARK

On the whole, rapid modernization or development has changed our society's way, especially the youth. The results showed that the elements of urban development and family ties have a significant relationship in the adolescent. Among the aspects of the city and the municipality that contribute to teens' social problems are shopping malls, entertainment centers, and many discos around this study area. Also, loose family ties with busy working parents cause neglected and abandoned youth drifting in the current city dreamy opulence. The objective of this study is to find the relationship between adolescent social problems and urban development. The findings revealed from this study suggests that the bonds of kinship, urban structures, and facilities in the city are equally contributing to adolescent social problems. The result indicated that teens who live in the city or near the city are more vulnerable to social problems. These issues are no longer sweeping the developed countries but also have spread to developing countries like Malaysia. It has become another social issue that needs to be shared to create a sustainable society. In conclusion, this study shows that the development and elements of municipal facilities and family ties that include parents' role have a strong influence on youth involvement in social problems. Thus, further research needs to explore in gaining more information about these issues and values through a viable urban development strategy in addressing social problems among adolescents in the city.

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LANDSCAPE CHARACTERS FOR TOURISM ROUTES: CRITERIA TO ATTRACT SPECIAL INTEREST TOURISTS TO THE KUALA SELANGOR – SABAK BERNAM ROUTE

**Khalilah Zakariya¹, Roziha Che Haron², Izawati Tukiman³,
Syakir Amir Ab. Rahman⁴, Nor Zalina Harun⁵**

^{1,2,3,4}Kulliyah of Architecture and Environmental Design

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

⁵Institute of Malay World and Civilisation

UNIVERSITI KEBANGSAAN MALAYSIA

Abstract

Tourism routes connect the city to the rural areas by linking a variety of activities and attractions. Tourism activities stimulate entrepreneurial opportunities through the development of ancillary products and services. The planning of resources and attractions along the route can be integrated to support the development of a region, conservation and rejuvenation of cultural and natural resources. An attractive route can attract special interest tourists whose travel motivation is to experience the rural environment. This paper examined the landscape characters found along the rural route of Kuala Selangor to Sabak Bernam in Selangor, Malaysia. Based on 250 survey questionnaires among locals and tourists, this study evaluated the importance of nine criteria of the rural tourism route. The findings suggested that the intangible criteria are pertinent to support the tangible criteria. This paper concludes by recommending ways to improve the landscape characters of the route to enrich the tourist experience.

Keyword: drive tourism, landscape character, rural tourism, tourism route

¹ Associate Professor at Dept. of Landscape Architecture, KAED, IIUM. Email: khalilah@iium.edu.my

INTRODUCTION

Scenery and setting of a destination are essential components in tourism routes. The characteristics of rural landscape along the road can enhance the attractiveness of a tourism destination. Rural tourism depends on the rural landscape characters. Traditional villages and agricultural landscapes need to be conserved and become productive, and tourism activities can become their means of sustainability. This study examined the characteristics of the landscape settings along the west coast route of Selangor, Malaysia, which is from Kuala Selangor to Sabak Bernam. This route is part of the federal road that goes through five areas comprising of towns, rural settlements, agricultural lands, and tourist attractions (Abdul Wahab et al., 2018). The first objective of this paper is to identify the typology of visitors that visit rural areas. The second objective is to outline the significant rural landscape characters for tourism routes as scored by the visitors. The findings from this study outlined the landscape characters that are significant to the planning of tourism route so that it can be sustained alongside the physical development of rural areas.

RURAL LANDSCAPE IN TOURISM

Rural landscape in this study is defined as a setting that has a prominent physical landscape and is mostly inhabited by the local community that still maintains traditional lifestyle and practices. The process of shaping the rural landscape is undertaken consciously or unconsciously by many different attributes including plants, hills, sea, river, buildings and roads (Harun and Jaffar, 2018; Zakariya et al., 2017). Landscape setting as the image for the rural area is mobilised for a wide variety of purposes that range from ecosystem services to exhaustive experiences that motivate and stimulate tourism activities. The link between rural landscape as an experience and tourism activity is often associated with cultural industries and rural placemaking. Traditional villages, homestays and the rural lifestyles can enrich the experience of visitors. The relationship between landscape and experience demonstrate that rural landscape characters are essential elements that need to be conserved and preserved to attract visitors to visit the rural area.

The National Landscape Department (2012) asserts that the identity of the Malaysian landscape can be recognised and enhanced by conducting landscape character assessments. The landscape features, such as the physiographic character and landform, water body and land cover are the landscape characters at the bigger scale (National Landscape Department, 2012; Brush, Chenoweth and Barman, 2000). The natural landscape can be seen through its types of vegetations, landform and topography (Jaal and Abdullah, 2011). Some of the natural sites become attractions for visitors to do nature-based

recreational activities. Likewise, the beautiful scenery is one of the considerations taken by a driver when choosing a route for sightseeing (Hasuike et al., 2013).

The local culture in its geographical setting is an essential aspect of the rural area, as it represents the spirit of the place that shape the senses and nostalgia. The rural atmosphere and local attractions become assets for rural tourism (Fatimah, 2015). Activities such as agriculture activities, playing traditional games, making local crafts, and eating traditional food could enrich the rural tourist experience and cater for different tourist segments. History is also an important component that encapsulates the tangible and intangible values of the past in a place, such as through historical sites, languages, customs and legends (Brown & Brabyn, 2012; Harun, 2018). This experience is enhanced by the settings of built elements in the rural area, such as traditional architecture, landmarks and rural structures (Mohd Hussain and Byrd, 2011).

TOURISM ROUTE IN RURAL AREAS

The facilities and infrastructure of the rural routes are essential for a rural tourism destination. Hashim et al. (2013) mentioned that efficient routes would be the chosen route for visitors. The efficient routes should have enough facilities such as petrol station, resting area, public toilet, food stalls and convenient stores. The visitors will usually select a route that seems most interesting to them. The two common options for drivers and motorists are either the highway or the rural route. For locals and visitors using public transportations in the rural areas, concerns should be emphasised on frequency, punctuality, safety and reliability (Ponrahono et al., 2015). Time-dependency is one of the main factors that tourists use to choose the routes. This factor is vital because it determines the duration of travelling and satisfaction values of activities (Hasuike et al., 2013). The shortest route often will be chosen because the visitors could reach the destination in a shorter period, so that they could have more time to enjoy their holiday at the destination (Hashim, Ismail & Ahmad, 2013). However, if the travel motivation is to experience the attractions along the way, then a longer or rural route may be chosen, so long that the route fulfils the needs of the visitors.

Scenic route between two locations plays a vital role for the visitors to choose. Alivand et al. (2015) mentioned that different routes have different environmental attributes that could attract the tourist. Sightseeing activity and lookout points along the way are some of the important components of tourism route planning as it can influence visitors' choices (Hasuike et al., 2013; Hu & Ritchie, 1993). A number of researchers found that visitors are attracted to rural environment and attractions due to several factors: the image of rurality (Saxena et al., 2007), the traditional and authenticity (Iaquinto, 2015), sentimental values with personal associations (Dolnicar et al., 2008), integration with natural environment (Lee & Jan, 2015; Serenari, 2012), integration with local community

(Mcarthy, 2008; Kastenholz et al., 2018), outdoor and recreational education (Park et al., 2014; Huang et al., 2016). Recently, the rural visitors’ motivation is likely to avoid the mass and hectic atmosphere of city pressures, such as noise, pollution, workload and climate (Li et al., 2020; Wang & Yotsumoto, 2019). Other motivational factors that is linked to rural tourists especially in South East Asia is associated with the family origins and visiting family and relatives living in rural areas (Molera & Albaldejo, 2007), especially during festive seasons. Over time, the rural tourism routes require rejuvenation in terms of planning and design (Pesonen & Komppula, 2010).

For the rural area, tourism infrastructure includes the physical components that are designed and erected to cater and facilitate the visitors’ needs along the side of the road. Physical infrastructure can come in the form of hotels, campsites, restaurants, and sports facilities. The integrated road from one village to another or a direct route from the urban area could attract visitors to visit the rural area (Hasuike et al., 2013). Good infrastructure such as convenient stores, money changer, effective signage and information centre could increase the number of tourists to visit a rural area when they travel. Irshad (2010) highlighted that people travel to the rural areas to experience the various attractions, activities and the village's culture.

Based on the literatures, Table 1 below categorises and summarises nine criteria and their attributes that contribute to the attractiveness and efficiency of rural tourism routes:

Table 1: Rural landscape characters and infrastructure for tourism route

Criteria 1: Rural Culture	Criteria 2: Recreational Activities	Criteria 3: Traditional Built Environment	Criteria 4: Agriculture	Criteria 5: Nature and Landscape Features
Traditional villages, homestay, rural lifestyle, traditional wear, local food and products	Traditional games, agrotourism, extreme sports, festival and events, user-based activities	Traditional houses, rural structures (foot bridge, wakaf, etc.), local landmarks, local materials	Crops, plantations and farms, fishery, cottage industry and livestock	Natural landscape (hills, mangrove, river), village landscape, nature-based recreation
Criteria 6: History and Heritage	Criteria 7: Sensory and Experience	Criteria 8: Infrastructure and Facilities		Criteria 9: Accessibility
Language, historical sites, traditional customs, legends /myths /folklore	Rural scenery, rural sounds, rural smells, nostalgia	Petrol station, directional signage, public toilets, religious facilities, rest area, accommodation	Lookout points, interpretive signage, visitor centre, ATM, convenient stores	Good road system, distance between destinations, public transportation, parking

METHODOLOGY

The method employed for this study is through surveying the locals and the visitors. A total of 250 respondents comprising 125 locals and 125 visitors (local visitors and foreign tourists) responded to the questionnaires. The responses were collected based on random samples distributed at five main towns: Kuala Selangor, Tanjung Karang, Sekinchan, Sungai Besar and Sabak Bernam. The questionnaire is formulated based on criteria found to contribute to the rural landscape character for tourism route planning, as shown previously in Table 1. Respondents were required to score the level of significance of each criterion and the attributes between the Likert scale score of 1 to 10. 1 is least significant and 10 is most significant. The results were analysed using the mean scoring rank of attributes under the rural landscape characters criteria (rural culture, traditional built environment, agriculture, nature and landscape features, history and heritage, recreational activities, and sensory and experience, with a total of 32 attributes) and tourism infrastructure criteria (infrastructure and facilities, and accessibility, with a total of 16 attributes).

RESULTS AND ANALYSIS

Respondents background

50% of the respondents are the local people residing in the area of study, and another 50% are the visitors, which are from Malaysia and international tourists. 26.3% of the visitors are from various states in Malaysia, such as Penang, Perak and Sabah. 1.8% of the visitors are the international tourists from Germany, Italy, USA and Beijing. The majority of the survey respondents are aged between 21-25 (37%) and 16-20 (29%). There is also a relatively balanced distribution between female (58%) and male (42%) respondents. A large percentage of them came with their families (81%) and individually (11.2%). The majority of the respondents visit this area during festivals or events (89.5%) and occasionally (2.9%).

Significant rural landscape characters

All 32 attributes of rural landscape characters measured in this study received mean scores of 6.0 and above. The highest mean score is 7.65 (Agriculture: Crops) and the lowest mean score is 6.14 (Recreational Activities: Traditional games). On the scale of 1 to 10, where 10 is most significant, the scores rated by locals and tourists on the attributes of rural landscape characters show the significance of all attributes to represent the rural landscape characters. When the attributes and their mean scores are ranked, the results reveal that the top ten attributes belong to six criteria, which are agriculture, history and heritage, rural culture, nature and landscape features, recreational activities and traditional built environment (refer Table 2).

Table 2: Significant attributes for rural culture

Criteria	Attributes	Mean	Rank
Agriculture	Crops	7.65	1
History & Heritage	Language	7.42	2
Agriculture	Fishery	7.38	3
Rural Culture	Fishermen village	7.38	3
Rural Culture	Local food	7.33	5
Nature & Landscape Features	Nature-based recreation	7.31	6
Agriculture	Cottage industry	7.29	7
History & Heritage	Traditional customs	7.22	8
Recreational Activities	Agricultural activities	7.22	8
Traditional Built Environment	Local landmarks	7.22	8

Agriculture

Agricultural lands are usually the most visible landscape character along the rural route due to their large plots. The most significant attribute for the rural landscape characters in this study is crops (7.65). Other significant agricultural attributes are fishery (7.38) and cottage industry (7.29). Agriculture and fishery activities are determined by the physiographic characters and natural resources of the area. In the Kuala Selangor – Sabak Bernam route, the paddy fields are the most prominent agricultural feature of the area (refer Fig. 1).

History and heritage

History and heritage connect strongly to the local people, their roots and locations. Language (7.42) is the second most significant attribute of the rural landscape. While language is intangible, local dialects can denote the geographical location of an area and become part of the rural ambience. Another significant attribute is traditional customs (7.22). Traditional customs are commonly promoted as part of rural tourism as it allows visitors to feel like a local and have the opportunity to interact with the locals (refer Fig. 2).



Rural landscape

Rural culture is shaped by the natural and cultural resources of the place. The results show that respondents regarded the fisherman village (7.38) and local food (7.33) to be significant attributes of rural culture. Fishermen village is unique to certain places that are located by the river or the sea. Local food is also influenced by the resources available in the area. In Kuala Selangor, *mentarang* is a type of shell-fish that is special to the area (refer Fig. 3).

Nature and landscape features

Nature and landscape features are composed of village landscape, nature-based recreations and the natural landscape such as hills, mangrove and others. However, it is surprising that nature-based recreation (7.31) was found to be more significant than the natural landscape setting (6.97). Since these two attributes are interrelated, the results show that visitors prefer to experience nature through recreational activities rather than just observing nature (refer Fig. 4).



Figure 3: Grilled *Mentarang*



Figure 4: Visitors can go to the peak of Bukit Malawati to enjoy this view

Recreational activities

Recreational activities include agricultural activities that visitors can participate, traditional games, extreme sports, festivals, events and activities for different user groups. Agricultural activities (7.22) is significant to the rural landscape character since agriculture has been acknowledged to be the most significant criteria.

Traditional built environment

The traditional built environment consists of local landmarks, local materials, traditional houses, and rural structures. The most significant attribute in the traditional built environment is local landmarks such as mosques and temples (7.22). Their architectural design and location make them stand out from the other built environment features.

Significant tourism infrastructure

16 attributes of tourism infrastructure measured in this study received mean scores of 6.0 and above. The highest mean score is 7.56 (Infrastructure & Facilities: Religious facilities) and the lowest mean score is 6.03 (Accessibility: Public transportation). The scores rated by locals and tourists on the attributes of tourism infrastructure show the significance of all attributes to facilitate tourism activities in the rural areas. When the attributes and their mean scores are ranked, the results reveal that the top ten attributes belong mostly to infrastructure and facilities (refer Table 3).

Table 3: Significant attributes for tourism infrastructure

Criteria	Attributes	Mean	Rank
Infrastructure and facilities	Religious facilities	7.56	1
Infrastructure and facilities	Directional signage	7.49	2
Infrastructure and facilities	ATM / money changer	7.44	3
Infrastructure and facilities	Petrol station	7.39	4
Infrastructure and facilities	Public toilets	7.32	5
Accessibility	Good road system	7.08	6
Infrastructure and facilities	Interpretive signage	7.01	7
Infrastructure and facilities	Accommodation	7.01	7
Infrastructure and facilities	Lookout points	6.92	9
Infrastructure and facilities	Convenient stores	6.82	10

Infrastructure and facilities

Infrastructure and facilities along the tourism route are important to support the tourist experience. The respondents regarded the facilities listed in Table 3 to be significant attributes in the rural area during their travels. Most of these integrated facilities can actually be found at the rest areas and some are provided at the petrol stations. The provision of quality infrastructure and facilities can create a positive travel experience for visitors.

Accessibility

Interstate and regional traveling require good road systems since most of the visitors travel through the rural areas using their own mode of transportation. Good accessibility also includes safety for a smooth journey. Routes that are well connected with attractions and facilities as discussed in the previous findings can contribute to the attractiveness of the journey along the rural areas.

DISCUSSION & RECOMMENDATION

Nine criteria of rural landscape characters for tourism route and their attributes have been examined based on their significance. The most visible criteria along the route are agriculture, nature and landscape features, and traditional built environment. These physical characters create the setting of the rural landscape and they are easily identifiable through sight. Major crops of the area form the rural landscape character, and rural tourism and agrotourism can be alternative means to how the agricultural plots can be sustained. For the Kuala Selangor – Sabak Bernam route, the paddy fields in Sekinchan and Sungai Besar have become one of the main icons in the area. Nature-based recreation should also be promoted as part of rural activities. In the study area, watching the fireflies at night is one of the nature-based activities that visitors can do along the river and mangrove. Nature seems to be more appreciated when they can be experienced. On the other hand, local landmarks such as mosques, temples and other religious institutions should be conserved and sustained as part of the rural landscape, especially when they portray the local architecture.

History and heritage, rural culture and recreational activities are criteria that need to be experienced by visitors. Their significance show that the intangible criteria are as important as the tangible criteria for the visitor to experience. Since tourism is an industry that offers experience as a product to its visitors, these intangible criteria shape the primary aspect of the rural landscape character. The opportunities for visitors to conduct activities along a rural route will differentiate a regular rural route from a rural tourism route. Language and traditional customs attributes that can only be experienced once the visitor engages in the activities at the site, rather than just driving by. Local food and site-specific traditional villages such as the fishermen village can give the visitors a unique experience. The agricultural activities can set the rural areas apart from urban or island tourism attraction. The significance of these attributes suggests that rural tourism routes need to be planned with activities for it to be worthwhile to be visited.

CONCLUSION

This study concludes by proposing the way forward to sustain rural landscape characters for tourism routes. Natural and cultural resources shape the landscape characters, and therefore, they must not be left out in the future planning of rural areas. A collaboration among landscape architects, planners, local authorities and key players in the tourism industry is essential to ensure that planning is wholistically done by taking into account the local resources into future developments. Programmes and activities to educate the locals and tourists about the uniqueness of the place can also make people more appreciative of the local culture, become potential businesses, and enhance the tourist experience. A

positive experience can become word-of-mouth promotion and encourage potential repeat visits. As found in this study, tourism infrastructure is integral, and they need to be well-maintained. The provision of quality infrastructure can enhance the overall tourist experience. The future development of the rural areas needs to recognise these criteria as crucial assets for it to be beneficial to both the locals and the visitors.

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CHALLENGES OF SMART TOURISM IN MALAYSIA ECO-TOURISM DESTINATIONS

Syakir Amir¹, Nur'Hidayah Dura², Muhamad Asrah Yusof³, Hitoshi Nakamura⁴, Rahmat Abu Nong⁵

*^{1,2,3}Department of Urban and Regional Planning
Kulliyah of Architecture and Environmental Design
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA*

*⁴Department of Planning, Architecture and Environmental Systems
SHIBAURA INSTITUTE OF TECHNOLOGY*

*⁵Department of Digital Forensics
MALAYSIAN COMMUNICATIONS AND MULTIMEDIA COMMISSION*

Abstract

Smartness helps in transferring and sharing information to facilitate tourism industry optimizing performance and competitiveness, generating solution for asset evaluation and shaping tourism products and services in a real-time. In Malaysia, tourism industry is moving forwards to acknowledge smart tourism concept as Malaysia Smart Tourism 4.0 initiatives is launched recently. Therefore, this study aims to identify challenges of smart tourism application in Malaysia. 400 respondents among domestic and international tourists were recruited for the study, using questionnaire survey in two eco-tourism destination, Pulau Langkawi and Cameron Highland. Chi-square test was used to assess the challenges. Awareness, security and privacy, and implementation mechanism of smart tourism are among the highest challenges were observed. This study extends for a new establishment of proper and comprehensive framework of smart tourism in Malaysia.

Keyword: Smart Tourism; Challenges, Domestic and International Tourists

¹ Senior Lecturer at International Islamic University Malaysia Email: syakiramir@iium.edu.my

RESEARCH BACKGROUND

In recent years, the word ‘smart’ has become a new buzzword in reflecting technologies in social (Deepti & Tooran, 2020) and economic developments (Caragliu et al., 2011), as well as exchanging knowledge and information (Vanolo, 2013; Vasavada & Padhiyar, 2016). The emergence of smart devices is highly favourable as it connects infrastructures with network available. This idea is conceptualised by Harrison et al. (2010), where smart was exploiting functional real-world data and near-real time to improve functional commitments through adopting analytical modelling, visualization and optimization. As cities become increasingly competitive, the smart technologies have leading and connecting everything together, including activities and services to be more connected, better informed and engaged with consumers (Bakici et al., 2013; Buhalis & Amaranggana, 2013; Lee et al., 2014), practically for tourism industries as a whole. On that count, tourism become more accessible and enjoyable for all while having interconnect services and better coordination provided by local organizations. However, Malaysia showing fewer studies on application of smart tourism as it still at early stage which tourism destinations are still looking for their own rhythm to survive. there are several issues have arisen for more further consideration, which are no specific framework, numeral global scale crises inclining negative impacts towards tourist arrivals and environment, as well as poor digitalisation urged drop-off tourist experiences and tourism development in Malaysia. As moving forward to application of smart tourism, Tourism Malaysia has launched Malaysia Smart Tourism 4.0 in boosting the usage trend of digital technology that giving impact towards travel demand and tourism-related businesses, specifically among the tourists. This study aims to analyze the interrelationship of smart tourism challenges among domestic and international tourists.

TOURISM

The United Nations World Tourism Organization (UNWTO) gives specific definition of tourism as “the activities of a person travelling to and staying in place outside their usual environment for not more than one consecutive year for leisure and not less than 24 hours for business and other purposes” (UNWTO Technical Manual, 1995, p.10). To simplify, tourism is a physical travel movement for many purposes such as leisure and practice the theory of business if attracting, accommodating, operating tours and entertaining tourists. It can be inbound tourism and outbound tourism, which involving inbound tourists and outbound tourists. Significantly, tourism contributes to economy (World Tourism Organization, 1980), which impacted directly and indirectly (Lee & Chang, 2008) which become an important economic generator for many regions and even for the entire countries around the globe. As for Malaysia, tourism industry has experienced rapid growth towards governmental endeavours and intensive

campaigns (Ng et al., 2016). It is proved from Tourism Satellite Account 2018 that recorded literally the tourism industry continued its contribution significantly towards Malaysia's economy, about 15.2% in 2018 compared to 14.6% in 2017 (Department of Statistics Malaysia, 2019). Hence, the Eleventh Malaysia Plan focused on targeting high yield tourists in order to stimulate the economic contribution and one of key drivers in the service sector.

SMART TOURISM

Recently, Information and Communication Technologies (ICT) has opened up a new tool for tourism industry (Buhalis & Amaranggana, 2014). It is a new innovation of approach and business model for tourism (Korkmaz et al., 2018) as Liu (2005) believes that tourism is one of leading industries to support both communication with customers (business-to-customer) as well as with other businesses (business-to-business), which commonly known as e-business. Although the physical characteristics of a place may attract the tourist, however, services and technological offering also have a strong impact towards tourists' psychological perception of a destination. For example, tourists could simply use their digital devices to explore much information about the destination and event of interest. Nowadays, tourism destination is facing a set of new challenges arising from both consumers and the environment itself as it influenced by the emerging of technologies that involved tourist's demand goods and services to improve their quality of life and enhance their experiences (Lamsfus & Alzua-Sorzabal, 2013). Therefore, ICT plays an important key role in shaping future of tourism. On that count, tourism destination can recognize the kind of changes that occurred as well as proactively respond to deal with issues and challenges (Soteriades & Aygeli, 2007).

Previously, ICT never been binding with travel experience and tourism management (Ollerenshaw et al., 1999). Before the commercialization of internet, it is used for travel and tourism (Sheldon, 1997). It transforms the tourism experience by bringing together related information, social networking and mobility-related functionalities with the widespread use of mobile technology, just onto the fingertips of the tourists (Tussyadiah & Zach, 2012). Potentially, tourism has transformed into a smart tourism by taking advantages from intelligent system into the demands of industry due to present application of advance technology (Gretzel, 2011). On that count, recent smart tourism relies on extensive adoption of emerging technologies, such as social media and mobile technology in creating new value propositions by collecting and exploiting the huge amount of big data (Gretzel et al., 2015). It will provide a result of interconnecting tourism activities with multiple community stakeholders through dynamic platforms, acknowledging intensive communication flows and enhancing decision support system.

METHODOLOGY

Questionnaire survey was chosen as the data collection method. The sample consisted of 400 respondents using simple random sampling approach. The questionnaire survey was distributed in two tourism destinations, namely Pulau Langkawi and Cameron Highlands. Two categories of tourists were participated, namely domestic and international tourists. The data that consists of perspectives results of ten smart tourism challenges as items were plotted and analysed with chi-square analysis. The ten challenges are based on the literature reviews. (1) tourists have difficulties with application systems (Ritchie et al., 2011; Fanselow, 2018), (2) Low proficiency in digital technology (Wang et al., 2020), (3) Limited and slow internet network (Chatterjee & Kar, 2018), (4) Tourists not afford for digital devices (Gupta & Hall, 2017), (5) Unclear definition and concept (Odendaal, 2011; Datta, 2015), (6) Less and limited digital technology applications (Fanselow, 2018), (7) Applications in all tourism sectors and businesses (Neuhofer et al., 2013), (8) Declining of locals involvement and benefits (Caber et al., 2016; Syahriah Bachok et al., 2018), (9) Less privacy and security of personal information (Boes et al., 2016), (10) Less awareness and understanding (Kang et al., 2006).

ANALYSIS AND FINDINGS

Table 1: Chi-square test: Tourist types and smart tourism challenges

Chi-Square Test :					
Tourist Types (Domestic & International) and Smart Tourism Challenges					
Smart Tourism Challenges	df	P-value	Decision	Cramer's V	Strength
Difficulties with application systems	1	.017	Significant	.23	Small
Low proficiency in digital technology	1	.062	Not significant	-	-
Limited and slow internet network	1	.029	Significant	.31	Medium
Do not afford for digital devices	1	.038	Significant	.44	Medium
Unclear definition and concept	1	.107	Not significant	-	-
Less and limited digital technology	1	.014	Significant	.75	Large

Application in all tourism businesses	1	.042	Significant	.18	Small
Declining of locals involvement and benefits	1	.056	Not significant	-	-
Less privacy and security of personal information	1	.082	Not significant	-	-
Less awareness and understanding	1	.033	Significant	.39	Medium

Source: Questionnaire survey, 2020

Table 1 above presents the chi-square test of independence to examine the relationship between types of tourists and smart tourism challenges. The result findings are as follows:

Application System

“Difficulties with application systems”, the relationship between these variables was statistically significant, $X^2(1, N = 400)$, p value = .017, with the effect size V of .23 signified a small effect. It illustrates that both types of tourists had difficulties with the applications in tourism services.

Digital Technology Proficiency

“Low proficiency in digital technology”, the relationship between the challenge and tourists types was statistically not significant, $X^2(1, N = 400)$, p value = .062.

Internet Network

“Limited and slow internet network”, the relationship between the challenge and tourists was statistically significant, $X^2(1, N = 400)$, p value = .029, with the effect size V of .31 signified a medium effect. It shows that the domestic and international tourists had the limitation access of internet network in the tourism destinations.

Digital Devices

“Do not afford for digital devices”, the relationship between the challenge and tourists was statistically significant, $X^2(1, N = 400)$, p value = .038, with the effect size V of .44 signified a medium effect. It shows that both tourists believe that the digital devices are costly for a budget trip.

Smart Tourism Concept

“Unclear definition and concept”, the relationship between the challenge and tourists types was statistically not significant, $X^2(1, N = 400)$, p value = .107.

Digital Technology Availability

“Less and limited digital technology”, the relationship between these variables was statistically significant, $X^2(1, N = 400)$, p value = .014, with the effect size V of .75 signified a large effect. It shows that the challenge of limited access to the digital technologies and devices is highly encountered by most the tourists.

Tourism Business

“Application in all tourism businesses”, the relationship between tourist types and the challenge was statistically significant, $X^2(1, N = 400)$, p value = .042, with the effect size V of .18 signified a medium effect. It illustrates that tourists believed that not all tourism businesses and operators are providing smart tourism services and applications.

Community Involvement

“Declining of local community involvement”, the relationship between the challenge and tourists types was statistically not significant, $X^2(1, N = 400)$, p value = .056.

Personal Information

“Less privacy and less security of personal information”, the relationship between the challenge and tourists types was statistically not significant, $X^2(1, N = 400)$, p value = .082.

Awareness

“less awareness”, the relationship between the challenge and tourists was statistically significant, $X^2(1, N = 400)$, p value = .033, with the effect size V of .39 signified a medium effect. It illustrates that most of the tourists and tourism businesses operators have less awareness on smart tourism implementations.

DISCUSSION AND RECOMMENDATIONS

The results observed that both domestic and international tourists equally considered the implementation of smart digital applications in tourism destinations are complicated and difficult, limited internet network, high cost for the devices, less implementation of all tourism activities and businesses, and less awareness among tourists and community. Moreover, both categories of tourists strongly agreed that the digital technology and facilities are limited and difficult to access. It illustrates here that this new culture of tourism seems complicated that required a digital intelligence whereas other countries have proven success. Principally, time needs to be given for Malaysians, to incorporate the new capabilities to face the digital challenges in the new ecosystem of tourism, particularly adapting the unstable pandemic of Covid-19.

Despite of its importance and characteristics, smart tourism indeed outlined several challenges that are facing by domestic and inbound tourists that need for an improvement. Therefore, several specific recommendations are outlined to improve smart tourism in Malaysia tourism destinations, not forgotten for including other components such as smart economic, smart environment, smart people, smart government and mobility in the implementation. Firstly, the tourist experience can be improved in particular destinations with the implementation of virtual reality (VR) and augmented reality (AR). With Industrial Revolution 4.0 applications in the tourism industry, sophisticated directory products that all processes and procedures of holiday package are displayed on the market can come into being by virtual reality. Such applications would be able to remove the intangibility, inseparability, variability, and uncertainty characteristics of the tourist product. At the same time, the graphical in digital applications should be designed to accommodate all millennials categories – age, physical capability, and races. They have played a major role in this paradigm shift. They enjoy travelling and also passionate about brand new technology. This mutual interested has given way to a new perspective where social media, apps, blogs, and etc. have an essential part for travel.

Not only that, the smart digital infrastructures which divided into two categories plays a role as connectivity mediums, which are virtual (e.g. internet coverage) and physical (e.g. facilities, amenities) that should be installed and applied in all main and supporting sectors especially within the core destinations, such as, ticketing counter, *warong*, and house-stays. It becomes progressively suited by adapting into business model and product offering to attract tourism demand. In addition, the specific control center acted as the main data reception hub to capture, manage and analyze the real time data. Many cities around the world are already using big data technologies to help them manage their tourism. Tourism boards and companies in the tourism sector can benefit from the data in many ways. That includes pinpointing marketing campaigns, offering packages tailored to visitors' likely interests and deciding which countries to focus on winning customers in. These can be a great help in the decision-making process, and improve the operation of tourism industry. Players in the tourism industry can now make informative decisions on the basis of analytics and number-driven data. They can identify targeted groups of potential customers at every stage in the trip planning process, and also increase efficiency and the quality of services as well. Not only that, the basic real time data and information should be properly and legally shared to government agencies and tourism operators. This may predict the tourist behaviors and preferences, as well as the tourism businesses may take actions to improve services, quality and tourist experiences. It is an important factor of the achievement and competitiveness of a tourism destination and lead to the exchange of data, objectives, and resources. This has facilitated information and communication technologies to become an integral part of

tourism operation. This is because information and communication technologies which covers all technologies that enable the use of information and facilitate different forms of communication among human actors and electronic systems.

CONCLUSION

Smart tourism is highly explored and studied nowadays as the world moving to a digital ecosystem particularly the tourism industry. As an important foundation for sustainable tourism services and businesses, smart tourism is strongly believed to be a game-changer to the industry. It is utilizing digital in offering and improving tourists' travel experiences, generating revenue to national and local economic. The study reveals the existing challenges and gaps in implementing smart tourism application in Malaysia. Tourists as the main users understood the importance of this new tourism approach, with the consideration of uncertain future of pandemic Covid-19. However, a complete study and concrete framework of smart tourism in Malaysia need to be established.

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THE IMPLEMENTATION OF STANDARD APPROACH FOR OPEN SPACE PLANNING IN KUALA LUMPUR

Robiah Suratman¹, Maryanti Mohd Raid², Muhammad Izuan Nadzri³, Salfarina Samsudin⁴, Nur Khairiyah Mohammad⁵

^{1,2,4,5} Faculty of Built and Environment

UNIVERSITI TEKNOLOGI MALAYSIA

³Institute of Oceanography and Environment (INOS)

UNIVERSITI MALAYSIA TERENGGANU

Abstract

This article attempts to discuss the implementation of standards approach, 2 hectares per 1000 population as approved by the National Physical Planning Council in 2005. Using Kuala Lumpur as case study, the analysis showed that the uniformity of standards approach implementation has failed to take into account the distinction within the local conditions which have implications on the level of achievement for the 6 planning zones in Kuala Lumpur from 2011 to 2017. Use of the standards approach without modifications has created high density zones such as the City Centre, Sentul-Manjalara and Wangsa Maju-Maluri failed to attain the standards. Besides, other zones namely Damansara-Penchala, Bandar Tun Razak-Sungai Besi and Bukit Jalil-Seputih have exceeded the targeted standards. Based on the analysis, the distinction of local condition for each zone in Kuala Lumpur in terms of population number, urban land availability, land value, urbanization process and densification rate of the city need to be considered in implementing standards approach.

Keyword: open space planning, standards approach, open space provision, high density city

² Corresponding Author & Research Officer at Universiti Teknologi Malaysia. Email: maryantimohdraid@gmail.com

INTRODUCTION

Standards approach has evolved through time and has been used worldwide as one of the conventional methods in providing open space. The trajectory of standards approach begins in United Kingdom, the pioneer country in adopting the standards approach since the late 1800s (Theobald, 1984; Veal, 2013). Since then, this approach became the vital part of open space planning policy to ensure the adequacy of open space quantity to be provided for each of the citizen in fulfilling their social needs. It is known that the provision of open space is essential to improve the quality of life as it offers various benefits in terms of social, environment, economic and aesthetic value of urban living and surrounding (Givoni, 1991; Torkildsen, 2005; Heidt dan Neef, 2008; Lee et al., 2015). Thus, the provision of open space is necessary to strengthen the efforts of the local authority to create a liveable city and encourage urban development towards sustainability framework.

RESEARCH BACKGROUND

In Malaysia, the importance of providing open space was initiated by the government since the idea to transform Malaysia into Garden City has emerged as a response to the Langkawi Declaration in 1989 and national commitment in rationalizing Agenda 21 in 1992 (Ismail, 1999). Open space must be part of the national environmental equilibrium agenda in achieving strong economic growth (Tahir, 1997). Thus, the provision of open space should not be taken as an afterthought but as part of the vital component of urban planning that need to be taken into account. This idea has been a core focus in the previous Economic Transformation Program (ETP) to encourage the provision for additional parks and tree planting through National Landscape Department to make Kuala Lumpur as an attractive place to work, live and invest (PEMANDU, 2012).

In 2005, a target of 2 hectare per 1000 population was approved and established by National Physical Planning Council (NPPC) to monitor the adequacy of open space provision towards developed country by the year 2020. The targeted standards established was at par with the international standards from other high density city such as Washington (4.57 hectare per 1000 population), San Francisco (3.23 hectares per 1000 population), Stockholm (8.03 hectares per 1000 population) and Amsterdam (2.97 hectares per 1000 population). In 2006, the first National Urbanization Policy (2006-2015) has adopted the target under its DPN9; adequate open space and recreation area should be provided according to the needs of the residents through the application of the target of 2 hectares per 1000 urban residents. Then, the need to increase the quantity of open space continues to be emphasized in the NUP 2 (2016-2025) as one of the efforts to create a safe, clean and comfortable neighbourhood with a low carbon lifestyle (JPBD Peninsular Malaysia, 2016).

However, adoption of the standards approach has created a dilemma especially among local authorities, while some policy implementers doubt the accomplishment of this target particularly for high-density cities. In Kuala Lumpur, the city is struggling to develop new open space while the quantity of existing open space has decreased in number and size (Noor et al., 2013). Until recently, little has been written specifically on standards approach implementation in Malaysia as one of the methods to measure the adequacy of open space provision specifically in high density city context. Thus, this paper attempts to demonstrate and discuss the results of the standards approach implementation in Kuala Lumpur as reference to improve open space planning method in the future.

LOCAL CONDITION ISSUE IN THE IMPLEMENTATION OF STANDARDS APPROACH

In open space planning, methods such as standards are frequently used as conventional planning guideline to determine the adequacy of open space provision in terms of quantity and types of open space should be provided. It is supposed to be a flexible guideline and supported by several important variables such as user preferences, leisure objectives, recreation experiences, time horizon, economic feasibility, political efficiency and other related elements (Theobald, 1984; Wilkinson, 1985). Butler (1962) and Gold (1973) asserts that standards approach is only appropriate to be applied for a small area with specific population. Uniformity of its implementation to all areas will ignore the uniqueness of the local conditions in terms of size of the area, total population, land availability, urban space limitation and many others (Butler, 1962; DCLG, 2002). As the result, the quantity of open space provision should be varied depends on its local condition.

Standards approach determine by the number of population and the area of open space provision. The size of open space area must exceed the number of population to achieve the target. However, the common result frequently demonstrates that the area of open space provision is decreasing while the number of population is rising (Noor et al., 2013; Kanniah, 2017). Theoretically, the area will not attain the targeted standards and even suffering from inadequate open space provision. According to Shen et al. (2013), urbanisation process will cause the number of population to rise, change in land use while size and quantity of open space provision decreased. Due to land scarcity, urban land is facing a great pressure between the need to provide socio-economic infrastructure and the need to preserve recreational space. This competition will give ways to more economically viable development and ignore the qualitative value of open space as an important element for quality of life and sustainable urban development (Yaakup et al., 2000; Wong dan Chen, 2008; Sheng dan Thuzar, 2012; Jim, 2013; Haaland dan van den Bosch, 2015).

The inability of open space and green areas to compete in open market has resulted to the declining of open space quantity and size in urban fabric (Cowen, 1992; Vining dan Weimer, 1992; Morriss dan Meiners, 2000; Maruani dan Amit-Cohen, 2007). This issue become more difficult to local authorities to provide adequate open space in accordance to the growing population (Nelson, 1990). Rapidly increasing demand for urban land will put green area and open space at risk of deprivation. Yaakup et al. (2000) indicate that the expansion of built up area in Klang Valley around 1988 to 1998 has destroyed 70% of agricultural and forest area. While Noor et al. (2013) has demonstrate that the expansion of built up area in Kuala Lumpur has cause 70% of green space area has been deteriorated.

Other constraint faces by local authority that administered high density city to achieve targeted standards is due to urban space limitation that caused open space and green area smaller in size due to the development pressure that took place around the area. Unavailability and inappropriate site as well as high land value has made it difficult for local authority to build new open space in a dense urban environment. These factors implicated that the open space planning in Kuala Lumpur would have problems such as new open space is difficult to be provided while the quantity of existing open space has decreased in number and size (Jim, 2004; Byrne et al., 2010; Ng et al., 2012; Tian et al., 2012).

METHODOLOGY

In this study, Kuala Lumpur was selected as case study. It comprises of six 6 planning zones namely Sentul-Manjalara, Damansara-Penchala, Bukit Jalil-Seputih, Bandar Tun Razak-Sungai Besi, Wangsa Maju-Maluri and City Center. Comparison of green area cover for the six planning zones were carried out to examine the achievement of standards approach in 2011 and 2017 using data from satellite imagery as the ancillary data. Multitemporal imagery used allows the changes to be distinguished thus correlated with the Kuala Lumpur City Hall (KLCH) statistics evidently. Then, in-depth interview with four respondents comprising officers from the policy implementer's agencies at the federal and local level were carried out to identify the factors that derived the distinction of achievement for the six planning zones in Kuala Lumpur. Then the data were analysed using Nvivo 11 software. All the respondents involved in this study are described in Table 1 below.

Table 1: List of respondent involved in this study.

Responden Code	Job Position	Agency	Level of involvement
R1	Deputy Diector	Property Management and Valuation, Kuala Lumpur City Hall	Policy implementer in local level
R2	Deputy Director	City Planning Department, Kuala Lumpur City Hall	
R3	Chief Deputy Director	Research and Development PLANMalaysia	Policy implementer in federal level
R4	Director	Policy Sector National Landscape Department	

RESEARCH FINDINGS AND DISCUSSIONS

Although overall achievement of Kuala Lumpur has exceeded the targeted standards, however the achievement of the six planning zones in Kuala Lumpur is varied. From Table 2 below, the analysis demonstrates that high density zones such as the City Centre, Sentul-Manjalara and Wangsa Maju-Maluri have failed to attain the standards. While other zones namely Damansara-Penchala, Bandar Tun Razak-Sungai Besi and Bukit Jalil-Seputih have exceeded the targeted standards.

Table 2: The achievement of zones in Kuala Lumpur in attaining targeted standards of 2 hectare per 1000 population.

Zone	Achievement (hectare/1000 population)		Status	
	2011	2017		
Kuala Lumpur	2.48	2.31	Achieved	
1. Damansara-Penchala	6.08	5.20	Exceed	
2. Bandar Tun Razak-Sungai Besi	2.14	2.37		
3. Bukit Jalil-Seputih	2.30	2.12		
4. Sentul-Manjalara	1.40	1.73		Not achieved
5. Wangsa Maju-Maluri	1.58	1.59		
6. Pusat Bandar	1.43	0.89		

The results of the analysis are also in line with the declining of green area distribution for each of the zone from 2011 to 2017 as showed and described in Figure 1 and Table 3 below.

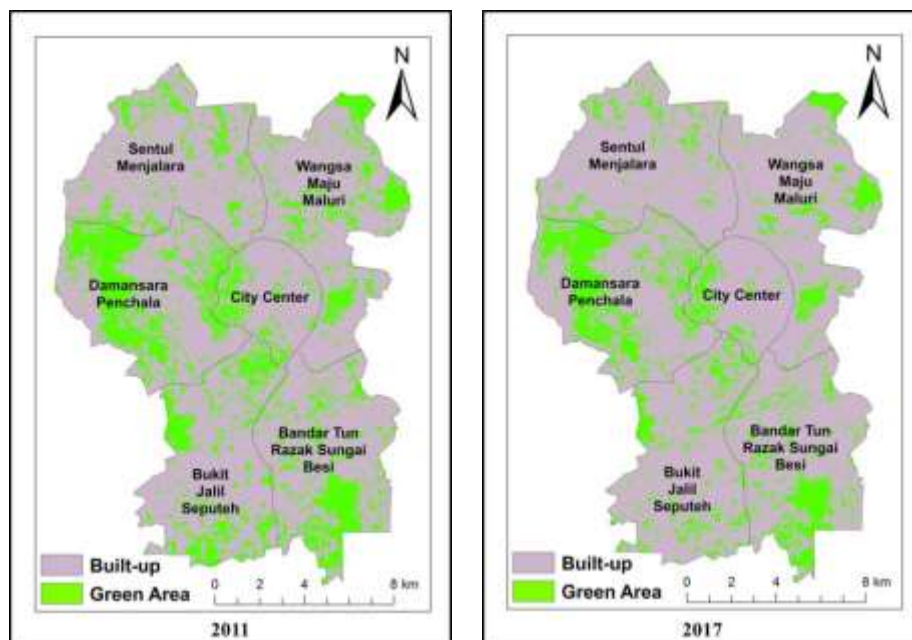


Figure 1: Green area distribution in Kuala Lumpur for 2011 and 2017.

Table 3: Green space area distribution and the achievement of standards of each zones in Kuala Lumpur in 2011 and 2017.

Zone	Year	2011	2017
City Center	Total of population	148,001	164,547
	Green space area	211.38 hectare (11.66%)	146.12 hectare (8.06%)
	Built up area	1,601.62 hectare (88.34%)	1,666.88 hectare (91.94%)
	Total area	1,813 hectare (100%)	
	Achievement of standards	1.43 hectare/ 1000 population	0.89 hectare/ 1000 population

Zone	Year	2011	2017
Wangsa Maju-Maluri	Total of population	416,131	432,677
	Green space area	658.52 hectare (14.27%)	686.57 hectare (14.88%)
	Built up area	3,955.48 hectare (85.73%)	3,927.43 hectare (85.12%)
	Total area	4,614 hectare (100%)	
	Achievement of standards	1.58 hectare/ 1000 population	1.59 hectare/ 1000 population

Zone	Year	2011	2017
Sentul- Manjalara	Total of population	363,449	379,995
	Green space area	508.33 hectare (10.92%)	657.78 hectare (14.12%)
	Built up area	4,148.67 hectare (89.08%)	3,999.22 hectare (85.88%)
	Total area	4,657 hectare (100%)	
	Achievement of standards	1.40 hectare/ 1000 population	1.73 hectare/ 1000 population

Zone	Year	2011	2017
Damansara- Penchala	Total of population	179,289	195,835
	Green space area	1,090.19 hectare (24.12%)	1,018.85 hectare (22.54%)
	Built up area	3,429.81 hectare (75.88%)	3,501.15 hectare (77.46%)
	Total area	4,520 hectare (100%)	
	Achievement of standards	6.08 hectare/ 1000 population	5.20 hectare/ 1000 population

Zone	Year	2011	2017
Bandar Tun Razak- Sungai Besi	Total of population	304,099	320,645
	Green space area	650.02 hectare (15.37%)	760.31 hectare (17.98%)
	Built up area	3,577.98 hectare (84.63%)	3,467.69 hectare (82.02%)
	Total area	4,228 hectare (100%)	
	Achievement of standards	2.14 hectare/ 1000 population	2.37 hectare/ 1000 population

Zone	Year	2011	2017
Bukit Jalil- Seputih	Total of population	283,533	320,645
	Green space area	652.85 hectare (14.87%)	635.81 hectare (14.48%)
	Built up area	3,737.15 hectare (84.13%)	3,754.19 hectare (85.52%)
	Total area	4,390 hectare (100%)	
	Achievement of standards	2.30 hectare/ 1000 population	2.12 hectare/ 1000 population

From the result of the analysis as described in Table 3 confirmed that the uniformity of standards approach implementation in Kuala Lumpur has failed to take into account the distinction of local conditions which have implications on the level of achievement for the 6 planning zones in Kuala Lumpur from 2011

to 2017. The distinction within local conditions were identified in terms of population number, limited and decreasing urban land availability, high land value, urbanization process and high densification rate of the city.

Population Number

Based on the interview, all respondents agree that the difficulty to achieve the targeted standards is due to the growing number of population that leads to insufficient of open space provision in certain area in Kuala Lumpur. From the statistic of urban population provide by Kuala Lumpur City Hall in 2011 to 2017, City Centre experienced the highest percentage of population grows with 10%, followed by Damansara-Penchala (8%), Bukit Jalil-Seputih (6%), Bandar Tun Razak-Sungai Besi (5%), Sentul-Manjalara (4%) and Wangsa Maju-Maluri (3.8%). The respond from all the respondents is detailed in Table 4 below.

Table 4: Respond from respondent R1, R2, R3 and R4 regarding population number in Kuala Lumpur.

Responden	Respond
R1	<i>“It’s difficult for us to provide sufficient open space in City Centre area. The growing number of population causes the need to provide open space increase but there’s no available land to build new open space and it’s not the current priority compared to economic development...”</i>
R2	<i>“Indeed, the population number for each of the zones in Kuala Lumpur is increasing and cause development intensifying thus affecting the quantity of our open space especially in City Centre area...”</i>
R3	<i>“Indeed, the factor of high population will make it difficult for high density city to provide adequate open space. They (local authorities) will be struggling and face challenges...”</i>
R4	<i>“Because the urban population is growing [...] if we take a look at Japan as one of the developed countries, they impose one child policy to help the government to predict population. But we (Malaysia) don’t have such policy. And if you look at the projection of the world’s population, in the next 5 or 10 years, 75% of the population will live in the city. Therefore, the city of Kuala Lumpur, especially the densely populated zones, must struggle to provide open space which is not enough compared to the growing population...”</i>

Limited and Decreasing Urban Land Availability

For City Centre area, limited and decreasing urban land availability has led to the decreasing in achievement of targeted standards from 1.43 hectare per 1000 population in 2011 to 0.89 hectare per 1000 population in 2017 (Table 3). All respondents responded that the decreasing due to the increment of built up area caused open space declined in 2011 to 2017 compared to other zone. The respond from all the respondents is detailed in Table 5 below.

Table 5: Respond from respondent R1, R2, R3 and R4 regarding limited and decreasing urban land availability

Responden	Respond
R1	<i>“NUP set targeted standards in open space provision, but Kuala Lumpur is facing land scarcity [...] it’s difficult for KLCH to allocate open space in urban fabric due to limitation of land [...] There’s case where developer has allocated buffer zone for approximately 1 acre. Since land is limited, the buffer zone has been utilized to develop affordable housing. We can’t reject the project since the developer willing to assist government program. Thus we have to admit and approve the application...”</i>
R2	<i>“Even though we have reserved Pudu Ulu Park, but we don’t have much choice to take it some of the land due to land scarcity. Especially today government has launch affordable home program. Looking at the acreage of open space in City Centre area, it’s decreasing...”</i>
R3	<i>“It is true that the provision of open space is not profitable and the provision is solely for the planning purposes. Since economic development is more profitable, then limited land resources have to focus on infrastructure development rather than the provision of open space. This situation will certainly affect the quantity of open space that is declining...”</i>
R4	<i>“Talking about Kuala Lumpur, of course the city is facing land scarcity issue [...] land will never expand and everybody wants to own land [...] for me, the standards is inapplicable for any area that having this issues. The area will definitely have to struggle to achieve the target...”</i>

High Land Value

According to all respondents, high land value has made available land in Kuala Lumpur were developed with economically viable development instead of open space provision. Respondent R1 stated, the reason why affordable housing is developed on open space area is due to low land value and cost saving. While respondent R2 stated that high land value has caused developer eager to obtain maximum profit and thus, any uneconomically viable development such as open space will be ignored although it is part of the planning procedure. Respondent R3 relate that the declining of open space area in size and quantity is due to the rapid development especially in City Centre area. While respondent R4 stated that although there will be vacant land, it does not mean that the land will be utilized for open space purposes. But the land will definitely be utilized for more economically viable development. From the respond, it can be derived that this factor has implicated the achievement of targeted standards in high density zone such as City Centre that available land will be utilized to develop more profitable development compared to open space provision.

High Densification Rate and Urbanization Process

From the interview, findings indicate that all respondents agree that high densification rate and urbanisation process will deter several zones in Kuala Lumpur from achieving targeted standards. Based on the statistic of population densification rate in Kuala Lumpur from 2011 to 2017 provided by KLCH, it was found that Wangsa Maju-Maluri has the highest population densification rate with 9,377.49 population per kilometres followed by City Centre (9,075.97 population per kilometres), Sentul-Manjalara (8,159.66 population per kilometres), Bandar Tun Razak-Sungai Besi (7,583.85 population per kilometres), Bukit Jalil-Seputih (6,835.52 population per kilometres) and Damansara-Penchala (4,332.64 population per kilometres). The result obtained is found to be aligned with the analysis as showed in Table 3 that Wangsa Maju-Maluri and City Centre were among the zones that failed to achieve targeted standards. The comment and respond from the respondent regarding this factor is detailed in Table 6 below.

Table 6: Respond from R1, R2, R3 and R4 regarding high densification rate and urbanisation process in Kuala Lumpur.

Responden	Respond
R1	<i>“There’s a lot of government policy that made us (KLCH) difficult to implement it in Kuala Lumpur such as NUP due to land scarcity. The implementation of the policy will deter us from making development. In this situation, we must go towards quality instead of quantity...”</i>
R2	<i>“People ask to convert. If we don’t approve, they do it anyway. For example, open space in Jalan Maarof has been converted from open space to residential with a claim that they don’t use it...”</i>
R3	<i>“The government need to be strict in preserving open space. If the state government does not allow it and wants to retain the area as open space, the area can be protected. Therefore, state government must be firm in protecting open space from being destroyed by development. For me, the targeted standards can be achieved provided that the state government must put some effort and being firm but this is not happening...”</i>
R4	<i>“In my opinion, we cannot measure the current situation through quantifying the provision of open space which very difficult especially for high density city like Kuala Lumpur. Maybe we can improve the quantity but we need a comprehensive plan to manage urbanisation effectively, which is very difficult since we don’t have any at the moment...”</i>

CONCLUSION

From the findings, it can be derived that the implementation of standards approach in Kuala Lumpur is inconsistent with the standards approach principle as recommended by Butler (1962); Gold (1973); Wilkinson (1985); Scottish

Government (2008); Byrne dan Sipe (2010); Veal (2013). Standards approach do not possess flexibility element to adapt to different local conditions in every area (Wilkinson, 1985). It assumes that each area is similar in characteristics but the fact that they are different (Veal, 2013) in terms of population number, limited and decreasing urban land availability, high land value, urbanization process and high densification rate of the city as found in this study. Standards can be used as a guide or benchmark to begin with, but modifications of the standards according to its local conditions are essential to ensure the effectiveness of its implementation. In this situation, standards that are difficult to be achieved is considered unrealistic as well as contrary to the principles of its application (Butler, 1958; Wilkinson, 1988). Therefore, the principle of standard approach suggests that standard approach should be implemented in a specific area so that an appropriate standard target can be determined as well as assisting local authorities in establishing a comprehensive and effective greening program and action plan to increase the quantity of open space in the area.

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ROUTE PLANNING FOR CROWD MANAGEMENT IN DISASTER PRONE AREAS

**Mohammad Zarif Mohd Zahari¹, Nur Afiqah M. Zulkifli², Muhammad Rijal
Mohamad³, Oladejo Aliu Olabayonle⁴, Nur Athifah A. Kadir⁵ and Syahriah
Bachok⁶**

*^{1,2,3,4,5,6}Kulliyyah Of Architecture and Environmental Design (KAED)
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA (IIUM)*

Abstract

Managing crowd is essential in a time of emergency because a large volume of movements or flow may be restricted or obstructed by the existing capacity. This paper centres around preparedness, actions were taken during the event and mitigation measures of flooding in two case studies. Hulu Langat and Cameron Highlands have similarities and differences in planning for, managing of and reviving from flood disasters. In particular, route planning is focused to extract the movement behaviour among people impacted by the calamity. This study employed an interview method which results have been synthesised to feed into the formulation of future strategies for access or movement facilities for victims of disasters.

Keyword: Route Planning, Crowd Control, Disaster Management

¹ Master Student. Email: zarifkool@gmail.com

INTRODUCTION

Planning a route is an essential part of the transportation strategy. Time and cost are important factors determining the decision of pathways to be taken, time taken to complete the travel, in normal circumstances (Bast, Delling, Goldberg, Müller-Hannemann, Pajor, Sanders, Wagner, & Werneck, 2016). However, when faced with various circumstances such as unfamiliarity, urgency, crowding and bottlenecks, other external factors would influence such decisions that irregularity and abnormality are maybe evident in the pattern and distribution of pathways and travel time (Bast et al., 2016). Crowding is triggered when overcapacity occurs especially at bottleneck areas such as junctions or intersections (Khalid & Yusof, 2018). This paper highlights the crowding events experienced by two localities in Malaysia coping with natural disasters. Selection of Kajang, Hulu Langat in Selangor and Lembah Bertam, Cameron Highlands in Pahang exemplifies the challenges faced by disaster-prone areas in managing the crowds during and after the calamities.

RESEARCH BACKGROUND

The National Disaster Management and Relief Committee (NDMRC) of Malaysia is the responsible authority regulating all relief activities before, during and post-disaster (Chong & Kamarudin, 2018). Meanwhile, policies and directives are set by a Prime Minister's Department known as the National Security Council (Majlis Keselamatan Negara, MKN) and executed by the National Disaster Management Agency (NADMA) (Chong & Kamarudin, 2018). Among the concerns regarding flooding or other disasters are the search and rescue activities, coordinating the assembly of crowds and relocating victims as well as ensuring the well-being, welfare and revival of the population following the impacts of the calamity. Preparing for disaster is currently the responsibility of agencies with designation and roles under the law (McEntire & Myers, 2004). However, the participation of the public or local community would minimise coordination effort and increase the effectiveness of relocation during the events. (Mohd, Fathi, Harun, & Chong, 2018). Identification of access points and rescue centres are essential, as much as the routes or pathways connecting these places. Roads, pathways or any transportation channels must not be disrupted, intersections or junctions must not be obstructed, and conditions of the paving must not be degraded too much that movement or flow cannot pass through smoothly and efficiently. Assistance must be transported and timely rendered so that victims receive the help and necessities, to increase probabilities of revival and resuming lives as normal just like before the disaster struck. Mitigation measures must be appropriately strategized to improve and protect the areas from the recurring and extended negative impacts of the disaster (Handmer and Dovers, 1996).

While various literature has focused on legislative and application of MKN Directives 19-21 at the Federal and State levels; the lowest level (local community) preparedness and mitigations have been less documented (Khalid and Shafiai, 2015; Mat Said and Ahmadun, 2007). Thus, this effort of mainstreaming the institutional mechanism and risk-informed community at the lowest level of administration in Malaysia aims at assisting in strengthening the disaster preparedness among the population of flood-prone areas and other relevant stakeholders.

METHODOLOGY

This study adopted qualitative methodologies of research. It employed the face to face communication method to capture primary data. The instruments utilised were audio and visual recordings of conversation based on semi-structured and general queries on the flood disaster preparation, first-hand experience dealing with flood and mitigation measures following the events. Data was collected between the month of August and November of 2019. Two case study were selected namely the districts of Cameron Highlands and Hulu Langat. Chief Assistant District Officers (CADO) of both districts were interviewed. Interview topics were focused on significant flooding events up to December 2018, which fall under the category of Level 1 based on MKN's definition. Flooding of smaller scale, such as flash flood due to a clogged drainage system, does not carry the weightage required for MKN's Level 1 disaster. Any recurring event beyond this date has not been considered during the interview sessions. Likewise, any preparation, search and rescue actions, as well as mitigation and revival activities beyond December 2018, are out of the scope of this paper.

FINDINGS AND DISCUSSION

Cameron Highlands is Pahang district of 35,000 people (DOS, 2010) living in a 712km² of highland areas, at an elevation of 1,400 meters from the sea level (4°30'N 101°30'E). It is located some 200 km northeast of Kuala Lumpur. Hulu Langat is a Selangor district of 1.1 million population (DOS, 2010), residing in 840km² of mixed urban and suburban townships, located in the south-eastern border of Kuala Lumpur.

Both Cameron Highlands (CH) and Hulu Langat (HL) districts are experiencing flooding frequently but for various reasons. Some are the results of normal rainfall over longer than the usual duration. Some are due to heavy rainfall over a short duration of time. In the former, land encroachment, cultivation that degraded the soil and rapid physical development along dangerous slopes are some of the compounding factors to the damaged soil that lacks permeability. In the latter, normal rainfall over normal duration but worsened by clogged drainage systems. Other man-made flooding disasters were also attributable to rapid and concentrated physical development upstream that led to irregular flow

downstream and the different scale of drainage systems. This is especially critical as some townships in Hulu Langat (downstream) bordered settlements in Negeri Sembilan, a neighbouring state (upstream) that the authorities in Selangor have no power and jurisdictions over. HL has dams constructed for water supply while CH has dams for hydroelectricity generation (CH). Both districts have Orang Asli or Aboriginal people as part of their demographic composition.

The interview contents were summarised in a thematic way based on preparedness and mitigation of flooding disaster literature. Which are stated as follows; the severity of the disaster, preparing for disaster, managing the victims during and after the events, evacuation routes and factors influencing the success of evacuation and rescue efforts. The results and findings are tabulated as follow.

Table 1: Synthesis of interview questions relating to flooding preparation, management and mitigations

(Flood) Disaster Severity		
Variables	Lembah Bertam/Ringlet, Cameron Highlands	Kajang and surroundings, Hulu Langat
Rate of recurrence (Flash Floods)	None in the last 3 years. Last one in 2013, though there was heavy rainfall over two days which resulted in landslides in 2017.	None in the last 3 years. Last one in 2013. Landslide in 2016 had 1,500 victims (Hulu Langat, Cheras).
Duration	2 to 3 days, longer due to the “dam release”.	Flash flood receded after two hours in Kajang City. In the 1990s experienced <i>Banjir Termenung</i> (static flooding) in Batu 10.
Impacts/ Damages/ Loss	Housing damages: severe damages took 2 to 3 days to recover (maximum compensation of RM500 per household) considered as small-scale disaster at the lowest hierarchy, the district level. Managed it independently. Required assistance depended on the severity level and geophysical expansion, or severity of the disaster. If the disaster is cross-boundary, assistance is required from the state and federal authorities (highest level of government) depends on the seriousness, required extensive assets, manpower deployments. Damages to settlements by the riverside, by the dam areas and of Orang Asli.	Severe property damages, life-threatening situations and complete or total vulnerability of network for 3 days or more. The old drainage system at Metro Kajang upgraded. Demolished shops with TOL, old shophouses in Bukit Angkat strengthened by retaining walls, water controlled. Upgrading works of Hugo in Kampung Jambu in progress. Only level 2 disaster and mostly level 1 disaster. No road blocked, alternative routes become very long. One occasion all was trapped, but there were boats. Never experienced the level 3 disaster. Semenyih is traditional Malay housing, previously a hill but was levelled for construction. No hill, wind passes easily, storm.

	<p>Land in Cameron Highlands is strong (stable) and seldom fallen trees occurred at the steepest of slopes.</p> <p>Small scale debris can be handled locally, based on MKN 20 Directive.</p>	
<p>Communication and Access cut</p>	<p>Population including the aboriginal spread into the forest for 22km. Not possible to utilise only one telecommunication system. Only the telephone, SMS did not always work. Wireless works, satellite phones expensive.</p> <p>Assistance from Cameron Highlands Adventure Team (CHAT). 4x4 amateur team who voluntarily provided vehicles, tracking devices and human resource.</p> <p>In Habu, Kuala Terlah, CHAT helped radio communication and vehicles.</p> <p>Communication breakdown due to lost wireless reception.</p> <p>Communication to improve with telecommunication mast in Brinchang.</p>	<p>Backflow of stormwater to village drainage system resulted in flooding. Panicky, moved electrical appliances to higher grounds.</p> <p>Communicate with MPKK and <i>Penghulu</i>. village leader to make headcount.</p> <p>Police Department to evacuate and DCW to counsel relocation and in the event of death.</p> <p>Disaster Unit to use excavator, container, tractor, pump, tanks. Repair toilets, communal area. Lack of boats. Head villager and <i>Penghulu</i> set up relocation centres.</p> <p>Criteria: distance, the total number and the alternative when anyone centre reaches its capacity. Food, dwelling facility, hygiene set supplied.</p>
Preparedness		
<p>Drill Exercise</p>	<p>Drill schedules based on need and capacity, on annual basis. Last March in Sultan Abu Bakar dam/Susu dam. Siren activated; all procedures followed. Simulations at several dam water levels, informed by TNB.</p>	<p>The drill is on annual basis. While training, SOP procedures were also learned. <i>Penghulu</i> will help in training provided by SSCC and District Office. Selangor State Disaster Unit to instruct. Smart Regional State Selangor focuses annual budget on broadband internet. Information updated,</p>

	<p>They need to make sure water discharge is within the permissible limit. Meetings quarterly or biannually</p>	<p>good network and accessible by small villages.</p>
<p>Actions during the disaster, important documents</p>	<p>During: Many documents were missing; people panicking and not listen to advice to relocate. Advise to prepare the documents in safe evacuation pack in a high place or an elevated room, easy to reach and keep documents in a plastic bag in rafts by the river. Allocated under MKN, Police as operation commander initiate the disaster control centre/room in the Land and District Office. Land and District Officer (DO) chair meeting: members – OCPD, Fire Department. Discussion, meeting among the main agencies. Others only support services. Areas impacted will be zoned as Green, Yellow and Red with limited or controlled access to respective agencies. Post-mortem and post-disaster assistance: A follow-up. Investigate all kinds of damages and fatality. Assets ready, recognised the location. An application for new reconstruction for damaged houses. If lost houses, provide a temporary dwelling, assist in their daily requirements, cash assistance.</p>	<p>During: Selangor State Command Centre, like Penang State Command Centre. Before it rains, already informed, immediately. If rain is accompanied by warning siren, would alert head villagers. Council inform <i>KRT</i>. The Meteorological Department would inform SSCC, which will inform DO. Broadband is important. If the disaster strikes in Sabak Bernam, a rural area with lack of facilities, it will be problematic. If flooding, relocate them as soon as possible. If high tide, would be prepared. Tried connecting the internet with the Aboriginal villages but failed. Left with wear and tear to rot, wastage of millions of ringgits. If electricity is installed, not reaching the village, they have to use petrol which is expensive. Not only grid connection (beam tower) but also power supply. Heavy loads to carry.</p>
<p>Factors of flooding</p>	<p>Illegal encroachment of government land but no longer occurring at an alarming rate. A case of fallen tree near Habu in the year (2018). Not related to any agricultural activity. Since land is elevated and sloped, tendency to result in soft soil, tree fell perpendicular to the road. Cultivation on hilltop without installing proper technology for irrigation. Haphazard water irrigation overflow and leaking in</p>	<p>Heavy rainfalls, long duration of rainfalls. Storm water overflow and backflow when the two drainages system are different size. River overflow. Dams for water sources, pollution by economic activities. Land and soil degradation due to mining and mineral extraction, improper scheduled waste disposal.</p>

	Sungai Ikan. Overflow compounded by heavy rainfall, impact slopes and result in landslide. Man-made disaster impact building, not the illegal cultivation.	
Relocation map	Identified the hotspots, early preparation and prevention planned, followed by mitigation. Alternatives actions. Access road. Determined the tracks to identify possible proposed alternative routes. If emergency occurs, this will be the route. Traffic is controlled and diverted accordingly.	Used maps to identify location of assets and machinery from October until March. Lorries stationed at PWD, prepared for flooding, boats at Batu 10 and Sungai Serai. No amphibian boats, only from the Federal agencies, Council, CDA, SSCC. Trucks traverse water up to hip high.
Crowd Management		
Siren	Lembah Bertam Fire and Rescue Department Siren: short-yellow, long-red Short siren for early warning and long for emergency situation. The lamp and lighting would be necessary.	Siren (flooding) in Pangsun, Sungai Serai, Batu 10. Volume and tone become higher, if worsening. The sound is captured by the SSCC's sensor. When siren activated, inform MPKK, <i>Penghulu</i> to communicated to people.
Movement	Movement follow directives. Directive 19 is regarding SMART team. SMART team only operational at the federal level under the purview of the Prime Minister. Disaster has been categorised into three types under <i>MKN 20</i> , type 1, 2 and 3. They will determine whether no open the Command Room, and types of assistance or what mitigation plan to accommodate and move people.	If movement is still manageable, get assistance from the Police Department to evacuate. DCW have counsellors to encourage relocation and in event of death. DCW and District Office Disaster Unit arrange movement. Head village disseminate info to locals, systematic, clear structure is clear. <i>ADUN</i> also played roles.
Early warning system	No advanced systems like Japan. Just communication channels through WhatsApp groups to set up operation room.	The Meteorological Department inform SSCC Broadband is important.
Rescue and Evacuation Route		

<p>Mapping the routes</p>	<p>Identified landslide hazards, risks, locations, our needs, manpower, assets and financial standing. Cleared the area of flooding damages immediately. The road would not be blocked and not to cause the landslide afterwards. A new small fire station, in Brinchang Lembah Bertam, by the RELA building, towards Sg Koyan identified flood-prone areas and landslide risks.</p> <p>Advanced mapping of the district of areas prone to disasters needed. No coordinated or comprehensive mapping. Each agency prepares its own mapping. Identified the hotspots but not thoroughly. In a utility map, aware of the location of each utility and then run a simulation. Need to see something movable like video which good to present to the public. Public Works Department had prepared a video on landslides but only the end results, not the process.</p> <p>Need alternative routes only just a tiny kampong street, not a highway. Concerned if landslides occurred between Ringlet and Kampung Raja. The only communication line is through Jalan Simpang Pulai.</p>	<p>There is a map on the Smart Selangor Command Centre (SSCC) website, the map is in real time. They have drone surveillance to update report. There are also siren and data on dams and rainfall statistics. They are even updated in midnight and wee hours.</p>
<p>Rescue Route</p>	<p>Access from (1) Tapah to Lipis, from (2) Lojing area to Simpang Pulai , from (3) Tanah Rata to Ringlet, from (4) Kampung Raja to Blue Valley Kuala Terlah, Tringkap, Brinchang, Habu and Lembah Bertam.</p> <p>The travel time is on average: One hour from Tapah (61km) This is original access road, one and half hour from Gua Musang (122km), Ipoh (90km) and Sungai Koyan (110km) through highways/Federal roads respectively.</p>	<p>Good network of highways, federal, state, district (PWD) and municipal roads. LEKAS highway, PLUS highway. Under Local Authority requirement, it should be 50 – 60 feet road. Under Ministry of Rural Development, 20 – 30 feet street is sufficient. Logically, two passing vehicles would need a minimum of 40 feet street.</p> <p>62 traditionally Malay villages, 12 New Villages for Chinese community, 5 Indian communities, good access.</p> <p>Also 10 Orang Asli (aboriginal) communities (in Semenyih, Hulu Langa, Gunung Nuang, Tekali, Dong Lai, Kacau</p>

	The main road runs about 40km. Another is Tanah Rata to Ringlet which traverses along 14 km route. To Blue Valley is about 24km. Some forest tracks. Helipad is aligned from the north to the south, twelve in total, each with an access by forest tracks.	Dalam, Sungai Pening and Broga). The aboriginals are directly under JAKOA. Their area is disaster resilience. Rescue route is resilient too.
Rescue centre	If no requirement for relocation, only carry necessary actions. A whatsapp group reports to the District Assembly Member (ADUN). Site visits by police, the fire and rescue department, CWD to determine the need for relocating the population. Rescue centre opened based on criteria: building condition and safety, access road into higher elevation, fire distinguisher and toilets facilities. Also, calculations of elevation, MCL, reverse the probability of flooding incident, ground permeability. Relocating of people illness, impairment and broken limbs. Facilities need to be on the ground floor and near the toilets. Normally, centres are schools and other buildings at higher ground.	If situation warrants, open the evacuation centre, feed the victims. When landslide occurs, headcount for people working, at home or outside the impacted area. Police to evacuate, DCW counsellors to help relocation, in event of death. Rescue works are only carried out by CDA. In rescuing people, PANTAS squad is despatched. Send the victims to CWD which in identified centres. Head village help designate a cook in green zones. Red zone is for technical agencies which have assets and expertise. DO prepared the food and drinks, for the operation room.
Factors Influencing Route Selection		
Existing Main Route	Limited networks. Access from Tapah to Blue Valley. If emergency occurs, that will be the route. To make sure traffic is controlled and diverted accordingly. Surrounded by forests, need to preserve and not degrade.	Roads can be 50 – 60 feet road, some rural areas 20 – 30 feet street. But 40 feet street is sufficient. Kajang has good networks, in and out of the city.
Existing Alternative Routes	There is no alternative route for road transportation. An alternative conceived which is a similar design to that of Rawang Bypass but limited by monetary resources. The route aligned by PWD, DID, Forestry Department but yet to reach compulsory land acquisition.	Main road is the Protocol Road. This road is utilised for official events where the Sultan, the Chief Minister, the Prime Minister or anything relating protocol, and is under the maintenance of PWD.

Proposed Alternative Routes	There are proposed alternative routes but still in confidentiality. There are helipads but still in confidentiality. No river/sea/water routes. Areas inaccessible, need boats, 4x4 vehicles.	Various road networks and access points but alternative routes can be very long/far. If trapped, use the boats. No need of helipads.
Socio-economic factors	Largely Chinese communities, cultivators and Aborigines are economic based community, need to make money. No one in the right mind would compromise this income source. No formal community participation but invited them as observers. The community is dependent on tourism as economic sources. They would not jeopardise their own income by letting flooding destroy their livelihood.	Malay villages, New Villages for Chinese community, Indian communities and 10 Orang Asli (aboriginal) communities. Aboriginal's area is disaster resilience. Possess knowledge of selecting settlements. Normal people organically start their settlement by the river. Aborigines are highly aware of values of the forest, economically.
Geo-physical and environmental factors	Cameron is largely forest reserve. Aboriginal communities are excellent jungle trackers preferred to select different safer routes. They run upwards to the highland, good knowledge medicinal herbs. Community is familiar with the highlands and urban settlement. Access roads limited due to geophysical nature.	When electricity is installed over the aboriginal's villages, they would claim the trees belonged to them and have high awareness about the environmental loss. Some community are complacent. They have knowledge of the access points of the area and perceived water to recede within couple of hours.

RECOMMENDATION AND CONCLUSION

Table 1 demarcated a few similarities between the two cases. These are associated with (i) dams that controlled the water discharge, (ii) heavy rainfalls, (iii) aboriginal resiliency, (iv) drill exercise, (v) MKN SOP, (vi) compounding landslide, (vii) mapping on 2D papers with no simulation runs and graphic presentation and (viii) a fully hierarchical set up at the three highest levels of administration. These findings concurred with those of Khalid and Shafiai (2015) as well as Mat Said and Ahmadun (2007). Other similarities are the lack of international best practice examples such as the non-existence of (ix) insurance scheme for protection against disasters (Linnerooth-Bayer & Mechler, 2007). Still, it was commendable for both cases (x) to establish rescue SOP, (xi) to set up relocation centre and (xii) to have the designation of Head of Village and

Penghulu to manage the local population as well as to deploy (xii) drones for surveillance.

The differences between the two cases are (i) the geographical settings (CH is highland, HL is lowland), (ii) access routes whereby CH has only four main routes which vulnerable to other disasters such as fallen trees and landslides. HL has a good network of roads. Both experienced (iii) land encroachment i.e. cultivation in CH while mining and illegal extraction and disposal of scheduled waste in HL. Another difference is that CH is planning for (iv) helipads due to non-existence of waterway networks. Whereas HL took advantage of its waterways by deploying amphibian boats. HL adopted developed countries strategies including (iv) the establishment of a command centre (SSCC) and (v) real-time map presentation on its website but the one CH had was not as advanced and sophisticated in terms of the use of technologies. HC asserted the need for simulation runs of disaster levels and impacts, to be presented in the 3D or 4D real-time mapping forms. There is a formally organised (vi) rescue squad at the state level (PANTAS in HL) but more voluntary set up of amateur and community-based CHAT organisation to share their 4x4 vehicles and radio communication in CH.

It is therefore recommended that both the case study to look into the following strategies from the global best practices (Paudel, 2012). One is the (i) insurance scheme establishments. Next is the (ii) simulation runs for the possibility of impacted areas and prediction of disaster severity. Another area that can be learned is the (iii) early warning systems such as in Japan. Enactment of laws can also empower (iv) legislative foundation for the authorities at the lowest level to undertake management functions of disaster, should their areas be cut off from any communication. Finally, (v) empowerment of the local people, especially the organised and knowledgeable society members in decision making may increase the effective and efficiency of rescue and relocations strategies. In areas where (vi) aboriginals are plenty, it is good to take advantage of their expertise and experiences dealing with calamities in sustainable manners.

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SPECTACLE OF CONSERVATION AND TOURISM IN PROTECTED AREAS: ANALYSIS OF MANAGEMENT, ISSUES AND TOURIST SATISFACTION

Normah Abdul Latip¹, Mastura Jaafar², Azizan Marzuki³, Kamand Mohammadzadeh Roufchaei⁴, Mohd Umzarulazijo Umar⁵

*^{1,2,3,4,5}School of Housing Building and Planning
UNIVERSITI SAINS MALAYSIA*

Abstract

National parks serve as rural ecotourism attractions, even though this area is very fragile. Therefore, conservation management must be implemented to ensure the balance of the environment is maintained. This study aims to study the relationship between park management, issues and tourist satisfaction in a protected area, Kinabalu Park. Moreover, this study considers the mediating role of environmental issues on the relationship between park management and tourist satisfaction. Overall, 351 respondents agreed to participate. A questionnaire survey was administered to visitors of Malaysia's Kinabalu National Park. In total, 351 completed questionnaires were returned and have been analysed using Partial Least Squares-Structural Equation Modelling (PLS-SEM). Partial Least Squares-Structural Equation Modelling (PLS-SEM) was used to analyze the resultant data using SmartPLS 2.0. The results showed that park management has a strong effect on tourist satisfaction and environmental issues. The results also revealed that environmental issues play a mediating role in the relationship between park management and tourist satisfaction. The findings of this study make a significant contribution to our current understanding of the importance of park management, especially in the protected area as well as addressing the existing issues and provide positive satisfaction to tourists. Through the results, it will significantly contribute to the conservation and management of the protected area to be more sustainable in the future.

Keyword: Conservation and park management, environmental issues, tourist satisfaction, Kinabalu National Park

¹ Senior Lecturer at Universiti Sains Malaysia Email: norma_abdlatip@usm.my

INTRODUCTION

Tourism provides an important incentive for conserving the natural resources of national parks (Weaver, 2000). Interest in nature-based (Abdul et al., 2013) tourism has grown considerably over recent decades, making it an increasingly important sector of the tourism industry. Nature-based tourism refers to tourism in protected areas or park lands, including national park (Eagles, 2002). Countries blessed with an abundance of natural aesthetic resources create tourism value and competitiveness by capitalizing upon these natural resources. Eagles (2002) argues that national parks are “closely associated with nature-based tourism, being a symbol of a high quality natural environment with a well-designed tourist infrastructure” (p. 133). Nevertheless, the growing number of visitors to these parks is becoming a significant issue (World Tourism Organization, 1992). With ever-larger shares of land being devoted to conservation, conflicts invariably arise in response to the spatial distribution of costs and benefits, which may be considered unfair for local residents. Consequently, there is often strong public debate preceding the establishment of protected areas. This is especially significant in the case of internationally recognized national parks pursuant to the World Conservation Union’s guidelines (Dudley, 2008; Thomas & Middleton, 2008).

National parks are vital assets in the conservation of biodiversity (Fennell & Nowaczek, 2010). As such, national parks are used to ensure the preservation of habitats and wildlife. Nevertheless, the establishment and management of national parks often invoke considerable controversy. To this end, Eagles (2014) observes that firm government action is often necessary to ensure the responsible and sustainable management of national parks. Such governmental action is necessary in response to the enormous pressure faced by park administrators and managers to supply additional tourist facilities and to offer an increased range of activities to entice new tourists (Huang, Deng, Li, & Zhong, 2008). As such, national parks must now balance the conflict between economic growth and tourism, and the need to promote conservation efforts aimed at protecting the very natural resources tourists come to enjoy.

Tourism is a significant contributor to the Malaysian economy, and the Malaysian government is committed to supporting the growth of the tourism industry. However, the rapid growth of the Malaysian tourism sector has come at the cost of the increased use of the nation’s natural resources. Consequently, tourism resources, such as Kinabalu Park, are often adversely impacted through the over-use and exploitation of tourism destinations. Blanke and Chiesa (2013) observe that Malaysia has struggled to cope with the rising demand on its environmental resources, with Malaysia’s environmental sustainability rating having dropped from 44 to 61 in 2008 according to the T&TC report. Moreover, Malaysia’s ranking on CO₂ emissions has dropped from 86 in 2008 to 103 in 2013 (Blanke & Chiesa, 2013). According to Shahbaz et al., (2015), the rapid

emergence of environmental consequences and climate change have created additional costs for the country's development objectives.

Kinabalu Park was gazetted in 1964 and it is well-known for its biodiversity (Tay et al., 2016). Kinabalu is one of the oldest world heritage sites in Malaysia, after being recognized by UNESCO in 2013. The park's management, Sabah Parks, aims to promote Kinabalu Park as a nature tourism hotspot while simultaneously ensuring that the park meets world standards for sustainability and conservation. Kinabalu Park is considered a strategic environmental asset because of its high levels of biodiversity, thus making its conservation an imperative (Tay et al., 2016).

Nevertheless, the increase in the number of tourists has had an adverse impact on Kinabalu Park (Latip, et al., 2015). According to Weaver (2000), there is a certain inevitability with respect to the deleterious effects of human activities on habitat areas. For environmentally sensitive areas, such as Kinabalu Park, the relationship between tourism and environmental sustainability has become an increasingly important subject of interest (Jaafar, Kayat, Tangit, & Yacob, 2013). Moreover, given the suggestion of Buckley, Robinson, Carmody, and King (2008), that the effectiveness of protected area management is rarely monitored, this relationship between tourism and environmental sustainability becomes increasingly salient.

Increasing the number of visitors to a nature-based destination puts increased pressure on local ecosystems, thus highlighting the importance of effective park management in ensuring the sustainability of development and preservation programs (Bulatovic & Tripkovic-Markovic, 2015; Gilmore & Simmons, 2007). According to Parks Enactment 1984, Sabah Parks is responsible for protecting and improving nature reserves throughout Sabah, including Kinabalu Park. Moreover, the Act mandates that Sabah Parks will coordinate and conduct systematic planning and action pursuant to these conservation and improvement goals. Tay et al. (2016), however, observes that agencies responsible for balancing environmental preservation and tourism promotion have a tendency to neglect environmental issues in favor of the economic benefits of tourism. For hotspots areas like Kinabalu Park, any strategic management plan focused on environmental conservation must also take into consideration the need to ensure tourist satisfaction. Tubb (2003) would suggest that this is a reasonable approach to park management given that conservation should emphasize environmental issues.

Several studies suggest that tourist satisfaction is a good predictor of intentions to revisit a destination and to recommend the destination to other people (Correia, Kozak, & Ferradeira, 2013; Lee, 2015; Sangpikul, 2018). Therefore, environmental issues such as air, noise, and water pollution are important to revisit because these issues inform subsequent tourist recommendations. Consequently, having appropriate management systems in

place in Kinabalu National Park can help to ensure the sustainability of tourism development while promoting tourism satisfaction. To this end, we argue the importance of investigating best practices in the management of Kinabalu Park, environmental conservation, and tourist satisfaction. This investigation has implications for existing park management policies and practices (Rasoolimanesh, Dahalan, & Jaafar, 2016).

The aims of this study are to determine: (a) the relationship between park management, tourist satisfaction, and environmental issues; and (b) the mediating role of environmental issues between park management and tourist satisfaction from the perspective of visitors to Kinabalu National Park. The findings of this study can benefit the management of Kinabalu National Park, facilitating the planning and management activities of key stakeholders. In addition, research focused on park management can be used to inform environment conservation efforts, thus improving the quality of the tourist experience and the satisfaction of visitors to the park. The findings of this paper also highlight the essential role of park management in future tourism development. Having reviewed the park management, environmental and tourist satisfaction literature, this paper goes on to describe the research methodology, results and undertakes to explore the implications of these findings in relation to the relevant literature.

RESEARCH BACKGROUND

Tourism development and environmental issues

Tourism is one of the largest developing industries in the global economy, having substantial environmental, social, cultural, and economic impacts. Nevertheless, tourism development is often a double-edged sword, creating both positive (e.g., job creation and image enhancement), and negative impacts on the biophysical (e.g., water and air pollution, ecosystem degradation), and social/cultural environment (e.g., loss of culture traditions) if not well planned, developed or managed (Azam et al., 2018). Without appropriate management, tourism development can have a number of potentially harmful effects on a destination's ecosystem and environment. Rabbany et al., (2013) argue that dysfunctional or poorly managed tourism development inevitably results in the unbalanced use of natural resources, resulting in significant environmental harm.

The growth of ecotourism parallels rising concerns about environmental issues in protected areas (Benedetto et al., 2016; Xu & Fox, 2014; Latip et al., 2018). While previous investigations of ecotourism development and environmental issues in protected areas have found considerable variation in the environmental perceptions of visitors, it remains unclear whether and how these visitor environmental perceptions might affect their support for ecotourism development. Instead, research interests have tended to focus on the value or benefits of ecotourism development as a source of revenue for national parks or

as a driver for improved conservation efforts (Landorf, 2009). To this end, the tourism industry has the potential to benefit ecosystems by engendering a renewed focus on environmental protection and conservation programs. To some extent, the rise in both the variety and number of protected regions and national park development projects across the world is a reflection of this renewed focus. Therefore, effective park management and planning are essential for ensuring the success of efforts to safeguard these protected areas for both the conservation of the environment itself and for leisure/tourism purposes (Jenkins & Pigram, 2003).

Tourism-steered economic growth and development is achieved at the cost of increased pollution and environmental degradation. In the absence of any concerted efforts to promote viable and environmentally sustainable global tourism practices, it is inevitable that the effects of pollution and environmental degradation will overshadow whatever benefits might result from tourism development. Previous studies have revealed that there is a substantial correlation between environment effects and tourism development (Azam et al., 2018; Rabbany et al., 2013). Robaina-Alves, Moutinho, and Costa (2016) assert that the environmental effects of tourism are particularly deleterious where there is a dependency on energy and carbon intense tourism activities and infrastructure. Few studies, however, explore the issue of tourism development and environmental pollution in the context of Malaysia. Environmental problems, such as noise, air and water pollution, and the loss of biodiversity often occur concomitant with the rapid development of tourism (Andrea, Tampakis, Tsantopoulos, & Manolas, 2014). In fact, Rabbany et al. (2013) observes that tourism impacts every aspect of the natural and human environment, including air, water, land, built facilities, landscapes, colors, sounds, and other environmental factors. The waterscape is an important environmental element for a tourism destination. Sewage, feces, garbage, and other sources of pollution associated with tourism activities can lead to the eutrophication of water sources, spreading infectious diseases, and degrading the sources of water used to keep forests hydrated (Andrea et al., 2014; Rabbany et al., 2013). Rabbany et al. (2013) found that water pollution in many tourism areas was ultimately caused by sewage being discharged directly into sources of ground and surface water.

Moreover, the atmospheric environment in some tourism areas has been negatively impacted by the use of coal and other fuels, as well as tourist activities. Rabbany et al. (2013) reported that the air quality in many tourism area had been greatly affected due to the emission of smoke, sulfur dioxide, nitrogen oxides, and other harmful gases from the use of coal power plants and other sources of emission. An inappropriate tourism development model can result in soil erosion and desertification. Ignoring environmental protections often results in nutrients being leached out the soil, potentially leading to salinization and acidification (Andrea et al., 2014). The soundscape is another important component of the tourism environment, helping to create a comfortable environment and making a

positive contribution to the tourism experience. Nevertheless, tourism activities often cause noise pollution. Empirical research has shown that tourism activities cause considerable noise, thus having a negative impact on the local environment. Sources of noise pollution range from vehicles or machinery to tourists themselves (Azam et al., 2018).

Given the scale of negative impacts related to tourism development on the environment, a number of researchers have called for greater attention to be paid to the protection and management of tourism resources (Azam et al., 2018). A number of scholarly investigations of park management policies and practices have emerged over the last 15 years to become an essential subfield within protected area management (Eagles, 2014; Johnston & Tyrrell, 2007; Lillestol, Timothy, & Goodman, 2015). In part, these investigations have been motivated by a need to inform park management and government policies about growth opportunities for the redevelopment of national parks (Henderson and Fry, 2011).

Park management

Effective park management is critically important for achieving desirable environmental outcomes and for the long-term viability of the ecotourism industry. Bennett and Dearden (2014) argue that many national parks exist purely on paper, serving no real purpose other than to protect them from the extractive industries. Effective park management, however, is fundamentally about ensuring that the resources of a national park are used productively, in both quantitative and qualitative terms (Getzner, Vik, Brendehaug, & Lane, 2014). Managing natural resources is largely about managing how humans interact with the natural environment and responding to broader changes in the human and natural environment. The effectiveness of this management is influenced by the availability of resources, legislative and public support, levels of cross-scale coordination and cooperation, and a number of other rules and regulations. According to Bennett and Dearden (2014), effective park management strategies include: (a) implementing a policy of carrying capacity and establishing standards for development, (b) establishing conflict resolution strategies and zoning for multiple uses, (c) increasing knowledge and awareness through education and communication campaigns, (d) undertaking a broad approach to the management of tourist activities, and (e) the enforcement of rules and regulations.

Tourism management in protected regions, such as national parks, requires an advanced and innovative management strategy. Management strategies in natural areas should focus on tourism; as such, there is a need to consider both the promotion of ecotourism development as well as how these developments will impact local ecosystems (Tubb, 2003). To this end, effective management strategies tend to prioritize environmental issues, with the development of ecotourism a by-product of this focus (Bulatovic & Tripkovic-Markovic, 2015). However, according to Ferreira and Harmse (2014), park management retains the option to control the degree and amount of interaction

between social and environmental interests. For example, access to natural areas can be controlled or limited through zoning, restrictions on permissible activities, as well as by educating visitors about appropriate park use (Inglis, Pearlman, & Whitelaw, 2005). Well planned and properly managed natural areas tend to show minimal environmental impact with high sustainable economic returns and greater visitor satisfaction (Benedetto et al., 2016). Connell, Page, and Bentley (2009) observe that there is a relationship between tourism and the ecosystem, with each being dependent upon the other. Moreover, Eagles (2014) suggests that management guidelines and strategies need to be established for new tourism developments to facilitate the preservation of a protected area's cultural and natural value.

Tourism activities have a number of often unidentified negative impacts on ecosystems. Consequently, the management and planning of such activities in the context of national parks should be both tactical and ongoing (Qian, Sasaki, Shivakoti, & Zhang, 2016). Management activities should involve all key stakeholders, the absence of which can result in knowledge gaps regarding the unique environmental values of a natural area. The absence of appropriate information can affect the decision-making efforts of authorities (Benedetto et al., 2016). Therefore, understanding tourist satisfaction is essential for the success of any tourism destination (Eagles, 2014). Destination management organizations are primarily concerned with promoting tourist satisfaction. Tourist satisfaction is important because it directly affects the economic returns enjoyed by a destination or host country. Tourist satisfaction influences visitors' selection of a destination, their consumption of products and services, as well as their decision to return to a destination. A number studies have shown that satisfied tourists tend to tell others about their positive or good experiences and plan return trips (Correia et al., 2013; Sangpikul, 2018). Tourist satisfaction is a desired psychological state that follows after direct exposure to a tourism experience or opportunity, and as such, represents a post-purchase evaluative judgment (Baker and Crompton, 2000). In a case study of Parks Canada, Banyai (2012) concludes that: "Overall experience satisfaction in a national park is highly dependent on visitors' satisfaction with the site-specific elements" (p. 115). Therefore, the investigation of tourist satisfaction is essential for ensuring sustainable park tourism management.

RESEARCH METHODOLOGY

The study data comprises of a mix of literature review, existing research reports and a questionnaire survey. This study analyses and evaluates the mediating role of environmental issues between park management and tourist satisfaction. The model for this study is illustrated in Figure 1. A number of studies highlight the influence of park management on tourism development and economic development (Bulatovic & Tripkovic-Markovic, 2015; Eagles, 2014; Qian et al.,

2016). Some studies go on to suggest that environmental issues play an important role in the revisit intentions and destination recommendations of tourists (Lee, 2015; Yousuf & Ali, 2018). Similarly, some studies have explored the role of rules and regulations in protected areas on tourist satisfaction (Bajs, 2015; Rasoolimanesh et al., 2016). Relying on prior studies (Bulatovic & Tripkovic-Markovic, 2015; Gilmore & Simmons, 2007), the current research assessed the relationship between park management at Kinabalu National Park, environmental issues, as well as tourist satisfaction. Therefore, the research hypotheses derived from this relationship are:

H1: Park management influences tourist satisfaction in Kinabalu National Park.

H2: Park management influences environmental issues in Kinabalu National Park.

H3: Environmental issues influence tourist satisfaction in Kinabalu National Park.

H4: Environmental issues mediate the relationship between park management and tourist satisfaction in Kinabalu National Park.

Figure 1 presents the hypothesized research model.

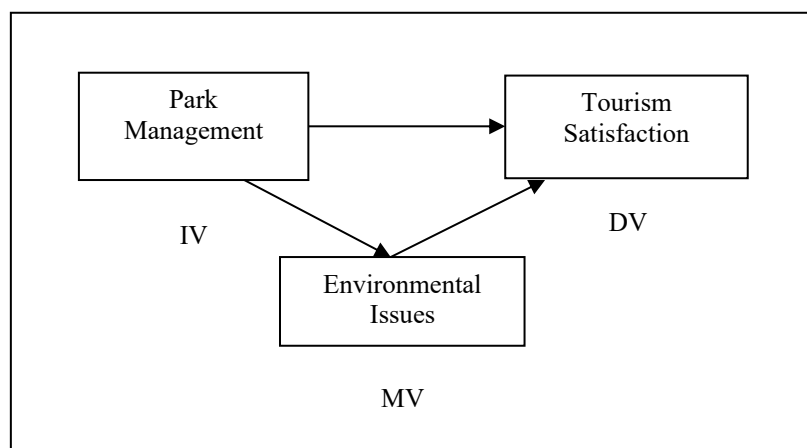


Figure 1. Proposed research model

This quantitative study assesses the hypothesized relationship and possible mediating effects of environmental issues between park management and tourist satisfaction within Kinabalu National Park. The method of data collection, which involved the use of a questionnaire survey, was influenced by preceding studies (Jimura, 2011; Nicholas, Thapa, & Ko, 2009), and sought to examine park management, environmental issues, and tourist satisfaction.

Kinabalu National Park is divided between four stations: Sayap in the Kota Belud District, Nalapak and Serinsim in the Kota Marudu District, and Monggis in the Ranau District. Respondents to this study include a sample of visitors to these areas. The questionnaire was distributed among these visitors, with 482 questionnaires having been returned. Nevertheless, only 351 questionnaires were completed or deemed usable. Consequently, the final sample includes 193 male (55%) and 158 female (45%) respondents. Approximately 39% of the respondents were ethnic Malays, 41% were Chinese, 16% were Indians, and 4.5% were other ethnicities. Among the respondents, 253 were aged 18–34 years, and 98 were aged 35 years or over. The majority of respondents (82.3%) were either undergraduates or held graduate degrees.

The questionnaire was divided into four parts: respondent demographic data (4 items), park management (7 items), environmental issues (7 items), and tourist satisfaction (6 items). Respondents were asked to indicate the degree to which they agreed with each item on a Likert scale ranging 1 (*strongly disagree*) to 5 (*strongly agree*). The questionnaire also provided closed questions with respect to the respondent's background, such as gender, age, nationality, and education.

Structural Equation Modelling (SEM) was employed to analyze the relationships between the variables. SEM is an in-depth statistical method that simultaneously enables the assessment of a conceptual model. SEM enables all of the paths in a model to be examined simultaneously (Tabachnick & Fidell, 2007). Partial Least Squares SEM (i.e., PLS-SEM) was utilized in this research because PLS allows for theory testing. PLS-SEM was conducted on the results of data collection using SmartPLS 2.0 software (Hair, Ringle, & Sarstedt, 2011). According to previous studies, PLS-SEM requires a minimum threshold of at least 100 samples (Reinartz, Haenlein, & Henseler, 2009); in this study, we used data derived from 351 completed questionnaires, thus exceeding this minimum threshold. Furthermore, Hair et al. (2011) suppose a *ten times rule* for determining sufficient sample size for PLS-SEM analysis. Based on this rule, the minimum sample size needs to be 10 times the highest number of paths designated to a specific construct. Therefore, having data derived from a sample of 351 completed questionnaires met the minimum sample size needed for this study.

DATA ANALYSIS

The questionnaire was distributed among these visitors, with 482 questionnaires having been returned. Nevertheless, only 351 questionnaires were completed or deemed usable. Consequently, the final sample includes 193 male (55%) and 158 female (45%) respondents. Approximately 39% of the respondents were ethnic Malays, 41% were Chinese, 16% were Indians, and 4.5% were other ethnicities. Among the respondents, 253 were aged 18–34 years, and 98 were aged 35 years

or over. The majority of respondents (82.3%) were either undergraduates or held graduate degrees.

Table 1: Characteristics of respondents

	Item	N = 351	(%)
Gender	Male	193	55
	Female	158	45
Age	18-24	133	37.9
	25-34	120	34.2
	35-44	61	17.4
	45-54	27	7.7
	55-64	10	2.8
Ethnic	Malays	137	39
	Chinese	144	41
	Indian	56	16
	Others	14	4

For further analysis, the model was evaluated using a two-step PLS-SEM method. Using this approach, the analysis began with the measurement model, after which the analysis moved on to the structural model (Chin, 2010; Hair et al., 2011). The validity and reliability of the relationships between the latent variables (LV) and any associated observable variables were examined during the course of analyzing the measurement model. During the structural model assessment, the relationship between the constructs themselves was subject to examination (Chin, 2010; Hair et al., 2011).

The analysis of model includes three reflective constructs: park management, environmental issues, and tourist satisfaction. Reflective constructs are so called because the measurement items for the constructs are strongly correlated with each other. Key to analyzing the measurement model is composite reliability (CR) and average variance extracted (AVE) (Chin, 2010; Hair et al., 2011). In addition, the reflective measurement model can be assessed by way of two forms of reliability: indicator reliability and construct reliability. The loadings of all indicators on their associated latent constructs were tested to distinguish indicator reliability. A loading more than 0.7 reveals adequate indicator reliability (Götz, Liehr-Gobbers, & Krafft, 2010; Hair et al., 2011).

Table 2: Result of measurement model assessment

Construct	Items	Loading	CR	AVE
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Park management		0.938	0.683
	Implementing a carrying capacity	0.826	
	Establishing standards for development	0.797	
	Conflict resolution strategies	0.795	
	Increasing knowledge and awareness	0.844	
	Management of tourist activities	0.826	
	Enforcing rules and regulations	0.835	
	Establishing zoning for multiple uses	0.826	
Environmental issues		0.852	0.667
	Noise pollution (vehicles, visitors)	0.712	
	Air pollution (vehicles, smoke)	0.736	
	Soil erosion	0.819	
	Garbage accumulation	0.728	
	Bad smell (garbage, toilet and drainage)	0.751	
	Cleanliness of water	0.873	
	Water turbidity	0.790	
Satisfaction		0.807	0.693
	I feel I benefited from coming here	0.764	
	I found the visit worthwhile	0.703	
	The visit was as good as I had hoped	0.802	
	I would recommend this place or tour to a friend	0.793	
	If I had the opportunity, I would like to come back here again	0.864	
	Overall, I was satisfied with the visit	0.835	

Source: Author, 2020

Table 2 shows that all indicators had a loading greater than 0.7. Two coefficients are typically considered to assess construct reliability: CR and, the more common coefficient, Cronbach's alpha (Chin, 2010; Götz et al., 2010). CR is the more suitable coefficient for PLS-SEM and should be greater than 0.7 (Hair et al., 2011). Table 2 indicates that the CR for both latent variables (LVs) in the measurement model was greater than 0.807. Therefore, the results demonstrate that our measurement model had internal consistency and was reliable. The validity of the reflective measurement model also accounts for convergent and

discriminant validity (Götz et al., 2010; Hair et al., 2011). For convergent validity, LVs with an AVE greater than 0.5 were considered acceptable (Chin, 2010; Hair et al., 2011). AVE is used to measure the amount of variance in an LV as contributed by its indicators (Chin, 2010). Table 2 shows that the AVE values for all constructs used in the measurement model were higher than 0.667 and had loadings higher than 0.7. Therefore, the convergent validity of the measurement model was more than acceptable. Discriminant validity describes the extent to which each construct is distinct from one another (Chin, 2010). Two measures must be checked to test discriminant validity: the AVE of each construct should be higher than the highest squared correlation of the construct with any other LV in the model, and the loading of an indicator with its associated LV must be higher than its loading with other LVs (Chin, 2010; Hair et al., 2011).

Table 3 shows the evaluation of the AVE of both constructs with the squared correlation of the other constructs. Table 2 reveals that the AVE of each construct is greater than the largest squared correlation of the same construct with other constructs in the model. Furthermore, the factor loadings for all items on their associated constructs was more than the cross-loading with other constructs. Consequently, the results indicate the acceptability of the reliability, convergent validity, and discriminant validity of the measurement model.

Table 3: Discriminant validity

Constructs	Park management	Environmental issues	Tourist satisfaction
Park management	0.667		
Environmental issues	0.205	0.683	
Tourist satisfaction	0.138	0.465	0.693

Source: Author, 2020

The R-square (R^2) measure of the endogenous constructs and the path coefficients was evaluated as part of an initial examination of the structural model (i.e., inner model) and theoretical framework (Chin, 2010; Hair et al., 2011). Chin (2010) recommends that measures of 0.67, 0.33, and 0.19 for R^2 should be thought of as respectively significant, average, and weak. The path coefficients should be substantial, and the value of R^2 is contingent upon the field of study. The R^2 level for the environmental issues construct in the model was 0.121, and 0.586 for the tourist satisfaction construct. The results for the structural model assessment based on the relationship between the constructs is presented in Table 4 and Figure 2. The structural model assessment, utilizing the bootstrap process with 200, 500, and 1000 re-samplings, as well as the magnitude and significance

of the structural paths are consistent. Bootstrapping resulted in 1000 samples being generated from 351 cases. As indicated by Henseler, Ringle, and Sinkovics (2009), the bootstrapping method produces standard errors and t-statistics used to assess the statistical significance of the path coefficients. At the same time, the calculation of the bootstrapping confidence intervals of standardized regression coefficients forms part of the analysis. To this end, Table 4 shows the positive, strong, and substantial effect of park management on environmental issues. Park management has a substantial effect on tourist satisfaction. The results indicate a positive and significant effect of environmental issues on tourist satisfaction. Therefore, all direct effects shown in Figure 3 are significant.

Table 4: The result of assessment of structural model

Hypotheses		Std.Beta	SE	t-value	Supported
H1	Park management Environmental issues	→ 0.266	0.072	2.460	Yes
H2	Park management Tourist satisfaction	→ 0.699	0.081	7.596	Yes
H3	Environmental issues Tourist satisfaction	→ 0.282	0.056	2.554	Yes

Source: Author, 2020

Tests on the mediation hypotheses (H4) use the analytical approach described by Preacher and Hayes (2008). Using this approach, we can analyze the direct effect of park management on tourist satisfaction by removing the environmental issues construct. Figure 4 shows the results of testing these direct effects. The application of bootstrapping (1000 re-samples) allows for testing of the mediation hypotheses (Preacher & Hayes, 2008). In addition, Sobel (1982) describes a general procedure whereby more complicated indirect effects may be tested. The Sobel test is conducted by comparing the strength of the indirect effect of X on Y to the point null hypothesis, which equals zero (Preacher & Hayes, 2008). The determination of significant indirect effects between two variables is decided based on the Z value. The null hypothesis (there is no indirect effect between two variables) is denied whenever the Z value is higher than 1.96 (Hair et al., 2011).

Equation 1 is applied to identify the statistical significance of the mediation reduction.

	$= \frac{ab}{\sqrt{a^2s_b^2 + b^2s_a^2}}$	[1]
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a: path coefficient value from IV to MV
 b: path coefficient value from MV to DV
 s_a and s_b : standard error values for the path coefficients

The Z value for this research model is shown in Equation 2:

$$z = \frac{0.266 \times 0.282}{\sqrt{0.070 \times 0.003 + 0.079 \times 0.005}} = 3.4 \quad [2]$$

The results in Table 5 show that park management has a significant effect on tourist satisfaction without a mediator. By adding the mediator, the effect of park management is reduced, although it continues to exert a substantial direct effect on tourist satisfaction. The Z value is greater than 1.96, which means that the indirect effect of park management on tourist satisfaction in the research model is significant. Consequently, environmental issues partially mediate the relationship between park management and tourist satisfaction.

Table 5: The result of mediating effect tests

Hypotheses	Std.Beta	SE	Type of mediation	Z
Park management Tourist satisfaction → without mediator	0.765	0.62		
Park management Tourist satisfaction → with mediator	0.699	0.081	Partial	3.4

Source: Author, 2020

DISCUSSION AND RECOMMENDATIONS

This study investigated the relationship between Kinabalu park management with regard to tourism development and conservation programs on tourist satisfaction and environmental issues. Tourism and the environment have been a focal point for several studies (Ferreira & Harmse, 2014; Nicholas et al., 2009). According to Zhong, Deng, Song, and Ding (2011), theories of environmental science and tourism have been used to assess and develop measures for sustainable environmental tourism. For Kinabalu Park, the investigation of the relationship between park management, environmental issues, and tourist satisfaction is

important for future planning, management, and the implementation of tourism programs or activities. As a world class recognized biodiversity hotspots, this assessment is necessary to: (a) measure tourist satisfaction, and (b) understand the experience and opinion of tourists with respect to the management of the park and environmental issues.

Tables 3 and 4 present an overview of the results of hypothesis testing. Based on 351 responses, this analysis confirms the relationships described in each of the research hypotheses. The first and second hypotheses describe the effects of park management on tourist satisfaction and environmental issues. The results show that park management has a substantial and positive influence on environmental issues and tourist satisfaction. Visitors indicated a belief that effective park management was important for environmental and tourist satisfaction. Tourists specifically emphasized the importance of having effective park management strategies related to environmental issues. Participants agreed that each of the proposed park management strategies played an important role in conserving the ecosystem and increasing tourist satisfaction. These park management strategies include the implementation of a carrying capacity policy and establishing standards for development, establishing conflict resolution strategies and zoning for multiple uses, increasing knowledge and awareness through education and communication campaigns, broader management of tourist activities, and more effective enforcement of park rules and regulations.

Destination or park management has been an important topic in discussions pertaining to rural tourism since the early 2000s. As an ecotourism and UNESCO world heritage site, Kinabalu National Park is obligated to conserve its environment, including flora, fauna, and human culture. Therefore, efforts to improve the efficacy of Kinabalu's park management will have practical benefits for tourism (Benedetto et al., 2016). Effective tourism management coupled with appropriate planning can help to ensure that the park's tourism resources remain sustainable. Moreover, effective tourism management is a collaborative strategy inclusive of formulation, planning, implementation, and evaluation. Therefore, an integrated planning and management approach is necessary to achieve tourist satisfaction and sustainable tourism development (Nicholas et al., 2009). Previous research has shown that the effective management of national parks plays a vital role in ensuring the park's sustainability (Ferreira & Harmse, 2014). Getzner et al. (2014) observe that, in most cases, effective park management is function of policy development and implementation. Therefore, it is necessary to develop appropriate environmental tourism policies, laws and regulations to promote environmental conservation (Benedetto et al., 2016). To this end, in terms of the future development of Kinabalu National Park, tourism management practices should emphasis tourist satisfaction and environmental conservation.

In addition, controlling and managing the potentially environmentally destructive activities of tourists is important in order to promote conservation and the preservation of the natural environment. Emphasizing the implementation of appropriate national tourism policies and legislation can help to improve the conservation and sustainable development of Kinabalu Park. Moreover, successful ecotourism development and tourist satisfaction is contingent upon ensuring that these policies and laws are sufficiently robust and focused on the needs of key stakeholders involved in the tourism planning process (Bulatovic & Tripkovic-Markovic, 2015).

Testing the third hypothesis (re: the effects of environmental issues on tourist satisfaction) showed a positive result. The development of ecotourism and promotion of environmental issues plays an important role in improving tourist satisfaction in Kinabalu National Park. The literature would suggest that ecotourism and environmental issues exert a positive effect on tourist satisfaction (Benedetto et al., 2016; Xu & Fox, 2014).

Testing the fourth hypothesis involved analyzing the indirect effects of park management and tourist satisfaction, using environmental issues as a mediating role. This fourth hypothesis was partly supported. This result indicates that the management of Kinabalu National Park needs to take a more active role in every aspect of the park's environmental conservation and ecotourism development if it is to actively promote tourist satisfaction. Wilderness destinations with better park management and planning strategies tend to be much more effective in attracting international tourism (Getzner et al., 2014). Therefore, a renewed focus on environmental issues and ecotourism development in Kinabalu National Park should result in improved tourist satisfaction. This idea is consistent with argument extended by Inglis et al. (2005), that park management strategies should be designed to fulfil multiple objectives in terms of attracting new visitors and new residents, while simultaneously promoting conservation, thus supporting sustainable tourism development.

The findings presented in this paper detail the relationship between park management, environmental issues, and tourist satisfaction in Kinabalu National Park. The result indicate that Sabah Parks should focus on park management as a key factor in the planning and implementation of tourism programs in relation to Kinabalu National Park. The interaction between park management, tourist satisfaction, and environment or sustainability provides an opportunity to identify to new strategies for the development of Kinabalu National Park.

As the number of visitors to Kinabalu National Park continues to rise, Sabah Parks has an obligation to strengthen its policies in relation to the environment. Our findings indicated that attention to environmental issues is as an essential component of an integrated approach to overall park management and to the promotion of tourist satisfaction. Particularly attention should be paid to tourism development planning and park management strategies, ensuring that

these strategies are intrinsically linked to the protection and conservation of the park's ecosystems. This integrated approach to the management of Kinabalu National Park ultimately aims to maximize the potential of the visitor experience, and ensure that the visitor is ideally poised to reap the maximum benefits derived from visiting the park. In turn, satisfied visitors boost the operation of the park's management, resulting in repeat tourist visitation and attracting new visitors.

Sabah Parks has at their disposal a range of strategic management models from which to choose from for the management of protected areas. These park management strategies attempt to address, and in some cases balance, ecological, community, and financial imperatives and objectives. An understanding of policies and legislation underpinning park management systems in various countries illustrates the diversity of interests and priorities of governments in addressing these challenges (Inglis et al., 2005). Consequently, it is imperative that park managers seek to understand, evaluate, and document the concerns of key stakeholders and visitors, and developing appropriate policies in response to these concerns. This framework can facilitate the process of identifying the right park management model for promoting the sustainability of Kinabalu National Park well into the future. Effective park management will inevitably require the implementation of a range of strategies aimed at controlling and managing the ecological impact of visitor activity. In addition to the selection of the correct park management model, park management must ensure the consistent monitoring and assessment of visitor impacts in order to manage and conserve ecologically sensitive areas.

The findings of this study lead us to recommend that key stakeholders be incorporated in the future planning and management of the park. Park management should be prepared to consider the implementation of new policies and practices aimed at addressing various environmental issues and tourist satisfaction. To this end, park management should look beyond traditional approaches and seek input from subject expertise in order to develop a revised strategic management model for park management. As such, visitor activities should aim to ensure a negligible environmental impact. In addition, visitors should be educated and informed as to the park's rules ahead of visiting protected areas, thus promoting the protection of the park's original integrity and value. Ideally, tourist behaviors and activities will have a positive impact on maintaining the environment. Moreover, the park's management will have a close relationship with whatever tourism programs or activities are provided onsite. Tourism brings additional funding to the park, which the park depends upon for its facilities and resources. Therefore, every aspect of the proposed tourism program has the potential to provide significant benefits for the park. Future research should explore the issue of what tourism programs might be considered appropriate for protected areas given the need to prioritize conservation.

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NOTES TO CONTRIBUTORS AND GUIDELINES FOR MANUSCRIPT SUBMISSION

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B-01-02, Jalan SS7/13B, Aman Seri, Kelana Jaya,

47301, Petaling Jaya, Selangor Darul Ehsan, MALAYSIA

Tel: +603 78770637 Fax: +603 78779636

Email: pmjournal@gmail.com

Homepage: www.planningmalaysia.org

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B-01-02, Jalan SS7/13B, Aman Seri, Kelana Jaya,
47301, Petaling Jaya, Selangor Darul Ehsan, MALAYSIA
Tel: +603 78770637 Fax: +603 78779636
Email: pmjournal@gmail.com or mip@mip.org.my
Website: www.planningmalaysia.org