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URBANIZATION AND LAND USE CHANGES IN RURAL TOWN: GUAR CEMPEDAK, KEDAH

Abdul Ghapar Othman[1], Kausar Hj Ali[2,] Izuandi Yin[3,] Tan Mou Leong[4] & Nurul Hanisah Mohd Jizan[5]

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Abstract

The change in land uses in rural areas is often associated with urbanization process. However, urbanization and industrialization also caused dramatic changes in the land use of rural areas and small towns, where a significant loss of agricultural land and an increase in the construction of rural settlements have led to transformation from non-built-up to built-up land uses. Factors influencing this transformation are many, ranging from physical, economic, social and environmental reasons. This paper intends to study land use changes from 2006 to 2020, determine land use growth parameters, and establish whether the identified physical factors conform to the land use growth and changes in Guar Cempedak, Kedah by applying the technique of overlay, AHP and fishnet using GIS. Findings of the study show that there were significant land use changes during the period of 2006 to 2014, where commercial, institution and public facilities and transportation experienced significant increase, while non-built land uses such as forest, lost more than 90% of its area to other land uses. Distance to transport network and distance to commercial activities identified as the main influencing factors, have been found to be consistent with the result of intensity analysis on land use changes in this small town.

Keywords: Urbanization, land use change, GIS

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INTRODUCTION

The urbanization process has led to the transformation of rural areas; especially through the physical development of land uses, economic growth and transportation systems (Hadi, 2010). The development of new settlement centres and transportation network systems has been a catalyst for changes in rural settlement patterns (Choy and Noor, 2018). To enhance the progress of this development, the government has taken the initiative to provide infrastructure facilities, such as more efficient transportation and communication systems by upgrading the transportation system along primary and secondary routes to improve accessibility between urban and rural areas. This also affects changes in land use activities in rural areas, such as housing, commercial and industry (Antrop, 2004). Developing small towns would also mean offering a variety of urban goods and services to the rural population while improving their accessibility to better facilities (Saleh et al., 2012). Development of small towns are also dependent on vibrant commercial activities and industries, well connected transportation network, as well as variety in urban services (Talib and Rostam, 2014). However, given that small towns are distinctive with varying characteristics and levels of development, determining the real factors influencing their growth can be daunting. Yet, it is imperative to study the contributing factors as it will help decision makers and planners in managing and planning for its future growth.

This paper aims to study land use changes in Guar Cempedak, a small rural town located on the main transportation line, and also one of the centres that provide urban services for Yan district in the state of Kedah. The results of this land use change study, will be further analysed to determine the intensity of expansion of land uses and to determine factors that most influence urban growth. The findings of the study will shed some light on our understanding of the main factors affecting small town development.

URBANIZATION AND IMPLICATIONS TOWARD LAND USE

Various terms can be used to describe urbanization, among which includes the social, economic and environmental changes that involve not only in terms of physical space, but also in terms of the socio-economic characteristics and the special cultural features of the area (Salleh et al., 2013). Among the positive implications of the urbanization process is the ease of human movement with the existence of a good transportation system and accessibility, while the negative implications include high population density, high land value, and vulnerability to the risk of natural disasters (Hussain & Ismail, 2016). According to Choy & Na (2017), the process of urbanization can be associated with rapid development, such as population growth, provision of infrastructure facilities, business and industrial zones. The increase in population will increase the demand for housing facilities in the area and this will cause many new areas to be explored; especially

agricultural areas and inland forests. As a result, non-built-up land use will decline. Municipalities transform existing traditional land use activities by converting non-built-up land uses to built-up land uses to meet these demands.

FACTORS INFLUENCING LAND USE GROWTH

Various studies have been conducted to identify urban growth factors. Aguayo et al. (2007) stated that land use growth is influenced by the distance and density of land uses while (Li et al., 2013) found that a good road network system can ease the movement of population and thus, increase accessibility. The land use growth that moves along major roads and highways increased rapidly when heavy dependence on private vehicles escalated in the absence of efficient and affordable public transportation (Othman and Ali, 2020). Other than transportation, economic factors, such as the existence of commercial and industrial zones, are also important determinants of land use growth. This is because the commercial and industrial sectors offer a variety of employment opportunities and services (Lu et al., 2013). However, expansion of new areas for industries and other urban activities has led to the loss of agricultural land use and vacant land, as these types of land uses are among the most suitable and easiest to be developed (Liu et al., 2008). A study by Mahamud, Samat & Noor (2016) has identified physical, social, economic and environmental factors as main contributing factors to urban growth. The findings of this study established that distance from workplace and distance from public facilities are major factors in urban growth, along with an efficient road network where it not only is able to shorten travel time but also provides alternative routes to many places.

The factors and sub-factors that influence the growth of urban land use from the above study will be adapted and used as criteria in the analysis of this study. The four main factors to be adapted are environmental, economic, social and physical, while the sub-factors have been restructured to tailor to the context of the study area. Specifically, distance from water body, distance from infrastructure and utility, distance from transportation network, distance from housing area, distance from commercial centre, distance from industrial areas, as well as distance from institution and public utilities.

STUDY AREA

The study area is the town of Guar Cempedak (N5.85246, E100.45987) located in the Yan district, Kedah, Malaysia (Figure 1). The town is categorized as a Main Settlement Centre and is a major contributor in the commercial service sector for the district (PlanMalaysia, 2017). With an area of approximately 3,983 acres, Guar Cempedak is accessible to the City of Alor Star and the town of Gurun by the main federal road, Federal Route 1 and to Yan Kechil (district administrative centre) by the state road K146. The nearest train station is the Gurun Train Station (4km) and access to the North-South Expressway is via the Gurun Toll Plaza

(6km). Both are located in the town of Gurun, south of the study area. Although Guar Cempedak is not the administrative centre for the Yan District, the main development policies and strategies for the district are mostly focused on this town with the development being 'infill' and redevelopment within the existing town centre (PlanMalaysia, 2012).

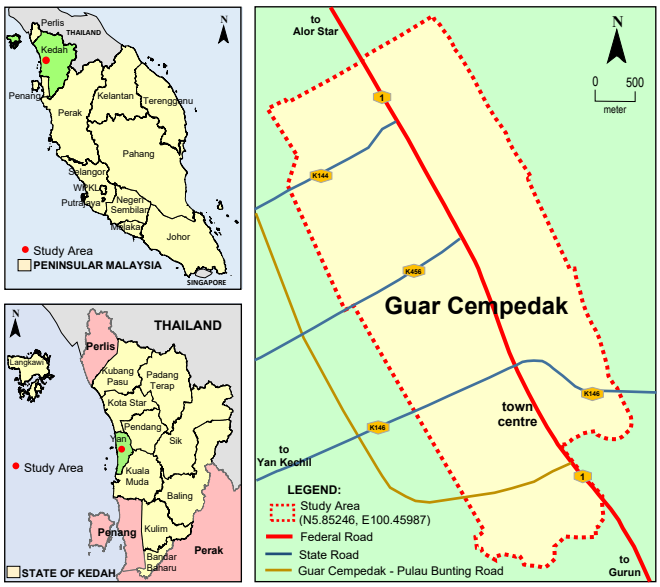

Figure 1: Location of Guar Cempedak

METHODOLOGY

This study aims to analyse land use changes from 2006 to 2014 and 2014 to 2020 for the town of Guar Cempedak. The 2006 and 2014 land use data were obtained from the Yan District Council while the 2020 data was acquired through fieldwork. The analysis utilizes a GIS software, ArcGIS 10.4 to produce a statistic of land use changes from 2006 to 2020. The overlay technique is then applied to generate a matrix table of land use changes from 2006 to 2014. This data will also be used to determine the intensity of urban expansion in the study area. Result from this analysis will be overlaid with the chosen sub-factors that have the highest influence on land use growth derived from the AHP technique. To analyse the intensity of urban expansion in the study area, a fishnet with a grid cell measuring 100m x 100m (a spatial unit) is created using the ArcGIS software. The annual expansion intensity index of each spatial unit is calculated and classified according to level of expansion: high, fast, medium, slow and very slow (Hu, Du & Guo, 2007). The result will also assist in identifying areas that experienced land use changes.

This study also integrates GIS and the Analytical Hierarchy Process (AHP), one of the multi-criteria decision-making (MCDM) techniques, to prioritize land use sub-factors according to their suitability weightage in influencing land use growth. This is achieved by applying the pairwise comparison method, a comparative matrix assessment used in AHP that estimates the weighting values of sub-factors based on probability measurements (Aburas et al., 2017). The scale of importance for each sub-factor is determined based on Saaty (1980) scale of evaluation for pairwise comparison. This method generates weight value for each sub-factor and compares them to distinguish each sub-factor level of importance in influencing land use growth (see Table 1). The value for the consistency ratio (CR) calculated in this study is 0.003. The CR value has to be lower than 0.1 for this assessment to be acceptable.

.

Table 1: Weightage based on Pairwise Comparison Matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**Weight**	**Priority**
1	1.00	0.17	0.33	0.20	0.17	0.14	0.13	**0.024**	7
2	6.00	1.00	5.00	5.00	6.00	0.25	4.00	**0.231**	2
3	3.00	0.20	1.00	0.14	0.20	0.13	0.17	**0.035**	6
4	5.00	0.20	7.00	1.00	0.33	0.25	2.00	**0.102**	4
5	6.00	0.17	5.00	3.00	1.00	0.17	4.00	**0.134**	3
6	7.00	4.00	8.00	4.00	6.00	1.00	7.00	**0.385**	1
7	8.00	0.25	6.00	0.50	0.25	0.14	1.00	**0.090**	5

Note:1=Distance from water body 2=Distance from commercial centre 3=Distance from industrial area 4=Distance from institutional and public facilities 5=Distance from infrastructure and utilities 6=Distance from transportation network 7= Distance from housing area

Results generated in Table 1 above show that distance from transportation network and distance from commercial are among the sub-factors with the highest weightage, 0.385 and 0.231 respectively. To produce a suitability map for each of this sub-factor, the Euclidean Distance method is applied using ArcGIS. The distance for the sub-factor reflects the suitability level in influencing land use growth and is altered accordingly and in accordance with the guidelines and planning standards from PLANMalaysia. Each of the sub-factor suitability map is overlaid with the intensity of urban expansion map to examine whether it has influence on the land use changes in the study area.

DATA ANALYSIS AND DISCUSSION

This section discusses the results of data analysis and findings on the pattern of land use change in Guar Cempedak for the period 2006 to 2020 and compares the intensity of urban expansion with land use growth factors.

Patterns of Land Use Change

Analysis of the land use changes in Table 2 and in Figure 2 shows that there were significant land use changes during the period of 2006 to 2014 compared to the period of 2014 to 2020. Between 2006 and 2014, commercial, institution and public facilities, and transportation were among land uses experiencing significant increase in land acreage while non-built land uses such as forest, agriculture and open space and recreational are on the losing end. Forest land use was the most affected, losing more than 90% of its area to other land uses. By 2020, forest land use is no longer in the statistics.

Table 2: Land Use Changes in Guar Cempedak (2006 – 2014 – 2020)

Land Use		Year						Changes			
		2006		2014		2020		2006-2014		2014-2020	
		Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%
Built-up	Housing	440.55	11.06	465.87	11.70	471.90	11.85	25.32	5.75	6.03	1.29
	Commercial	23.26	0.58	31.83	0.80	34.10	0.86	8.57	36.84	2.27	7.13
	Industry	17.23	0.43	17.69	0.44	17.69	0.44	0.46	2.67	0	0.00
	Inst & Pb Fac.	90.11	2.26	129.46	3.25	129.76	3.26	39.35	43.67	0.3	0.23
	Transportation	216.53	5.44	251.60	6.32	261.34	6.56	35.07	16.20	9.74	3.87
	Infra & Utility	88.48	2.22	88.75	2.23	88.67	2.23	0.27	0.31	-0.08	-0.01
Non-Built-up	Opn Spc & Rec	181.32	4.55	156.16	3.92	153.87	3.86	-25.16	-13.88	-2.29	-1.47
	Agricultural	2,832.50	71.11	2,768.79	69.51	2,755.07	69.16	-63.71	-2.25	-13.72	-0.50
	Forest	22.21	0.56	2.07	0.05	0	0	-20.14	-90.68	-2.07	-100
	Water Body	71.16	1.79	71.13	1.79	70.95	1.78	-0.03	-0.04	-0.18	-0.25
	Total	**3,983.35**	**100**	**3,983.35**	**100**	**3,983.35**	**100**				

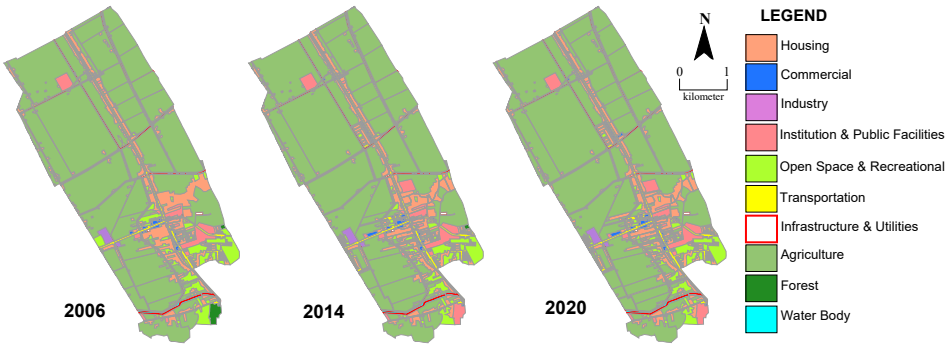

Figure 2: Land use changes in Guar Cempedak 2006, 2014 and 2020
Source: Yan District Council & fieldwork

From 2014 to 2020, land use change was progressing at a slower pace but portraying similar pattern as from 2006 to 2014, with significant decrease of agriculture land use (-13.72ac) followed by open space and recreational and forest

land uses. This decrease has resulted in an increase of land acreage in transportation, housing and commercial land uses.

Table 3 below shows the details matrix of change between land use activity for the time series from 2006 to 2014 (Note: the land use change matrix for 2014 to 2020 is not shown because the changes are not so drastic compared to land use changes from 2006 to 2014). Agricultural land area declined by over 60 acres, contributing to the increase primarily of urban land uses such as housing, institution and public facilities, transportation and commercial. The development of these urban land uses is positively correlated to each other. For example, a new government office would require development of new housing to accommodate the civil servant. This is also true with the development of transport facilities to support the function of commercial and industry. Meanwhile, forest land use was also encountering major loss in land acreage (20.14ac) mainly to the development of a public/tourist facility at the main entrance to Gunung Jerai (Mount Jerai), another tourist destination site for the district.

Table 3: Matrix of Land Use Changes (2006-2014)

		LANDUSE 2014 (acres)										
		House	Comm.	Ind.	Inst&PF	OpnSpc	Transport	Infra	Agr.	Forest	Wtr Bdy	Total
LANDUSE 2006 (acre)	House	428.66	2.12		0.70		9.07					440.55
	Comm.	0.01	23.13		0.07		0.04					23.26
	Ind.			17.23								17.23
	Inst & PF				90.03		0.08					90.11
	OpnSpc	12.11	2.89		0.85	153.99	11.49					181.32
	Transport						216.53					216.53
	Infra.						0.12	88.36				88.48
	Agr.	25.09	3.69	0.46	17.67	2.17	14.25	0.39	2,768.79			2,832.50
	Forest				20.14					2.07		22.21
	Wtr Bdy						0.03				71.13	71.16
	Total	465.87	31.83	17.69	129.46	156.16	251.60	88.75	2,768.79	2.07	71.13	**3,983.35**

The pattern of land use changes shows that the urbanization process is taking place in the study area whereby non-built-up areas are being replaced by built-up areas. This can be explained by the development of new housing estates (Taman Chempedak Indah, Taman Desa Indah, etc.) around Guar Cempedak and the upgrading of existing and the building of new local roads. Back in 2006, the study area did not have good road network. With the development of new government office (National Registration Department of Malaysia), commercial centre (Guar Cempedak Farmers Market), and school (Guar Cempedak National Secondary School 2), the need for better transport facilities especially roads is mounting. Apart from that, the construction of the new road from Guar Cempedak to Pulau Bunting also affects the agricultural land use in the study area. It is connected to the K146, K453 and K144 state roads as a catalyst for the development of tourism industry in the Yan district where Pulau Bunting is planned to be another tourist

destination. Industrial land use on the other hand, experienced minor changes during this period of study. The industrial area is located outside the study area, namely in Sungai Limau Dalam.

The results of this land use change analysis show that transportation land use has increased significantly in both time periods. Transport facilities such as road increase accessibility not only within the study area but also to the neighbouring areas. This is also part of the development strategy of the state government to connect all urban and rural areas by improving the communication and transportation system (PlanMalaysia, 2017). Transportation facilities have undoubtedly attracted the development of other built-up land uses, such as housing, commercial, industry, and institutions towards rural areas. They act as a catalyst for change in rural settlement patterns, where affordable housing, employment opportunities and the availability of urban services such as retail services and finance added values to the community (Choy & Mohd Noor, 2018; Mohd & Rahaman, 2016). On the other hand, most of the land use changes and majority of new land developments occurred on non-built-up areas. As their physical features can be easily developed and the costs are much lower compared to other built-up land uses, they are often targeted for new development (Othman & Jizan, 2020).

Factors Influencing Urban Growth

Results from pairwise matrix in Table 1 above show that distance from transportation network and distance from commercial centres are the main factors influencing urban growth. These factors were extracted and overlaid with the intensity of urban expansion in Guar Cempedak between the years 2006-2014. Table 4 shows the High intensity of urban expansion has occurred in all categories of transport distance suitability with the largest acreage of built-up areas (122.13ac) found within 50-250m from major roads. As many areas closest (0-50m) to major roads are already built-up, High intensity development only covers 42.1 acres in this category. There are also considerable expansions at varying intensities, most notably in the Fast and Medium intensities. Nonetheless, it is important to note that 92% of High intensity development took place within 500 meters from major roads. This implies that urban growth, encompassing new built-up land uses relies on major transport network especially in providing access to new housing and public facilities developments. Some development that seems to be located further away from major roads (Figure 3(a)) is actually being served by feeder and local roads. However, the main expansion with High intensity is still dominated and influenced by distance to major roads. Distance to major roads was also cited by Samat et al. (2020) as the highest influencing factor in urban growth, especially in cities with urban sprawl. Guar Cempedak, traditionally a market town serving surrounding rural communities is also located on Federal Route 1 and situated halfway between Alor Setar City to the north,

and Gurun and Sungai Petani to the south. Given its strategic location, its growth is easily influenced by economic expansions of neighbouring cities, transforming its traditional role for accessing markets and services to become nodes of agglomeration supported by accessibility and favourable location (Denis, 2018).

Table 4: Overlay between Transportation Parameter and Intensity of Urban Expansion

Distance from Major Roads & Level of Suitability	**Intensity of Urban Expansion 2006 – 2014 (acres)**					**Total**
	High	Fast	Medium	Slow	Very Slow	
0-50m (Most Suitable)	42.10	2.15	4.42		246.20	294.88
50-250m (Suitable)	122.13	3.53	5.47		950.95	1,082.08
250-500m (Mod. Suitable)	71.49	2.45		2.47	1,010.56	1,086.97
>500m (Not Suitable)	21.10	4.94	0.77	2.47	1,490.15	1,519.42
Total	256.82	13.07	10.66	4.94	3,697.86	3,983.35

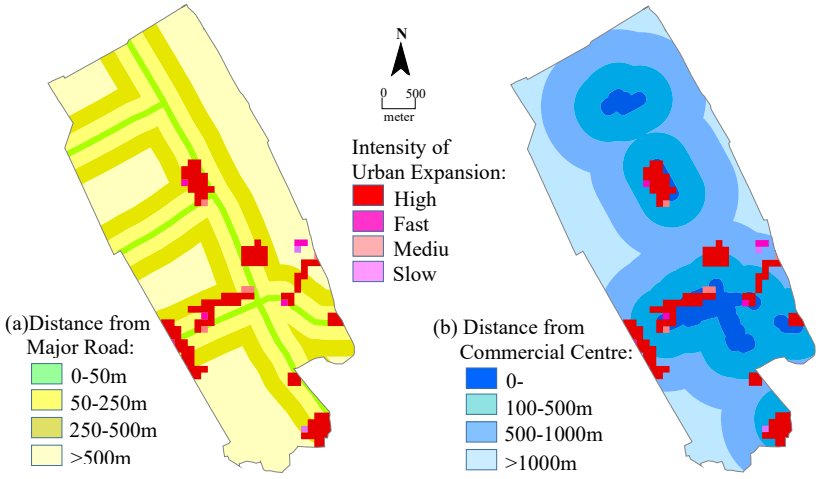

Figure 3: Overlay between Intensity of Urban Expansion and (a) Distance form Major Road and (b) Distance from Commercial Centre.

As far as distance to commercial centres is concerned, the overall pattern suggests that expansion has been more concentrated not far from existing commercial activities. This can be deduced from Table 5 where the results show that there is no new expansion of built-up areas beyond 1 kilometre from existing commercial centres. The results also show that 80% of the High intensity expansion of built-up areas occurred within less than 500 meters of existing commercial centre, with the largest area of expansion (121.87 acres) took place between 50-100 meters from existing commercial centre. There are also new built-up expansions taking place at varying degrees of intensity but all are within

1000 meters of commercial centre. The new development in commercial land uses has increased by 37% (see Table 2), the second largest land use change after institution and public facilities land uses, and both of these development expansions took place in close vicinity with existing commercial activities (see Figure 3(b)). This finding emphasizes the importance of commercial activities in influencing urban growth and expansion especially in smaller towns where urban functions tend to spatially concentrate in the town centre. Northern Corridor Economic Region has identified twelve Key Development Zones in Kedah, two of which are bordering Guar Cempedak: Gunung Jerai-Lembah Bujang Eco-Archaeo Tourism Zone and Yan; and Kulim-Sungai Petani-Gurun Growth Corridor in its development plan 2025 for Kedah. The neighbouring small towns of Yan and Gurun are also identified as Catalytic Economic Nodes (NCIA, undated). This means that commercial activities in Guar Cempedak will continue to expand along with emerging small urban centres in providing access to resources to surrounding rural communities. Commercial activities are also highly dependent on consumer preferences, more so in the age of online shopping (Productivity Commission, 2020). Even though the impact of e-commerce on small towns in rural areas are uncertain, commercial land use in these towns will likely continue to host brick and mortar shops for its rural communities to meet their daily needs in the near future.

Table 5: Overlay between Commercial Parameter and Intensity of Urban Expansion

Distance from Commercial Centre & Level of Suitability		**Intensity of Urban Expansion 2006 – 2014 (acres)**				**Total**
	High	Fast	Medium	Slow	Very Slow	
0-100m (Most Suitable)	84.09	4.48	6.78		218.53	313.88
100-500m (Suitable)	121.87	2.95	3.11	2.47	1,190.97	1,321.37
500-1000m (Mod. Suitable)	50.86	5.64	0.77	2.47	1,574.36	1,634.10
>1000m (Not Suitable)					714.00	714.00
Total	256.82	13.07	10.66	4.94	3,697.86	3,983.35

From Figure 3(b), the trend also suggests that new and existing commercial activities took place not far from major road intersections, and this includes all types of land use expansions, including institutions and public facilities and housing. The figure also shows the distribution of new expansions where most of high intensity development can be seen closely following along major roads while being within 1 kilometre of existing commercial activities. About 92% of High intensity development took place within 500 meters from major roads while 80% of the same High intensity expansion occurred within less than 500 meters of existing commercial centre. This implies that distance to transportation has a slightly higher influence in land use changes. This pattern underscores the significance of transportation and commercial activities in

influencing urban growth and built-up land use expansions. Spatial analysis of this town concurs with urban growth factors identified earlier through pairwise comparison.

CONCLUSION

The study on land use changes from 2006 to 2014 found that three built-up land uses that benefited from agricultural land reduction were institutions and public facilities, commercial, and transportation, while from 2014 to 2020, conversion of agricultural land was mainly due to transportation, housing, commercial and services type of land uses. The influencing factors identified through pairwise matrix are transportation and commercial activities. The results from the overlay show that high intensity expansion occurred along major transportation lines and within 1 kilometre of existing commercial centres. The findings point to the significance of accessibility to major roads and commercial activities as the driving factors in small town land use growth. As these towns are the main centres where rural communities obtain their daily necessities and services, it is imperative that small town development process be understood and the influencing factors closely identified for the changes in land uses over time. Sustainable planning for small towns will be more realistic once the growth is well understood and the influencing factors identified.

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TRAFFIC CONGESTIONS, TIME SPENT AT THE EXPRESSWAY JUNCTIONS, AND ITS IMPACT ON INDIVIDUAL PRODUCTIVITY: A PERCEPTION STUDY OF ILESA-OWO-BENIN EXPRESSWAY IN AKURE ONDO STATE, NIGERIA

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Abstract

The importance of the free flow of traffic, time spent in traffic at junctions, and individual productivity of road users along the Ilesa-Owo-Benin expressway in Akure Ondo State, Nigeria, cannot be overstated. While extant literature has shown that traffic congestion on roads significantly influences how road users perform their duties, few studies have explored the part played by the length of time they spend at junctions and how it impacts individual productivity. We collected data using a Questionnaire survey, comprising questions associated with traffic congestion at junctions of 203 respondents from across the residents (and travellers through Agbogbo/Irese/Futa junctions along Ilesa-Owo-Benin expressway in Akure). With an analysis of variance (ANOVA), we identified the differences in road users' perception of traffic congestions at junctions. We investigated the impact of traffic congestion on the productivity of road users. Finally, we identified potential solutions to the persistent traffic congestion experienced at the junctions. This paper offers a traffic congestion community with a better understanding of traffic congestions on road networks and aid in developing suitable methods and policies for road traffic congestion management.

Keywords: Road, Junctions, Flow, Traffic Congestion, Cities, Urban Areas

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INTRODUCTION

Road Junctions are locations of high traffic concentration, and in most countries, 40 - 60% of the total number of traffic congestions occurs at junctions (European Commission Transport Road Safety, 2020). As noted by Bashiru and Waziri (2008), most Nigerian road users, particularly commuters and motorists, spend between 30 to 60 minutes in traffic due to congestions. A closer look at the traffic flow in Akure, a major city in Nigeria, it can be said that most traffic congestions occur at the start of the workweek (Mondays and Tuesdays). Similarly, significant traffic congestions in other major cities in Nigeria have been noted. Agbonika (2011) examined the Abuja City Road network, while Aderamo & Atomode (2012) observed the road junctions in Ilorin. Both authors noted extensive traffic congestion on Mondays. In most circumstances, traffic congestions are caused by gridlocks at the preceding junctions, potholes, trading activities, public transport vehicles when loading and discharging passengers, and inadequate or the lack of traffic lights at junctions.

Junctions, irrespectively of the number of interlocking roads, are defined as the intersection of roads where the vehicles' flow is controlled by traffic police or traffic light (Singha & Kalita, 2016). They are intended to operate where vehicles often share space with other vehicles and pedestrians anywhere in the world. The primary objective of a junction is to enhance all road users' efficient movement, such as motor vehicles, buses, trucks, bicycles, and pedestrians, and increase convenience, comfort, and safety on the road (Fitzpatrick et al., 2005). However, due to its interlinking nature, junctions are prone to traffic congestion (Fadairo, 2013) as vehicles and motorists attempt to use the connecting junctions to their destination.

A traffic stream is a group of vehicles to pass towards a road through a junction (Singha & Kalita, 2016). Vehicular flows at the junctions show vehicles from several different approaches. They intend to occupy the same physical space simultaneously, allowing the increased flow of vehicles that will cause traffic congestion and incur longer waiting times for the stream of vehicles. It becomes so essential that interest should be given when determining the type of junctions and the number of junctions along a road corridor and the proper design of each to ease traffic. In this study, we discussed the persistent traffic congestion at major road junctions in Akure city. The aim is to provide case study evidence of traffic Congestions, time Spent at the expressway junctions, and their impact on the individual productivity road users.

METHODOLOGY

This paper provides a case study of traffic congestions, time spent at the expressway junctions, and its impact on individual productivity: A perception study of Ilesa-Owo-Benin expressway in Akure Ondo State, Nigeria. A case of

Agbogbo/Irese/Futa Junctions and the impedance to the continuous free flow of vehicles leading to traffic congestion at the junctions. These junctions were selected because they link significant roads within the city and connect Ondo state with other states like Oyo, Osun, Ekiti, and Edo.

- Objective 1: To examine road users' opinion on the traffic situation on Ilesa-Owo-Benin expressway, Akure, i.e., the cause and effect on their productivity.
- Objective 2: To identify the wait time (time spent) at the junctions during heavy traffic congestions at Agbogbo/Irese/Futa junctions.
- Objective 3: To highlight road users' suggestions towards overcoming the traffic congestions at Agbogbo/Irese/Futa junctions.

Based on recommendations from previous studies, a questionnaire was designed with closed-ended questions and administered to the daily road users and commuters at the three junctions. The questions targeted their experiences and perception of time spent, traffic congestions at the expressway junctions, and its impact on productivity and proximity. The responses were designed on an option-based scale and a five-point scale. A minimum of 250 responses was targeted as representative of the daily road users. To achieve this target, we used convenience sampling method to collect data required. Out of the 250 responses received, 203 responses were deemed valid. The responses retrieved were processed and analysed via IBM SPSS Statistics 21. The results and findings are presented and discussed in the sections below.

FINDINGS AND BACKGROUND INFORMATION

Most of the respondents were aged between 25 - 31 years and 32 – 38 years (31.03% & 30.05% respectively) with a considerable number aged group between 39 – 45 years (18.72%). However, other participants include 18 – 24 years (11.33%) and 46 and above (8.87%). There was a relatively even distribution of male and female respondents in the survey, with 57.64% Males and 42.36% Females. Most data were collected from the employed 51.23%, who about 61.58% of them primarily residents in the study area. Table 1 shows the information and details obtained about age group, gender, occupation, educational status, and locality.

Table 1: Respondents Backgrounds

Background	**Counts (%)**				
Age	18-24 (11.33%)	25-31 (31.03%)	32-38 (30.05%)	39-45 (18.72%)	46 > (8.87%)
Gender	Male (57.64%)	Female (42.36%)			

Occupation	Employed (51.26%)	Unemployed (13,79%)	Self-Employed (26.11%)	Retiree (0.49%)	Student (8.37%)
Education	No formal Education (0.99%)	Primary/Secondary (15.76%)	NCE/OND (22.66%)	HND/BSc (52.71%)	Postgrad (7.88%)
Locality	Resident (61.58%)	Non-Resident (22.17%)	Tourist (3.48%)	Business Owner (7.88%)	Public Transp. (4.93%)

Traffic Congestion at the Junctions

The respondents were asked to choose how often they get stuck at the junctions due to traffic congestion. As shown in Figure 3, most of the respondents, 84 (41.4%), responded that they got stuck in traffic congestion at the junctions daily. Considering that 61.58% of the respondents are residents (Table 1), this is suggesting that most of the respondents use the road every day. However, 39.4% of the respondents, 80 out of 203, get stuck a few times a week. Also, 39 (19.2%) respondents get stuck a few times a month, implying that they often don't use the road. Based on Table 1, wherein 22.17% are non-residents, 7.88% are business owners, 4.93% are public transporter, and 3.45% are tourists, we can conclude that these are the groups of road users who get stuck in traffic a few times a week and a few times in a month.

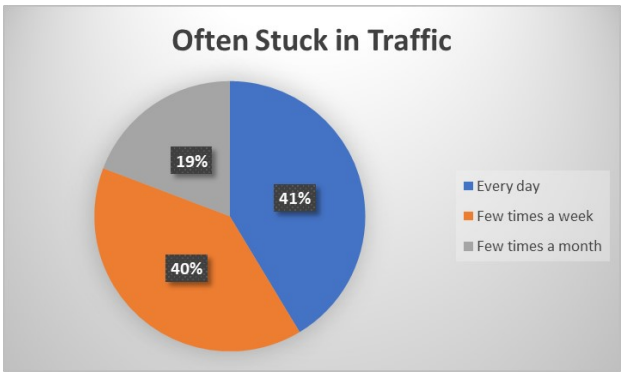

Figure 1: Respondents' opinion on how often they get stuck in traffic at the junctions
Source: Fieldwork 2021

The respondents' opinions on what they thought caused the traffic congestions were retrieved (Figure 4). About fifty-two percent of the respondents (51.7%) opined that the cause for the traffic congestion at these junctions was poor road infrastructure. In comparison, 58 (28.6%) opined that too many vehicles on the road were to be blamed for the congestions while 38 (18.7%) and

2 (1%) felt that the reasons are the commercial activities at the junctions and other problems respectively.

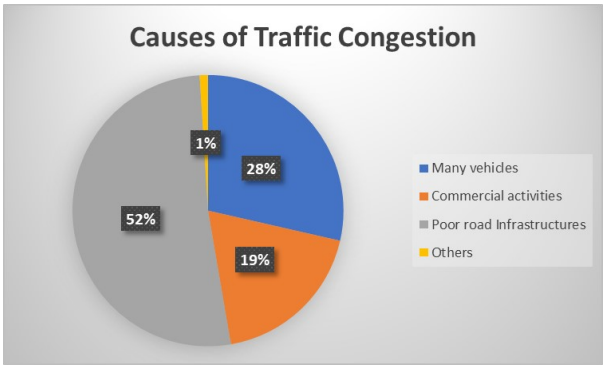

Figure 2: Respondents' opinion on causes of traffic congestion at the junctions
Source: Fieldwork 2021

Past works maintain that traffic congestions are regular on roads with several junctions and proximity of junctions (Simeon et al., 2018, Eom & Kim, 2020, Erdelic et al., 2021). To test this past result, we asked the participants to respond to the statement was, "*The continuous traffic congestion at the junctions is the result of proximity between the junctions."* As depicted in Table 2, 53.7% agreed and strongly agreed with the statement, while 19.7% disagree and strongly disagreed with the statement. Twenty-six percent (26.6%) were unsure if the statement was true or false.

Similarly, previous studies have indicated that traffic congestion affects the individual productivity of road users (Kamruzzaman & Rumpa, 2019, Olawale et al., 2015, Harriet et al., 2013). As such, we asked the participants to respond to the statement, *"The continuous traffic congestion at the junctions impacts on my productivity."* About sixty-five percent (64.5%) agreed and strongly agreed that continuous traffic congestions impacted productivity. Only 20.2% disagreed and strongly agreed with its impact on productivity. Twenty-five percent of the respondents were unsure.

Table 2: Respondents opinion on proximity of junctions and its impact on productivity

Scales	Proximity of junctions	Impact on individual productivity
Strongly Disagree	05 (2.5%)	15 (7.4%)
Disagree	35 (17.2%)	26 (12.8%)
Not sure	54 (26.6%)	51 (25.1%)
Agree	90 (44.3%)	97 (47.8%)
Strongly Agree	19 (9.4%)	34 (16.7%)
Total	203 (100%)	203 (100%)

Waiting time spent in traffic congestion at the junctions

Research shows that vehicle traffic slows down when roads get jammed with high-volume congestion (Ross, 2012, Wang et al., 2018, Nguyen-Phuoc et al., 2020). Based on these studies, we investigated the wait time road users spent in traffic and the impact on individual productivity., the respondents were asked how much time they spent in traffic at Agbogbo/Irese/Itaoniyan Junctions for a single journey during the weekdays (Monday – Friday). Traffic during the weekends was not investigated because they do not generally relate to work productivity.

The length of time was considered based on when there was Heavy Traffic (respondents spent more than 10mins at the junctions) and Seldom Traffic (respondents spent less than 10 mins at the junctions).

As shown in Table 3, a considerable number of respondents spent 20 minutes at that junction when there was heavy traffic (97, 47.8%). This is followed by 60 respondents (29.6%) and 37 respondents (18.2%) who spent 15 minutes and 25 minutes, respectively. Only 09 respondents (4.4%) reported spending 10 minutes in traffic. Deductively, most of the respondents spend a lot of time at the junctions due to the heavy traffic.

In contrast, when there is seldom traffic at the junctions, many respondents spent 10 minutes or less travelling through the junctions (69, 34.0%). However, the differences are not too apparent in the time spent at junctions by the respondents' responses. Most of the respondents also spent a lot of time getting at the junctions with seldom traffic. Seventy-one respondents (35%), spent 15 minutes, while 42 respondents (20.7%) and 21 respondents (10.3%) spent 20 minutes and 25 minutes, respectively.

Table 3: Waiting Time Spent at the Junctions

Waiting Time Spent (mins)	Heavy traffic		Seldom traffic	
	N	**%**	**N**	**%**
10 mins	09	(4.4%)	69	(34.0%)
15 mins	60	(29.6%)	71	(35.0%)
20 mins	97	(47.8%)	42	(20.7%)
25 mins	37	(18.2%)	21	(10.3%)
Total	203	(100%)	203	(100%)

To ascertain whether there was any significant difference in opinion amongst the respondents on time spent at the junctions, they were asked to choose the period when they experienced heavy traffic congestion during a weekday - Morning (7-11 am); Afternoon (12-3 pm) and Evening (4-6 pm). An analysis of variance (ANOVA) was carried out at a 95% confidence interval ($p < 0.05$) (Witton et al., 2019). Table 4 shows that heavy traffic is experienced most during the mornings

(46.3%) than other times of the day (afternoons -15.8%; evenings -9.4%). Interestingly, 28.6% of the respondents reported no specific time when they experienced heavy traffic during the weekdays.

A glance at the descriptive statistics shows that our sample data produces a difference in the mean scores of the four levels of our regularity of road use variable. Specifically, the data analysis shows that the evening (weekdays) subjects spend quite a bit more time in traffic than subjects in the other three groups (Min. time = 15 mins; Max. time = 25 mins). However, to determine whether the difference in mean scores reaches significance, homogeneity of variance (a requirement for the ANOVA test) was carried out, which shows that the variances of each comparison group are equal. Tested using the Levene statistic showed a greater significance value than 0.05 ($p>0.05$).

The Levene statistic based on a comparison of medians is 0.937, which implies that there is no significant difference in opinion amongst the respondents between when they experienced heavy traffic and the wait time they spent in traffic. Hence, an Honest Significant Difference test (Tukey HSD) was not required. The requirement of homogeneity of variance has been met, and the ANOVA test is considered robust.

Table 4: Mean values, Test of Homogeneity of variances amongst respondents' on how often they use and how long wait at the junctions during more traffic congestions.

How often (Road Use)	N	%	Mean	Std. Devi.	Std. Error	95% Confidence Interval for Mean		Min. wait. time	Max. wait. time
						Lower Bound	Upper Bound		
Morn.	94	46.3	18.56	3.854	.397	17.77	19.35	10	25
Aftern.	32	15.8	18.91	3.753	.664	17.55	20.26	10	25
Even.	19	9.4	19.74	3.899	.895	17.86	21.62	15	25
No specific	58	28.6	19.48	4.156	.546	18.39	20.58	10	25
Total	203	100	18.99	3.929	.276	18.45	19.53	10	25

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
.138	3	199	.937**

df = Degree of Freedom; p = significance**; Morn. = Morning (7-11am); Aftern. = Afternoon (12-3pm); Even. = Evening (4-6pm)

Overcoming traffic congestions at the junctions

Regarding suggested solutions to overcome the traffic congestions at the junctions (Figure 5), 85 respondents (41.9%) suggested providing a flyover to contain more cars on the road. About thirty-four percent (33.5%) of the respondents suggested creating effective buffer zones around the junctions, and

50 respondents (24.6%) suggested providing functional traffic signals at the junctions. These showed that people who travel through these junctions want some form of infrastructure fixed at these junctions, with most numbers wanting a flyover at the junctions to ease the traffic congestion situation.

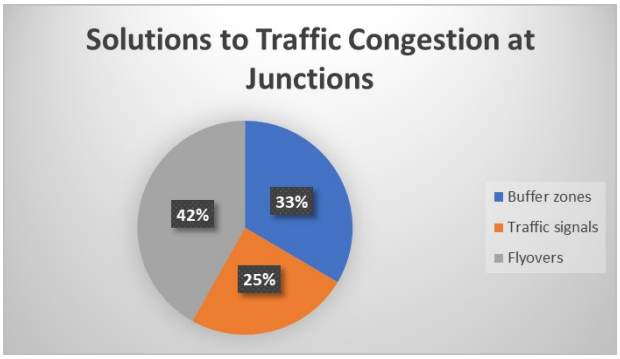

Figure 3: Respondents' opinion on possible solutions.
Source: Fieldwork 2021

DISCUSSION

The findings from our analysis have identified essential aspects of the current traffic congestion experienced along the Ilesha-Owo-Benin expressway, Akure. We found that most of our respondents get stuck in traffic every day and a few times a week at the junctions. During these times, they spent an average of 20 mins in heavy traffic and 15 mins in seldom traffic. Most of the traffic congestions occur in the morning (at rush times between 7 – 11 am). Those who experienced traffic congestions in the evening reported spending a minimum of 15 mins in traffic at the junctions.

As expected, there was no significant difference in opinion between the periods of traffic (morning, afternoon, and evening) and the wait time spent at the junctions. This means that all the respondents agreed with their opinions. Our findings are no different from past works that have shown the traffic congestion in major cities across the globe. For instance, Moses (2011) argued that traffic congestion is a problem in most Nigerian cities. Aderamo & Atomode (2012) examined traffic congestion problems and their causes at selected road intersections in Ilorin, Nigeria.

Lai et al. (2016) examined the traffic problems and sustainable improvement of road intersections at Ettumanoor, India. We acknowledge that the ubiquity of road traffic congestion at junctions is quite complex and requires proper planning at onstage. Just as synonymous with past studies are recurrent queues, delays, and time wastage commuters' experience on the road networks, especially during rush hours in Akure road networks.

The problems of longer transit time between locations are pronounced by the waiting time at the road junctions and the respondents in our study felt that the leading causes of traffic congestions at these junctions were poor road infrastructure, commercial activities, and proximity of junctions. The high number of vehicles was also noted as a significant cause of the traffic congestions. In support of our findings, several studies (Bashiru and Waziri 2008; Aworemi et al. 2009; Aderamo and Atomode 2011) have noted that poorly designed junctions contribute significantly to traffic congestions. Ukpata (2012) pointed out that economic activities at the road links or junctions in Nigeria's urban city major cause traffic congestion.

As established from past studies, one of the significant reasons road traffic congestions persists is the spatial spread of traffic junctions that impede traffic flow. The long waiting time at the three junctions Agbogbo/Irese/Futa along Ilesa-Benin-Owo Expressway, a common sight on the road network, also causes a Stop and Go driving experience among motorists. This incapacitating situation continues to defy every solution and strategy of the government's approach, arrangement, and countermeasures introduced over the years in major cities, including Akure (Mabogunje,1968; Onakomaiya, 1979; Odeleye, 2001; Ogunsanya, 2002; Oni, 2004; Adalemo, 2005; cited in Joshua et al. 2016).

Our study also showed that the productivity of road users was impacted by the traffic congestions each day. This result is supported by past works such as Kamruzzaman & Rumpa (2019), Olawale (2012), and Harriet et al. (2013). Harriet et al. (2013) found that traffic congestions reduced commuters' earnings from 20 trips to 15 trips each day and GH¢50 to GH¢40 per trip in Ghana. Olawale (2012) noted that time loss due to congestion has a negative and significant effect on career progression and satisfaction of workers in Lagos metropolis, Nigeria. Kamruzzaman & Rumpa (2019) examined the impact of road traffic congestion on workers' performance in Dhaka, Bangladesh. The authors found that effectiveness, efficiency, career progression of workers, satisfaction, innovation, and quality of work.

Regarding possible solutions to the traffic congestion at the junctions, the respondents suggested establishing flyovers and buffer zones at the junctions to reduce the currently continuous traffic congestions. The work of Mudiono (2015) supports our study. The author maintains that a Flyover is the most technically efficient solution to traffic congestions at a Jatingaleh highway in Indonesia. Also, Lal et al. (2016) proposed modifications, footpaths, proper road markings, traffic signs, and signals as solutions to the traffic congestion at intersections in developing countries.

CONCLUSION

This study aimed to provide case study evidence of the importance of free flow of traffic, time spent in traffic at junctions, and individual productivity of road users along the Ilesa-Owo-Benin expressway in Akure Ondo State, Nigeria. We achieved this aim by retrieving the opinions of over 200 respondents on the different problems associated with traffic congestion at three junctions on the Ilesha-Owo-Benin expressway in Akure City, Nigeria.

We found that road users mostly experience traffic congestions at the three junctions at an average of 20 minutes every day. Traffic congestions occur mostly during the mornings on weekdays. Also, the road users felt that their productivity was impacted due to the time spent in transit at these junctions. Poor road infrastructure, many vehicles on the road, and proximity of the junctions were noted as the cause of the traffic congestions. Potential solutions include establishing a flyover and buffer zones between the junctions.

We acknowledge the limitations of this study to include potential bias that is associated with perception studies. We suggest that field investigation such as road mapping and observation of traffic situations should be carried out at these junctions to illustrate the situation further. That said, our results provide an essential indication of a persisting issue that requires immediate attention. The results of this study are beneficial, not only to the Akure local government. But also, to the person overseeing the transportation networks in Akure city and beyond.

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SPATIAL ANALYSIS OF CRIME HOT-SPOT IN THE NORTHEAST PENANG ISLAND DISTRICT AND KUCHING DISTRICT, MALAYSIA

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Abstract

Over time, the relation between criminal acts with drug abuse cases has been discussed pedantically. From social and spatial points of view, this paper aims to determine the hot spot areas of burglary cases in the Northeast Penang Island District and Kuching District. The gained results of burglary cases are then being correlated with the presence of drug abuse cases. Both study areas came with location coordinates of the incident based on police stations boundaries and police station sector boundaries from the year 2015. The type of analysis used for this research is Optimized Hot Spot Analysis. Results for burglary cases of both areas are divided into two (2) which are daytime and nighttime. The spatial analysis revealed that there are five (5) sectors identified as hot spots for the Northeast Penang Island District which involve Jelutong Police Station boundary and Ayer Itam Police Station boundary, while none of the areas identified as hot spot areas in Kuching District.

Keywords: Optimized Hot Spot Analysis, burglary, crime, crime geography

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INTRODUCTION

Drug abuse and crime are so relative that there is a correlation. Among the examples of drug abuse problems with an increase in crime are theft, robbery, and burglary. Drug abuse accounts for almost 50 percent of criminal cases occurring in 23 countries and this clearly indicates that there is a link between criminal behavior and drug abuse (Abdullah, 2016). In addition to that, according to the UK's Prime Minister's Strategy Unit (2003), 56 percent of crimes are due to drug abuse of which 85 percent involve shop theft, 70 percent involve burglary, and 54 percent robbery. This suggests that drug abuse contributes to crime activities (UK Strategy Unit Drugs Report, 2003).

Shahrul Nizam (2016) proposed that statistics show that drug abuse makes up almost 50 percent of the criminal cases that occur. Reflecting on that, the percentage shows the connection between criminal acts with drug abuse. However, due to the inaccurate, unreliable, and incomplete manual processes back then, the old system of a criminal record has failed to fulfill and keep up with the need of the existing crime scenario. Hence, it is neither effective nor efficient to be applied until the presence of technology starts to reciprocate (Johnson, 2000). However, the evolution in technology has contributed to vast alterations in the human ability to explore and assess changes, including for criminal activities. Weisburd and McEwen (1997) as cited in Weisburd et al., (2009) also confirmed that criminologist has been paying attention to the relationship between crimes with the location since a long time ago.

As stated by Mohd Reduan (1990), drug addicts will commit crimes, especially those that bring in monetary benefits in a short time such as stealing, robbery, burglary, and so on to get money to buy drugs. Drug abuse causes a person to commit a crime because of the unstable mind and feelings. In addition, the rising cost of drugs will cause drug addicts to commit a crime such as theft, break-in, and violent activities (Hussin, 2005). Typically, crimes were committed by people who are under the influence of drugs as a result of long-term personality changes in the individual that may occur immediately (Wanberg and Milkman, 2008).

LITERATURE REVIEW

"One of the more influential tools facilitating the exploration of the spatial distribution of crime has been GIS" (Ratcliffe and McCullagh, 1999; Harries, 1999). Crime occurs due to various factors such as the physical arrangement of an area (Greenburg and Rohe, 1984.; Quetelet, 1984), accessibility to the target or victim (Cohen and Felson, 1979; Brantingham and Brantingham, 1981; Quetelet, n.d.). Ferreira *et al.* (2012), to meet the current need, GIS as a spatial-based tool helps to understand the causes by producing outputs that contain enormous amounts of location-based information.

Chainey (2001) suggested that in the scope of spatial element, crime has an intrinsic geographical quality and it is not randomly distributed, which means that here are possibilities for crime to occur in any place and at different time. Hence, there would be localities with hot spot and cold spot. Grubesic (n.d.), noted that any area which is prone to have higher concentrations of crime compared to other area is generally addressed as hot spot area while any area which has low concentration of crime is known as cold-spot. Chainey (2011) proposed four elements that present and make up a crime namely legal, victim, offender and spatial. Fajemirokun *et al.* (2006) support that, for crimes to occur, offenders and their targets - the victims and/or property - must exist at the same location for a period of time.

Crime mapping by using Geographic Information System (GIS) is increasingly being used and it has enabled authorities to identify risky areas. Thus, the process of monitoring the focus areas can be enhanced. According to Liu *et al.* (2005), GIS was used to identify crime and drug abuse areas in Langfang, China. The hot-spot area was determined by using the Point Pattern Test. After that, the results obtained were analyzed with the Average Nearest Neighbor (ANN) method to attain the ANN index and z-values are presented via maps. The results proved that the pattern of drug abuse and crime hot spots was identified in Langfang, China (Liu *et al*., 2005).

Fuentes and Henandez (2013) applied Kernel Density Estimation (KDE) to study the spatial correlation between property crime with socioeconomic status in Ciudada Juarez Chihuahua, Mexico. The spatial data were the police sector boundaries and land use data. While the non-spatial data were the demographic data and the number of property crime cases in 2008 and 2009. The results showed that clustered spatial pattern of property crime was highly found in areas with low socioeconomic status and areas with crowded business centers.

Robert (2016) conducted a study using spatial statistics namely Kringing interpolation, multiple analysis, and cluster analysis. The unit of analysis is the boundary of residential areas. The attributes were the demographic data and crime data from 2011 until 2013, and the incident locations. The generated outputs found that income and education were the factors that influence crime.

Patel et al. (2014) used thematic maps in analyzing crime in the city of Ahmedabad, India. The non-spatial data used were crime data from July 2011 until December 2011, address, and time. Spatial data consists of police station sector boundaries, police station boundaries, and land-use boundaries. The results showed that most of the burglary cases took place between 12.30 am to 6 am.

METHODOLOGY

The study areas for this research are the Northeast Penang Island District and Kuching District. The Northeast District of Penang which is situated at *latitude 5° 22' 16.28''N and longitude 100° 14' 14.22''E* has an area of 122.79 km^2. The district is divided into fifteen *mukim* namely *Mukim 13, Mukim 14, Mukim 15, Mukim 16, Mukim 17, Mukim 18, Bandar Ayer Itam, Bandar Batu Feringghi, Bandar Bukit Bendera, Bandar Glugor, Bandar George Town, Bandar Jelutong, Bandar Tanjong Bungah, Bandar Tanjong Tokong and Bandar Tanjong Pinang.* Whereas Kuching District which situated at latitude 1°33′36″N and longitude 110°20′42″E has an area of 431 km^2. Kuching District is divided into two (2) councils namely DBKU (Dewan Bandaraya Kuching Utara) and MBKS (Majlis Bandaraya Kuching Selatan).

Mapping crime hot spot areas using GIS applications involves data from study areas that include location coordinates of incidents based on police stations boundaries and sectors from the year 2015. The spatial analysis applied for this research is Optimized Hot Spot Analysis. Optimized Hot Spot Analysis tool interrogates data to obtain the settings that will yield optimal hot spot results (Getis and Ord, 1992; Ord and Getis, 1995).

Optimized Hot Spot Analysis as a spatial tool on ArcGIS that works by producing a new Output Feature Class with a z-score, p-value, and confidence level bin (Gi_Bin) for each feature. The Gi_Bin field identifies statistically significant hot and cold spots, corrected for multiple testing and spatial dependence using the False Discovery Rate (FDR) correction method. Features in the +/-3 bins (features with a Gi_Bin value of either +3 or -3) are statistically significant at the 99 percent confidence level; features in the +/-2 bins reflect a 95 percent confidence level; features in the +/-1 bins reflect a 90 percent confidence level; and the clustering for features with 0 for the Gi_Bin field is not statistically significant.

Table 1: Relations between z-score, p-value, and Confidence Level

z-score (Standard Deviations)	p-value (Probability)	Confidence level
< -1.65 or > +1.65	< 0.10	90%
< -1.96 or > +1.96	< 0.05	95%
< -2.58 or > +2.58	< 0.01	99%

Source: Size 8pt Italic

The results are capable to identify the statistically significant spatial clusters of high values and low values. High values mean hot spots and low values mean cold spots. The outputs generated from the spatial analysis are shown in the attribute table of z-score and p-value to determine the hot spot area of burglary cases. For this research, the scope of criminology is the number of cases of burglary in the Northeast Penang Island District and Kuching District, Malaysia.

RESULTS

Based on the statistical record, the number of burglary cases recorded in the Northeast Penang Island District in 2015 was 194 cases, of which 66 cases happened during the daytime (34 percent), while 128 cases happened at nighttime (66 percent). Table 2 shows the Optimized Hot Spot Value of Burglary Cases in the Northeast Penang Island District in 2015. Based on the z-score and p-value obtained, the identified hot spot areas are Jelutong Police Station and Ayer Itam Police Station. The significant p-value of $p<0.05$ shows that the localities identified as the hot spot areas for Jelutong Police Station are four (4) sectors that are sector 27, 23, 28, and 29, whereas the locality acknowledged as the hot spot area for Ayer Itam Police Station is sector F.

Jelutong Police Station (Sector 27) recorded the highest z-score among the hot spot areas with a value of 5.430675, followed by Jelutong Police Station (Sector 29) with a value of 3.554131. For Ayer Itam Police Station (Sector F), the value of the z-score obtained is 3.132625. By referring to the value in Table 2, Jelutong Police Station (Sector 27) noted the highest degree of freedom (*df*)=3 which reflects the 99 percent confidence level. Figure 1 shows the localities according to the police station's boundaries which are identified as hot spot areas.

Table 2: Optimized Hot Spot Value of Burglary Cases in the Northeast Penang Island District in 2015

Police Station (Sector)	Z-Score	P-Value
Jelutong Police Station (Sector 27)	5.430675	0.000000
Jelutong Police Station (Sector 23)	2.94293	0.003251
Jelutong Police Station (Sector 28)	2.679146	0.007381
Jelutong Police Station (Sector 29)	3.554131	0.000379
Ayer Itam Police Station (Sector F)	3.132625	0.001733

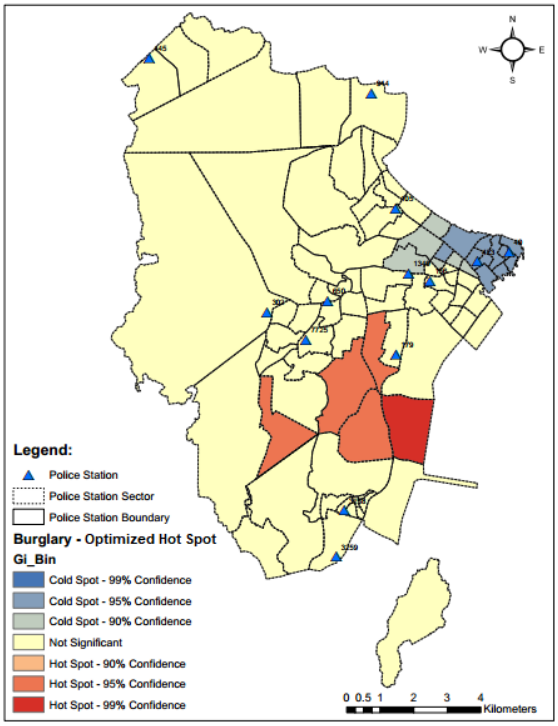

Figure 1: Optimized Hot Spot for Burglary Cases in the Northeast Penang Island District in 2015

Table 3 shows the z-score and p-value based on the Optimized Hot Spot Analysis of burglary cases during daytime and nighttime in the Northeast Penang Island District for the year 2015. Based on a 95 percent confidence level and significant $p<0.05$, the identified hot spots areas are located within the boundaries of Jelutong Police Station and Tanjung Tokong Police Station. The number of sectors involved for both police station boundaries is six (6) sectors. For the boundary of Jelutong Police Station, the sectors identified as hot spots are 4 sectors, namely sector 27, 29, 23, and 28. Whereas, the other two (2) sectors identified within Tanjung Tokong Police Station are Sector 1 and Sector 2.

The highest z-score for the entire police station sector is Sector 27 with a value of 3.391971 and Sector 29 with a value of 3.310101. These two (2) sectors are located within the boundary of Jelutong Police Station. Whereas Sector 1 and Sector 2 which are located within the boundary of Tanjung Tokong Police Station recorded the lowest z-score. Based on the spatial analysis conducted, the highest *df* level recorded for daytime burglary cases is at level 2 and 95 percent confidence level.

Sector 27 and Sector 29 which are located within the border of Jelutong Police Station achieved *df*=2 which reflects a 95 percent confidence level, while

other sectors only achieve *df*=1 which means the 90 percent confidence level. Figure 2 and Figure 3 show the police station sector boundaries which are identified as hot spot areas for burglaries during daytime and nighttime in 2015 respectively.

Table 3: Optimized Hot Spot Value of Burglary Case During Daytime and Nighttime in the Northeast Penang Island District, 2015

Police Station (Sector)	Daytime		Nighttime	
	Z-Score	P-Value	Z-Score	P-Value
Jelutong Police Station (Sector 27)	3.391971	0.000694	5.059188	0.00000
Jelutong Police Station (Sector 29)	3.310101	0.000933	3.605416	0.000312
Jelutong Police Station (Sector 23)	2.377696	0.017421	2.978471	0.002897
Jelutong Police Station (Sector 28)	2.543675	0.010969	2.478719	0.013186
Tanjong Tokong Police Station (Sector 1)	2.264333	0.023554	-	-
Tanjong Tokong Police Station (Sector 2)	2.264333	0.023554	-	-
Ayer Itam Police Station (Sector F)	-	-	3.350964	0.000805
Sg Nibong Police Station (Sector D)	-	-	2.348375	0.018856
Bandar Baru Police Station (Sector 3)	-	-	2.485252	0.012946

Figure 2 shows the boundary of police station recognized as hot spot area based on the z-score and p-value obtained for the analysis of burglary cases during daytime and Figure 3 shows the boundary of police station known as hot spot area based on the z-score and p-value for the analysis of burglary cases during nighttime. An area is classified as a hot spot area if the significant value of p-value is $p < 0.05$ at a 95 percent confidence level.

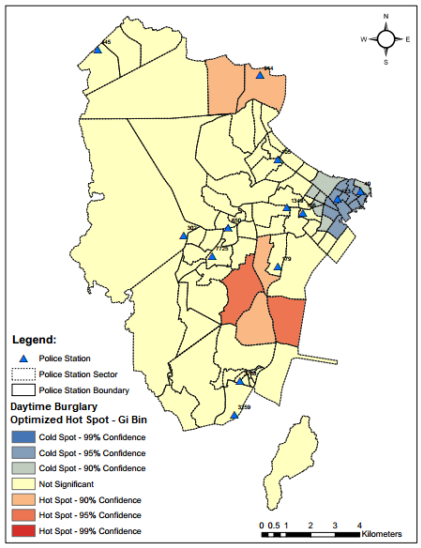

Figure 2: Optimized Hot Spot for Burglary Case During Daytime in the Northeast Penang Island District in 2015

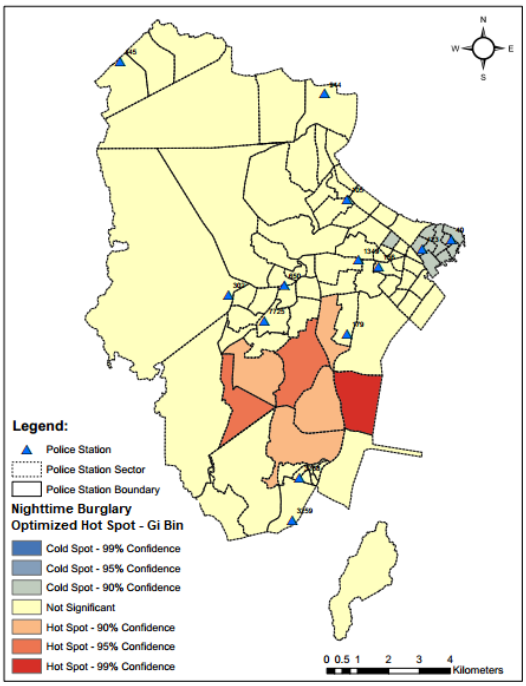

Figure 3: Optimized Hot Spot for Burglary Case During Nighttime in the Northeast Penang Island District in 2015

The number of burglary cases reported in Kuching District in 2015 was 236 cases, of which 146 cases (62 percent) occurred during daytime and 90 cases (38 percent) occurred during nighttime. Table 4 and Figure 4 show the localities according to police station's boundaries which are identified as hot spot areas.

Overall, results show that most areas are not significant because the p-value obtained indicates $p>0.10$. However, spatial analysis on the other hand revealed that there are sectors identified as cold spot areas for burglary cases in Kuching District for 2015. Table 4 shows the police station boundaries identified as cold spot areas for burglary cases. Based on the z-score and p-value obtained, there are 11 police station sectors known as cold spot areas involving the boundaries of Tabuan Jaya Police Station, Sekama Police Station, and Sentral Police Station. For the boundary of Tabuan Jaya Police Station, the entire sector which covers from Sector 1 to Sector 7 are all classified as cold spot areas. For Sentral Police Station, the cold spot area involves three (3) sectors namely Sector 4, Sector 5, and Sector 7. Whereas, for Sekama Police Station, there is only one (1) sector which is classified as a cold spot area that is Sector 1.

Based on the z-score and p-value obtained, there are seven (7) sectors with cold spot areas at 95 percent confidence level and the four (4) sectors with

cold spot area at 90 percent confidence level. Sectors showing the cold spot area at 95 percent confidence level are Sentral Police Station (Sector 4, Sector 5 and Sector 7); Tabuan Jaya Police Station (Sector 5, Sector 6, and Sector 7); and Sekama Police Station (Sector 1). For the 90 percent confidence level, the cold spot areas identified are namely Sector 1, Sector 2, Sector 3, and Sector 4 in the boundary of Tabuan Jaya Police Station.

Based on Table 4, the cold spot area that recorded the lowest z-score of -3.19302 and p-value of 0.001408 ($p < 0.05$) is Sector 1 that is located within the boundary of Sekama Police Station. Whereas, the cold spot area that records the highest z-score of -2.600071 and p-value of 0.00932 ($p > 0.10$) is Sector 1 that is situated within the boundary of Tabuan Jaya Police Station.

Table 4: Optimized Hot Spot Value of Burglary Cases in Kuching District, 2015

Police Station (Sector)	Z-Score	P-Value
Tabuan Jaya Police Station (Sector 1)	-2.600071	0.00932
Tabuan Jaya Police Station (Sector 2)	-2.600071	0.00932
Tabuan Jaya Police Station (Sector 3)	-2.631259	0.008507
Tabuan Jaya Police Station (Sector 4)	-2.366861	0.01794
Tabuan Jaya Police Station (Sector 5)	-3.19302	0.001408
Tabuan Jaya Police Station (Sector 6)	-3.328743	0.000872
Tabuan Jaya Police Station (Sector 7)	-3.514273	0.000441
Sentral Police Station (Sector 4)	-3.542051	0.000397
Sentral Police Station (Sector 7)	-2.75646	0.005843
Sekama Police Station (Sector 1)	-2.843574	0.004461
Sentral Police Station (Sector 5)	-3.19302	0.001408

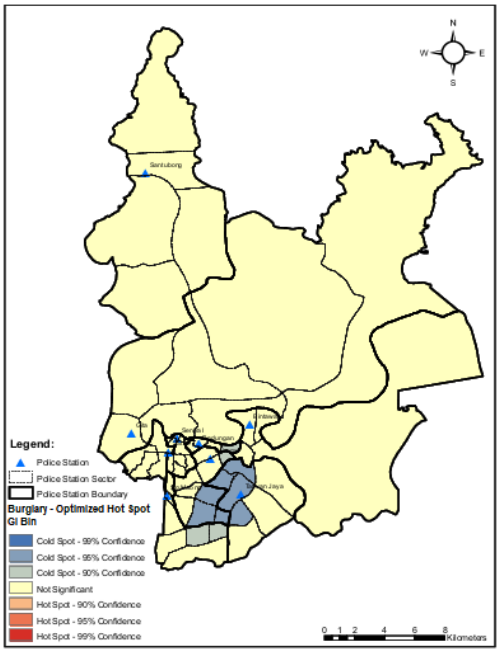

Figure 4: Optimized Hot Spot for Burglary Cases in Kuching District in 2015

Table 5 shows the results of Optimized Hot Spot analysis for burglary cases in Kuching District in 2015 during daytime and nighttime. Santubong Police Station (Sector 5) was identified as a hot spot area during daytime, while the hot spot area during nighttime is Gita Police Station (Sector 2).

Based on a 90 percent confidence level and significant value $p<0.10$, the hot spot area for burglary during daytime is Santubong Police Station (Sector 5) with a z-score of 2.44755 and a p-value of 0.01438 while Gita Police Station (Sector 2) with a z-score of 3.19106 and a p-value of 0.00142 was identified as the hot spot area during nighttime.

Table 5: Optimized Hot Spot Value of Burglary Case in Kuching District, 2015

Police Station (Sector)	Daytime		Nighttime	
	Z-Score	P-Value	Z-Score	P-Value
Santubong Police Station (Sector 5)	2.44755	0.01438	-	-
Gita Police Station (Sector 2)	-	-	3.19106	0.00142

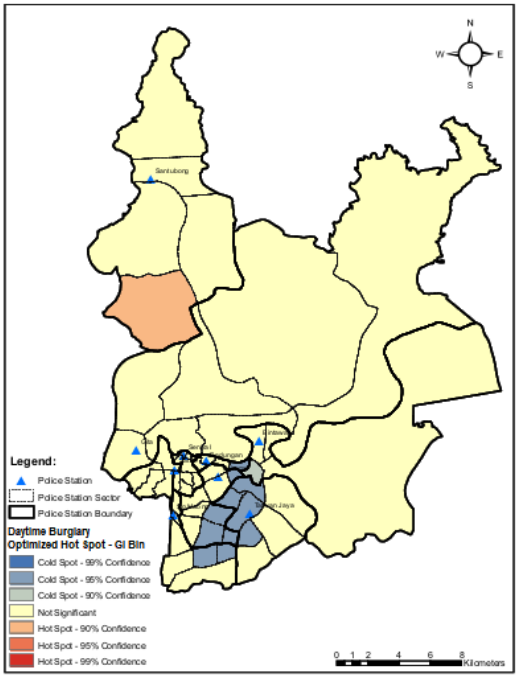

Figure 5: Optimized Hot Spot for Burglary Case During Daytime in Kuching District in 2015

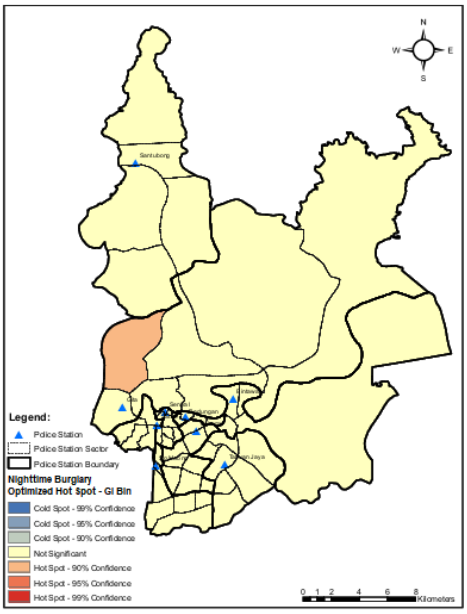

Figure 6: Optimized Hot Spot for Burglary Case During Nighttime in Kuching District in 2015

DISCUSSION

Crime may present due to the changes that occur in the attitudes and behaviors of individuals especially those who live in an urban environment and practice a modern lifestyle. The behavior of criminals may also ignite potential actions of other people towards criminals or the opportunity to be involved in a particular space and time (Faizah, 2015). The rate of crime cases increases in tandem with the population growth rate and the rise in ~~the rate of~~ economic expansion, hence making the security aspect as the basis of current urban environment planning as what is happening in Penang, Malaysia (Sophie, 2000).

A high number of criminal activities have been reported in urban areas and the rapid development shows that municipalities are among the factors that greatly influence the increase in the number of criminal cases. For that matter, it has also led the world towards increasingly complex criminal problems. Possibilities for criminal activities such as robbery and burglary will be higher if the area is knowingly high with drug abuse cases (Mohd Norashad and Tarmiji, 2016).

Crime occurs due to the motivation of criminal offenders, the appropriate targets, and the absence of oversight that can prevent the occurrence of crime in the environment. Criminal targets may involve people or objects and the lack of supervision will risk the occurrence of crime (Adewumi *et al.*, 2017). The low count of criminal incidents is due to supervision from authorities such as police, RELA as well as neighborhoods' communities in residential or village areas. Any type of crime, including burglary, have a variety of factors such as the lighting level at the surrounding, door and key types, emergency alarm sounds, and any possibility to be observed either by neighbors or by people in the neighborhood area (Zuriatunfadzliah *et al.*, 2019).

The Daily Activity Theory explains that criminals will take into account the environmental and daily activities of the target area such as the group of people living in the area, their workplace distance, the public who are passing through the area as well as the social activities. In addition, criminal events usually occur during weekdays or when the owners are away from their abodes. This is to ensure that no eyewitness will see the activities (Siti Rasidah dan Adrian, 2008).

CONCLUSION

The hot spot areas for crimes are continuously changing due to the crime prevention initiatives or programs that have been applied to an area such as supervision and patrolling by authorities, RELA, and the cooperation from neighbors. The potential of changing of crimes is often associated with mechanically criminal control programs such as the use of key systems, emergency sounds, and closed-circuit cameras. However, the changing and

shifting of criminal locations from one target area to another occur without reducing the crime rate as a whole.

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DETERMINANT FACTORS OF NEIGHBOURHOOD QUALITY INFLUENCING RESIDENTIAL MOBILITY BEHAVIOUR IN PENANG ISLAND

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UNIVERSITI SAINS MALAYSIA

Abstract

Residential mobility behaviour is about people's choices and preferences whether to remain at the present house and neighbourhood, or to move out. Moving to another house or neighbourhood entails a deliberate decision that require various considerations by the residents involved especially in dealing with housing adjustments, life neccesities and financial matters. Residents' perceptions of their housing and neighbourhood can be indicative of their intention to stay in or move out. The act of moving is often asssociated with lower levels of satisfactions with residents' current housing and neighbourhood environment, thus activating self-preference and residential mobility. This study aims to identify the determinant factors of neighbourhood quality that influence residential mobility behaviour in neighbourhoods in Penang Island. The nine attributes of neighbourhood quality dimensions included in this study are dwelling features, dwelling utility, neighbourhood facilities, greenery, accessibility, public transportation, environment, economic livelihood, and neighbourhood interaction and attachments. A total of 717 heads of households residing in Penang Island were involved in the questionnaire survey. Using logistic regression method, the study findings reveal that four factors of dwelling features, facilities, neighbourhood environment, and neighbourhood interaction and attachments are significant in influencing residents' intention to move. Moreover, both internal and external factors of housing and the neighbourhood can influence the residents' decision to stay in or to move out, thus implying important policy measures for local housing.

***Keyword**:* Residential mobility behaviour, residential mobility intention, residential satisfaction, neighbourhood quality attributes

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INTRODUCTION

An insight into people's motivation and decision to move to another house or neighbourhood is critical towards an understanding of residential mobility. A classic view postulates that residents move as an adjustment to changes in family life course (Rossi, 1955) such as birth, death, marriage, divorce and change in social status. Family life cyle still remains as a dominant influence in the residential mobility process. Over time, literature presents a multi-dimensional framework to analyse poople's underlying reasons to move. They include family transition (Geist & McManus, 2008), employment opportunity (Kronenberg & Carree, 2012), social network support (Oishi et al., 2013), neighbourhood attributes (Coulton et al., 2012) as well as urban policy and design principles (Emami & Sadeghlou, 2020). Nonetheless, linkages between residential mobility and residential satisfaction have received much emphasis in view of enhancing well being and quality of life among residents in metropolitan areas (Oh, 2020).

Residential satisfaction is an integral variable to understand residential mobility. Residential satisfaction is a complex concept measured in multi-context views derived by combining different attributes within explicative models and relationships between sets of predictors or criteria (Bonaiuto et al., 1999). Residential satisfaction depicts the individuals' and households' personal choice and preference for particular types of dwellings and neighbourhoods (Huang & Du, 2015). Studies showed that perceptions and satisfaction measures for dwelling and neighbourhood can influence residential mobility behaviour (Hedman, 2011; Jones & Dantzler, 2020; Parkes & Kearns, 2003). Mobility intentions and residential mobility can be determined through the residents' satisfaction assesments of their house and neighbourhood. Thus, moving in or out of the house either within or across neighbourhoods is indicative of numerous reasons and justifications why residents decide to leave and settle elsewhere.

Neighbourhood quality consists of inclusive dimensions in residential mobility measurements encompassing physical, social and economics perspectives. Prior studies indicate that good neighbourhood quality does not directly trigger residential mobility or vice versa (Boehm & Ihlanfeld, 1986; Parkes & Kearns, 2003). In fact, the trajectories for residential mobility decisions are still open to debates especially on particualr neighbourhood attributes that can affect the decision to move among residents This study therefore aims to determine the factors of neighbourhood quality which can influence the residents' mobility decisions based on a case study in Penang Island.

RESEARCH BACKGROUND

Mobility intention or thought can be referred to as the purposeful act of thinking, considering, wishing, willing, planning or expecting to move (de Groot et al., 2011). It is indicative of a wish to leave the house or neighbourhood (Lee et al., 1994). Prior research assert that an expectation or a plan to move is a close proxy

to mobility behaviour, more so than a desire or consideration to move (Kley & Mulder, 2010). Likewise, mobility intention or thought also relates to residential mobility decision (Coulter & Scott, 2014). Literature highlights residential mobility behaviour can be predicted by residential satisfaction (Francescato et al., 1989; Liu, 1999) and residential quality (Galster & Hesser, 1981). Residential mobility behaviour unravels the conditions of housing and neighbourhood which allure residents' to move in or move out.

Theories of residential satisfaction accentuate various indicators which measure a difference or gap between the residents' actual housing conditions and their desired dwelling and neighbourhood environment (Emami & Sadeghlou, 2020; Galster & Hesser, 1981). Residential mobility and residential satisfaction applys a similar approach in which both encounter a gap, mismatch or discrepancy between the present housing consumption and residential preferences or desired future housing. The instrument of residential satisfaction assessment both in general or specific terms may well lead to particular mobility action or behaviour (Varady, 1983). As such, an incongruity between actual residential satisfaction and desirable residential norms can bring about remedial situations such as reconsideration of satisfaction assessment, housing need adjustment and moving to another place that matches the residents' conformity and aspirations (Mohit et al., 2010; Morris & Winter, 1975). Hence, the gap or mismatch that the residents experience provides a strong basis to assess their satisfaction levels with current dwelling and neighbourhood and their move intentions.

Prior studies explicitly describe the neighbourhood dimensions which are associated with residential satisfaction among the residents (Mohit et al, 2010; Mohit & Adel Mahfoud, 2015). The residents' present living condition enables them to gauge their housing needs and preferences by comparing between expectations and reality. Specifically, the attributes in the neighbourhood context consist of neighbourhood facilities (Yi & Lee, 2014), neighbourhood greenery (Andersen, 2011), accessibility (Osmadi et al., 2015), public transportation (Andersen, 2011), neighbourhood environment (Dawkins et al., 2015), economic livelihood (Ferreira et al., 2010), and neighbourhood interaction and attachment (Dassopoulos & Monnat, 2011). Residents' reactions and responses toward their present house and neighbourhood affect their satisfaction levels which trigger related mobility behaviour such as moving house or housing adjustments.

METHODOLOGY

Data for this study were collected using a questionnaire survey of 717 heads of households using stratified sampling from 10 housing locations in Pulau Pinang (*Profil Bandar Pulau Pinang*, 2009). These housing locations are Bayan Lepas, Bayan Baru, Sungai Ara and Balik Pulau in Barat Daya District; and Tanjung Bungah, Tanjung Tokong, George Town, Jelutong, Air Itam and Sungai Dua–

Sungai Nibong in Timur Laut District. Logistic regression method was performed to determine which attributes of neighbourhood quality have significant effects on residential mobility intention. The logistic regression model has nine independent variables and a dichotomous (binary) dependent variable of Yes or No response categories, see **Table 1**.

Table 1: Coding variables and description of Neighbourhood Quality

Variables	Descriptions
All items in:	1 : (very dissatisfied and dissatisfied) 0 : (slightly satisfied, satisfied, very satisfied)
1) Dwelling features	1 if the household is dissatisfied, 0 is satisfied
2) Dwelling utility	1 if the household is dissatisfied, 0 is satisfied
3) Neighbourhood facility	1 if the household is dissatisfied, 0 is satisfied
4) Neighbourhood greenery	1 if the household is dissatisfied, 0 is satisfied
5) Neighbourhood accessibility	1 if the household is dissatisfied, 0 is satisfied
6) Neighbourhood public transportation	1 if the household is dissatisfied, 0 is satisfied
7) Neighbourhood environment	1 if the household is dissatisfied, 0 is satisfied
8) Neighbourhood economic livelihood	1 if the household is dissatisfied, 0 is satisfied
9) Neighbourhood interaction and attachment	1 if the household is never/occasionally and strongly disagree/disagree; 0 is seldom/frequently/always and slightly agree/agree/ strongly agree

Source: Fattah (2017)

The questionnaire for this study was developed based on a careful review of the literature. A hoslitic framework of neighbourhood quality factors was adopted including physical environment, social attributes and economic livelihood features. Physical environment features consist of dwelling features, dwelling utility, neighbourhood facilities, greenery, accessibility, public transportation and environment. While social attributes and economic livelihood features have neighbourhood interaction and attachment, and neighbourhood economy, respectively. Combining these groups of neighbourhood quality dimensions provides a comprehensive tool for neighbourhood assessment.

On the housing component, the questionnaire employs the *dwelling features* dimension consisting of satisfaction with the living room (Opoku & Abdul Muhmin, 2010), kitchen (Andersen, 2011), dining room (Salleh, 2008), bedroom (Woo & Morrow-Jones, 2011), bathroom (Elsinga & Hoekstra, 2005) and design of room arrangement (Jansen, 2014); while the *dwelling utility* emphasizes the residents' satisfactions toward electical and water supply (Salleh, 2008). On the neighbourhood component, the residents are inquired about their satisfaction level towards the availability of *neighbourhood facilites* within their neighbourhood such as hospital, community hall, police station, market (Mohit & Azim, 2012) and mini mart (Salleh, 2008). The study also queries about residents' satisfaction towards *neighbourhood greenery* such as recreational park (Ho et al., 2015) and landscape provision in the neighbourhood (Andersen, 2011).

The questionnaire also incorporates *neighbourhood accesibility* measurements such as residents' satisfaction levels with travel time to activity places with less traffic jam (Woo & Morrow-Jones, 2011) and home-work travel distance (Witten et al., 2008). The p*ublic transportation* dimension places an emphasis on satisfaction levels with frequency of bus service (Pacione, 2003), availability of public transport (Go & Lee, 2012) and facilities at the bus stop (Day, 2013). Moreover, indicators of *neighbourhood environment* are considered in terms of satisfaction levels towards cleanliness in the neighbourhood area (Woo & Morrow-Jones, 2011), maintenance, security (Hur & Nasar, 2014) and privacy (Jansen, 2014) within the nighbourhood. The study also used the criteria of *neighbourhood economic livelihood* to determine satisfaction levels towards employment and income opportunities (Greenwood, 2014), cost of living (Hui et al., 2012) and housing price (Tan, 2012). Finally, factors of *neighbourhood interaction and attachment* are identified in terms of the residents' level of agreement with the neighbours (Hamdan et al., 2014), frequency of contacts with neighbours (Baum et al., 2010) and satisfaction levels with social mix in the neighbourhood (Permentier et al., 2009).

RESULTS

The study employs a logistic regression method due to the nature of the dependent variable of mobility intention, which is a dichotomous (binary) measure with two response options (Yes or No). The full logistic regression model shows results of $\chi 2$ (9, N = 717) = 83.539, $p < .001$, which indicates that the developed model is able to distinguish significantly between those residents who have an intention to move out and those residents who wish to stay in, see **Table 2**. The model indicates that between 17.3% (Cox & Snell R2) and 23.1% (Nagelkerke R2) of the variance have residential mobility intention and they are classified correctly at 65.7% in the neighbourhood quality attributes.

Equation 2 shows the regression formula y = a + bx; while Equation 3 shows the four independent factors (χ) of neighbourhood quality that are found to be significant in affecting residential mobility intention (y). These significant neighbourhood qualities are neighbourhood interaction and attachment ($\chi 1$), dwelling features ($\chi 2$), neighbourhood environment ($\chi 3$) and neighbourhood facilities ($\chi 4$). **Table 3** shows the full results of logistic regression by using enter approach in which all variables in a block are entered together in a single step.

Table 2: Factors of Neighbourhood Quality affecting Residential Mobility Intention

	B	S.E	Wald	Df	Sig	Exp (B)	95% C.I for EXP(B)	
Neighbourhood Quality:							Lower	Upper
1) Interaction & Attachment	.980	.209	22.066	1	.000	.375	.249	.565
2) Economic livelihood	-.341	.200	2.908	1	.088	.711	.481	1.052
3) Environment	.505	.213	5.599	1	.018	.604	.094	1.593

4) Accessibility	.300	.200	2.236	1	.135	1.350	.397	.917
5) Public Transport	-.088	.133	.440	1	.507	.915	.911	1.999
6) Greenery	.169	.112	2.289	1	.130	1.184	.705	1.188
7) Facilities	.406	.196	4.274	1	.039	1.501	.951	1.473
8) Dwelling Utility	-.192	.216	.791	1	.374	.825	.540	1.261
9) Dwelling Features	.640	.199	10.300	1	.001	.527	.357	.779
Constant	6.321	1.009	39.282	1	.000	556.032		
Model -2LL	526.422							
(χ2)	126.78; df - 16 p= .000							
Cox & Snell R2	.173							
Nagelkerke R2	.231							

Source: Fattah (2017)

Factors of Neighbourhood Quality affecting Residential Mobility Intention

$$y = \alpha + b1\chi1 + b2\chi2 + b3\chi3 + b4\chi4 + e \quad \text{.....(2)}$$

Y = Mobility Intention
α = Constant
B = Regression coefficients
χ1 = Neighbourhood Interaction nd Attachment
χ2 = Dwelling Features
χ3 = Neighbourhood Environment
χ4 = Neighbourhood Facilities
e = Standard error

$$y = 6.321 + 0.980\chi1 + 0.640\chi2 + 0.505\chi3 + 0.406\chi4 + 1.009 \quad \text{.....(3)}$$

Source: Fattah (2017)

Table 3: Full model of Logistic Regression on Factors of Neighbourhood Quality affecting Residential Mobility Intention

IV(Neighbourhood Quality)	DV- Residential Mobility Intention [B (S.E)]								
	1	2	3	4	5	6	7	8	9
1) Interaction & Attachment	1.123 (.190) ***	1.042 (.192) ***	.934 (.195) ***	.932 (.195) ***	.942 (.196) ***	.977 (.200) ***	1.020 (.204 ***	1.010 (.206) ***	.980 (.209) ***
2) Economic Livelihood		-.463 (.172)**	-2.65 (.182)	-.337 (.193)	-.326 (.194)	-.332 (.194)	-.319 (.195)	-.346 (.198)	-.341 (.200)
3) Physical Environment			.591 (1.75)**	.651 (.183)***	.646 (.183)** *	.720 (.196) ***	774 (.201)* **	.620 (.210)**	.505 (.213)*
4) Accessibility				.208 (.177)	.257 (.191)	.256 (.191)	.256 (.193)	.317 (.197)	.300 (.200)
5) Public Transport					-.083 (.123)	-.070 (.124)	-.115 (1.29)	-.124 (.131)	-.088 (1.33)
6) Greenery						.116 (.107)	.100 (.108)	1.32 (.110)	.169 (.112)
7) Facilities							.236 (.183)	.372 (.194)	.406 (.196)*
8) Dwelling Utility								-.497 (.193)*	-.192 (.216)
9) Dwelling Features									.640 (.199)**

Source: Fattah (2017)

IV(Neighbourhood Quality)	DV- Residential Mobility Intention [B (S.E)]								
	1	2	3	4	5	6	7	8	9
Constant	3.565 (.611)	4.845 (.798)	5.873 (.868)	5.606 (.896)	5.705 (.911)	5.695 (.911)	5.352 (.943)	5.999 (.988)	6.321 (1.009)
Model -2LL	568.055	560.613	548.653	547.255	546.799	545.612	543.932	537.206	526.422
Cox & Snell R2	.091	.106	.130	.133	.134	.136	.139	.152	.173
Nagelkerke R2	.121	.141	.173	.177	.178	.181	.186	.203	.231

DISCUSSION

From the nine independent variables of neighbourhood quality, four variables have shown statistically significant contributions to the model in influencing residential mobility intention. They are neighbourhood interaction and attachment, dwelling features, neighbourhood environment and neighbourhood facilities. The first factor of *neighbourhood interaction and attachment* is found to be statistically significant in affecting residential mobility intention with a value of $B = .980$, $p \leq .001$. The B value shows a negative direction and the odd ratio value is less than 1. These findings imply that residents who are dissatisfied, disagree or only occasionally interact with their neighbours are more likely to move out in the future. Neighbourhood interaction and attachment, which is illustrated by the degree of social networkings, shared thoughts and experiences among the neighbours, is found to be significant in influencing residential mobility intention. Casual social activities in the neighbourhood such as chatting buddies, helping each other and social recreation have indirectly created internal bonding among the residents. Consistent with findings of prior studies, frequent socialising and contacting with their neighbours reveals the residents' sense of attachment and belonging to the neighbourhood (Baum et al., 2010; Ghorbanian, 2011). Such social ties may not be directly visible but a sense of comfort and meaningful comradeship is developed among residents who have known each other in the neighbourhood. In fact, higher levels of satisfaction with neighbourhood attachment and interaction can reduce the probability of residents moving out.

The second factor of dwelling features is also statistically significant in influencing residential mobility intention with a value of $B = .640$, $p < .01$. Residents who are dissatisfied with their dwelling features are more likely to move in the future (odd ratio value < 1). Likewise, residents who are dissatisfied with living room, kitchen area and room design arrangement are likely to move out. Dwelling features are the only housing component that significantly affect residential mobility intention. Residents are more likely to move in the future (odd ratio value < 1) if they voice dissatisfactions with dwelling features. On the contrary, those residents who are moderately satisfied with the dwelling features are less likely to move. Dwelling layout and room arrangement might not appear

aesthetically appealing to residents if they do not complement their desires. Nevertheless, those who are dissatisfied with their dwelling layout may choose to renovate and improve their house accordingly, but with their own budget. Previous studies also show moderate satisfaction levels with the dwelling features among residents (Mohit et al., 2010; Salleh, 2008; Salleh et al., 2013). An assumption can be made that the residents would be interested to raise their satisfaction level with regards to dwelling features.

The third factor of neighbourhood environment is also found to be statistically significant in affecting residential mobility intention with a value of $B = .505$, $p < .05$. Residents who are dissatisfied with their neighbourhood environment are likely to move in the future (odd ratio value < 1). Likewise, residents who feel dissatisfied with neighbourhood cleanliness, maintenance, security and privacy are likely to move out to settle elsewhere. The significant relationship found between neighbourhood environment attributes and residential mobility intention indicates that the residents who are moderately satisfied with the neighbourhood environment are less likely to move. Neighbourhood environment is considered as an important factor to residents since unfortunate incidences of poor maintenance and air pollution from traffic congestion can indirectly affect their livelihood. An unhealthy neighbourhood environment might put some strains on some residents forcing them to leave their residence and settle in healthier neighbourhoods. This study finding also shows that those who are dissatisfied with the security level in the neighbourhood are triggered to move out. This finding is parallel with the fact that a secure and safe environment is a quality-of-life factor that satisfies the residents (Maliene & Malys, 2009). Similarly, the rising problem with neighbourhood security is indicative of a trend in mobility pattern (Moser, 2009). Nevertheless, neighbourhood environment is considered as a priority for residential satisfaction regardless if the decision to move is on the line.

The fourth and final factor of neighbourhood facilities has a significant influence on residential mobility intention with value of $B = .406$, $p < .05$. Analysis shows that residents who are dissatisfied with neighbourhood facilities such as mini mark, pedestrian walkway, religious place and hospital are more likely to move out. This factor shows a high probability of residents' moving out with odd ratio value more than 1. Neighbourhood facilities are statistically significant in affecting residential mobility intention, which is found the be the strongest predictor in neighbourhood quality attributes, Residents who are dissatisfied with neighbourhood facilities are 1.5 times more likely to move in the future. Likewise, residents who are moderately satisfied with the neighbourhood facilities are less likely to move. In hindsight, this finding is supported by prior study that shows that higher satisfaction levels in neighbourhood facilities would less likely trigger residential mobility and vice versa (Boehm & Ihlanfeld, 1986). Notwithstanding, this study places an

emphasis on a holistic framework of neighbourhood quality attributes encompassing physical, social and economics components to assess the effects of likelihood of mobility intention by residents. Provision of adequate facilities, equipments and services in neighbourhoods is a priority to enhance satisfaction levels among neighbourhood residents.

Findings in this study found that other five attributes of neighbourhood quality such as economic livelihood, accessibility, public transportation, greenery and dwelling utility do not fit with the model with a significance level p >.05. This means that they are not significant in explaining residential mobility intention at 95% confiudence level. Nonetheles, it is noteworthy that these neighbourhood quality attributes are still regarded very important for residents' satisfaction. For instance, neighbourhood economic livelihood which measures income and employment opportunities, is an vital component that stimulates the residents' ability to hold and organize income-generating activities at the neighbourhood level. An economic variable is always a prominent factor in residential decisions (Tannier et al., 2015). People are often influenced to move to a new place which offers relatively lower living costs with similar benefits (Hui et al., 2011). Any moving activities should be linked with the local economy as an attraction. By the same token, other studies highlight the importance of accessibility in the neighbourhood as a major determinant for future mobility. If accessibility is high, then the probability of future mobility decreases accordingly (Alkay, 2011). In addition, neighbourhood accessibility indicates location attributes which are reachable within a specific time. Location attributes and accessibility are considered beneficial to residents because such information help them relate spatially to the entire urban area (Guo & Bhat, 2007). Thus, accessibility does have an impact for an intention to move in the future.

This study findings found that the factors of neighbourhood quality are very important considerations in analysing residential mobility behaviour. Although their impacts may vary by city and places, neighbourhood quality presents a recent trend for residents' preferences for moving. The study findings highlight the significant factors of neighbourhood quality which affect residential mobility intention.

CONCLUSION

Neighbourhood quality attributes are one of the dimensions that characterized the motivations and justifications for residential mobility decision. The inclination of moving in or moving out of a house in a neighbourhood context reflect the different perceptions and experiences among the affected residents. Moving to a reputable neighbourhood would be beneficial in terms of an enhanced neighbourhood quality and satisfaction level. On the contrary, moving out of the neighbourhood shows dissatisfaction and mismatch of housing consumption with

residential preference and future needs. Hence, residents' satisfaction and perception might differ and change over time and space.

Results of this study show four factors of neighbourhood quality that significantly influence residential mobility intention. The factors are neighbourhood interaction and attachment, dwelling features, neighbourhood environment and neighbourhood facilities. The study finding also indicates that moving behaviour relates to financial sources which is a main obstacle especially those of the lower income category. While all residents wish to live in their desired and preferred house and neighbourhood, yet they could not do so due to lack of funding and limited resources. More efforts should be geared to understand residential mobility trends in Malaysia. A better understanding of mobility decisions is essential to predict future changes of residential preference. From a public policy perspective, it is essential that local housing development project incorporates all the attributes of neighbourhood quality to ensure that the housing provision and neighbourhood environment are most convenient, comfortable, safe and satisfying to prospective residents. A thorough understanding of residential mobility behaviour would consequently improve an appreciation of the residents' future housing needs and requirements. More importantly, this situation would underline the implications of relevant housing policy measures in the urban areas that give an advantage to residential mobility trends.

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ACCESSIBILITY FOR PERSONS WITH DISABILITIES IN BUILT ENVIRONMENT OF URBAN AREA: CASE STUDY OF GEORGE TOWN, PENANG

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Abstract

Persons with Disabilities (PwD) confront several challenges that hinder them from fully exercising their rights and participating in social, professional, and cultural activities when it comes to accessing built environment. This paper is to investigate the accessibility challenges that PwD face in George Town, Penang. The questionnaire survey techniques employed was to obtain data from a group of PwD. The questionnaire was conducted on wheelchair users, the walking impaired, the visually impaired, and the hearing impaired in George Town areas. Most PwD three key challenges, such as narrow sidewalks, uneven sidewalk surfaces, barriers on sidewalks and dangerous drop curbs. Accessibility facilities in George Town still need to be improved to make it easier for PwD to get around. The findings and recommendations in this study would assist in improving current access to a built environment so that PwD may visit the George Town areas easily and safely.

Keywords: Accessibility, Persons with Disabilities, Built Environment, Urban Design, George Town

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INTRODUCTION

Accessibility refers to the ease with which people can move around their surroundings to reach services, activities, and destinations using a preferred mode of transportation (walking or driving) and at a preferred time (Bertolini, le Clercq, & Kapoen, 2005; Ribeiro, Antunes, & Páez, 2010; Litman, 2011). According to Frey (2003), the top of the agenda is ensuring that all persons with various characteristics have equal access to activities and services. Nonetheless, the development of urban areas is more focused on the development of normal people than the needs of PwD. Compared to Persons without Disabilities, PwD have less opportunities to participate in activities because of the inaccessible environment. To provide convenient and safe facilities, a reliable and effective urban built environment must be designed comprehensively. The relevance of a built environment in assisting PwD is to engage in all activities successfully - from the most basic tasks to more complicated participation behaviours like grocery shopping, visiting friends, and visiting parks.

PwD encounter numerous challenges in urban areas, including accessibility. They are unable to access the significant areas of cities because of inaccessibility in the built environment (Baris & Uslu, 2009; Ja'afar, Rahim, Samad, & Rahim, 2017). PwD, such as wheelchair users, the visually impaired, the hearing impaired, and others in various positions, face numerous obstacles when navigating the built environment. It prevented them from fully exercising their rights and participating in social, professional, and cultural activities on an equal footing with others. It includes aspects such as a sidewalk, road crossings, bus stops, drop curbs, and tactile blocks in the built environment. Uneven sidewalk surface, incorrect placement of street furniture, wrongly placed textured pavement blocks, hostile pedestrian crossing for disabled individuals, a lack of or dangerous design of a drop curb, and inability to see the signboards are among the barriers for PwD (Gallagher, Hart, O'Brien, Stevenson, & Jackson, 2011; Jenkins, Yuen, & Vogtle, 2015; Rosenberg, Huang, Simonovich, & Belza, 2013).

In this regard, George Town, Penang, is no exception. As the areas are well connected, vehicle mobility in Georgetown (Penang Island) is unaffected by obstructions or challenges. On the other hand, it is the opposite for pedestrian movements, particularly those involving PwD (Mok, 2016). Because of the ways in which the built environment is organized to prioritize vehicles, many disabled people's access to George Town is either difficult or impossible without assistance. This is evidenced by the shared experience of a wheelchair user travelling in George Town, who mentioned low quality, steepness and lack of curb ramps that prohibit the confidence among those with impairments and wheelchair users from leaving the footpaths or crossing the road. Besides that, non-level access and gaps between infrastructure platforms have been listed as frequent problems while travelling around the city (I Wheel Travel, 2019). In order for vulnerable groups of the population to not be ignored or marginalized,

the physical environment in cities should be able to provide more services. A well-designed urban built environment can help to ensure equal opportunities for each layer of society even while increasing urban mobility. According to the Persons with Disabilities Act of 2008, transportation facilities and infrastructure must comply with the Universal Design in order for PwD to have quick and easy access (Hussein & Yaacob, 2018).

A built environment for the disabled and barrier-free is being studied from a variety of perspectives. Nonetheless, the scope of the existing research has been limited; in general, limitations on the study of the needs of specific users, such as visually impaired people or wheelchair users, and restricted to highly restricted areas; in the public area or public building (government building, shopping malls and mosques). Thus, this paper is to study the accessibility issues experienced by PwD in urban areas, specifically in George Town, Penang. It is apparent that George Town's urban design in terms of accessibility for PwD is in desperate need of improvement. From the standpoint of the tourism sector, physical mobility accessibility will assist Penang in demonstrating the 'Malaysian Hospitality' tagline. It will also play a critical role in attracting the rising domestic tourism market (Tan, 2017).

PERSONS WITH DISABILITIES

PwD are characterized in a variety of ways depending on the viewpoints expressed. The public in general defines PwD to be those who have both physical and mental disabilities, although the term is much broader when viewed from different perspectives. Disabilities can be obvious or invisible, and they can appear at any age, including birth, childhood, adolescence, adulthood, and the elderly. People with disabilities are diverse and complex; nonetheless, stereotyped perceptions of impairments focus on wheelchair users and a few other typical kinds, such as the visually and hearing impaired (Park, Curtice, Thomson, Phillips, & Johnson, 2011). PwD may be defined differently by each disability group and other organizations. The World Health Organization's definition of Persons with Disabilities and those of the United States, the United Kingdom and Malaysia, are shown in the table below.

Table 1: Comparison of PwD Definition

Organization	Definitions
Americans with Disabilities Act (ADA) (1990), United States	An individual with **a physical or mental impairment** significantly restricts one or more main activities in life, a record of such an impairment, and regards as having such an impairment (Americans with Disabilities Act, 2011).
Disability Discrimination Act (DDA) (1995),	A person with a disability has **a physical or mental impairment** that has an adverse effect on their ability to perform normal day-to-day activities over a substantial and

United Kingdom	long term (lasting 12 months or the rest of the person's life) (Policy Division, 1997).
The Person with Disabilities Act 2008, Malaysia	A Person with Disabilities as those who have **long term physical, mental, intellectual or sensory impairments** which in interaction with various barriers may hinder their full and effective participation in society (Americans with Disabilities, 2011)

In addition, the Department of Social Welfare Malaysia (2016) has stipulated specific categories of disabilities, including seven categories, namely area hearing, vision, speech, physical, learning difficulties, mental and various or multiple disabilities as in the table below.

Table 2: Categories of PwD by the Department of Social Welfare Malaysia

Category Disabilities	Description
Hearing	Unable to hear clearly in both ears without using a hearing aid or incapable of hearing even when using a hearing aid.
Vision	Blinds in either eyes or blind in one eye, or vision impaired in either eyes or any other permanent visual impairment.
Speech	An inability to speak impairs proper communication and is impossible to understand to those who interact with the individual. It is a permanent or incurable condition. For children, it must be based on an evaluation at five years of age and above. An Otorhinolaryngology Expert shall be consulted in case of doubt.
Physical	The permanent impairment of parts of the body, whether caused by damage or absence or the failure of any part of the body to perform its essential functions thoroughly, results from injury (trauma) or disease.
Learning Difficulties	Intellectual capacity which does not conform to biological age. Late Global Development, Down Syndrome and Intellectual Disabilities are the ones that fall within this category.
Mental Disability	Refers to a condition of severe mental illness that causes an inability to function in person, in whole or in part, in matters relating to him/herself or his / her relationship within the community.
Multiple Disabilities	Having more than one type of disability and usually not being categorized in categories 1 to 7 is not common.

Source: Department of Social Welfare Malaysia, (2016)

LEGISLATION, STATUTORY, AND GUIDELINE FOR PERSONS WITH DISABILITIES

Malaysia's government has made a concerted effort to recognize and promote the rights of persons with disabilities by enacting several legislation and guidelines. Accessibility to a location, public circulation, where it can be pursued by all people, equipment, or the use of every member of society, priority security, and the duty of each responsible party are all highlighted in the legislation. The table below summarizes Malaysian's legislation aimed at maintaining and improving the living standards of PwD.

Table 3: Regulations employed by Malaysia to Protect the Right of PwD

Policy / Act / Legislative	Description
Uniform Building By-Laws: UBBL (34A)	The Uniform Building By-Laws 1984 was amended in 1990 to supplement the provisions of by-law 34A. 34A requires improvements to buildings for public use to enable Persons with Disabilities to get into, out of and within. (Legal Research Board Malaysia, 1984).
Malaysian Standard (MS)	Malaysian Standard 1183:1990 - Code of Practice for Means of Escape for Disabled Persons - This MS is used as an instruction to design and modify new buildings. In the sense of fire safety, it provides the planning, intervention, and obligation to be extended to building for people with disabilities (Department of Standards Malaysia, 1990). Malaysian Standard 1184:2002 - Code of Practice for Access for Disabled Persons to Public Buildings - This MS-specific the basic requirements for elements of a building and related facilities to permit access by Persons with Disabilities Department of Standards Malaysia, 2002). Malaysian Standard 1131:2003 - Code of Practice for Access for Disabled Persons Outside Buildings - Specifies the basic requirements for providing and designing outdoor facilities so that disabled persons can access facilities and make them usable (Department of Standards Malaysia, 2003).
Persons with Disabilities Act 2008	The Person with Disabilities Act (2008) encourages the development and improvement of the quality of life and well-being of disabled persons. It has given a new breath to disabled people in Malaysia, especially about the protection, development and welfare of Persons with Disabilities, registration, rehabilitation, and the establishment of a national council to protect the rights of Persons with Disabilities. with disabilities (International Labour Organization, 2008).

Nevertheless, the enforcement of these laws and guidelines does not always meet the needs of PwD, as Malaysia still lacks a user-friendly built environment (Kamarudin, Hashim, Mahmood, Ariff, & Ismail, 2012). There is a dearth of facilities that allow for easy mobility and varying design standards in the development of walkway facilities, which impede the movement of PwD (Yaacob & Ariffin, 2001).

METHODOLOGY

CASE STUDY

Currently, an estimated two billion people, or 37.5% of the world's population in 2020-7.8 billion people, experience some form of disability (Wagner, 2021). According to the statistics from World Health Organization (WHO), In 2017, Malaysia had 10 to 16 per cent of PwD from the total population which is about 3 million people (Zahari, 2017). On the other hand, according to statistics released by the Department of Statistics Malaysia (2018), 453,258 PwD registered until 2017. Physical disabilities accounted for 35.2 per cent of the total, led by learning disabilities (34.8 per cent) and visual disabilities (34.8 per cent) (8.9 per cent). At the same time, speech disabilities were the least common, accounting for just 0.5 per cent of the total. Meanwhile, the following table shows the population statistics for PwD in George Town, Penang, for physical disabilities (wheelchair users, cane users, and walking disability), visual impairments, and hearing difficulties: -

Table 4: Number of registered PwD by types, Timur Laut, Penang, 2020

Types of Disabilities	Total Registered
Physical Disabilities	4,490
Visual Disabilities	1,261
Hearing Disabilities	1,058
Total	6,809

Source: Shaari, (2020)

George Town, the capital of the state of Penang, was selected as the study area. A scenic Malaysian city on the island of Penang is a culturally significant and popular tourist destination with a variety of activities. George Town is one of the UNESCO World Heritage Sites and Malaysia's third most populated city, with a population of 708,127 people as of 2010 (ASEAN, 2018). In brief, whatever occurs in this place may draw visitors, whether locals or tourists, from various demographic categories, including adults, the elderly, individuals with impairments, and children.

METHOD APPROACH

Data was collected using a quantitative approach in which the questionnaire research technique was used. The goal of the survey was to collect information from a pool of PwD about the mobility issues that they experience when travelling throughout George Town. The survey was conducted on a random sample of PwD, including wheelchair users, the elderly, the visually impaired, and the hearing impaired, at locations that these group of people may visit, such as hospitals, government offices, banks, and shopping malls. The questionnaire survey was only one phase of the communication thread, which lasted about 15 to 20 minutes for each person and was separated into three (3) sections: -

Table 5: Guided Questions for PwD Questionnaire

Section	Variable	Guided Questions
A	Respondent's Profile	• Personal background. (age, educational level, gender).
B	Respondent's Illness Information	• Information about their disabilities. (types of disabilities).
C	Issues and Challenges when Travelling	• Issues and challenges experiences when travelling in George Town.

FINDINGS AND DISCUSSION

RESPONDENT'S DEMOGRAPHY PROFILE

The questionnaire survey was conducted at places where these PwD may go, such as care centers, hospitals, government offices, recreational areas, banks, and shopping malls in George Town, Penang. A total of 321 questionnaires were returned and completed.

Table 6: Respondent's Demography Profile

No.	Category	Frequency	Percentage (%)
1.	**Gender**		
	Male	155	48.3
	Female	166	51.7
2.	**Age**		
	Below 20 years	29	9.0
	21 years to 30 years	73	22.7
	31 years to 40 years	78	24.3
	41 years to 50 years	88	27.4
	51 years to 60 years	41	12.8
	61 years and above	12	3.7
3.	**Type of Disabilities**		
	Walking Disabilities	129	40.2

	Visual Disabilities	32	10.0
	Hearing Disabilities	44	13.7
	Wheelchair Users	116	36.1
4.	**Respondent's Travelling Profile**		
	Visited George Town	289	90%
	Not visited George Town	32	10%

The survey indicated that male respondents made up 48.3 per cent of the total, while female respondents made up 51.7 per cent. When it comes to age, 27.4 per cent of respondents are between the ages of 41 and 50, while 24.3 per cent are between the ages of 31 and 40. Then came the respondents between the ages of 21 and 30, who made up 22.7 per cent of the total respondents. The age range of 51 to 60 years is represented by 12.8 per cent of the total respondents. While 9.0 per cent of respondents are under the age of 20, only 3.7 per cent of all respondents are 61 years or older. According to the table above, 40.2 per cent of respondents have walking impairments, followed by 36.1 per cent who use a wheelchair. While 13.7 per cent of the total respondents have hearing impairments, just 10.0 per cent of the total respondents are visually impaired. The bulk of the respondents, 90 per cent out of 321, said they had visited George Town in the previous one to two years. Only 10% of the total number of respondents did not visit George Town during that time.

RESPONDENT'S PERCEPTION TOWARDS ACCESSIBILITY IN GEORGE TOWN

This section aims to elicit more detailed responses from respondents regarding accessibility for Persons with Disabilities in George Town. Respondents were asked about their concerns and the obstacles they have in terms of accessibility for Persons with Disabilities when travelling through George Town. Only those who have visited George Town in the recent one to two years will be considered as a sample respondent for future surveys and studies.

Table 7: Issue and Challenges While Travel in George Town

	Issues and Challenges	Type of Persons with Disabilities			
		Walking	Visual	Hearing	Wheelchair User
1.	Lack proper sidewalks	16 (12.4%)	1 (3.1%)	3 (6.8%)	87 (75.0%)
2.	Inconsistent sidewalks surface quality and conditions	65 (50.4%)	16 (50.0%)	24 (54.5%)	86 (74.1%)
3.	Obstruction on sidewalks (vehicle, garbage, signage, utility poles, etc.)	88 (68.2%)	22 (68.8%)	36 (81.8%)	92 (79.3%)

4.	Narrow sidewalks	87 (67.4%)	2 (6.3%)	16 (36.4%)	81 (69.8%)
5.	Wet or icy sidewalks	10 (7.8%)	1 (3.1%)	3 (6.8%)	44 (37.9%)
6.	Lack of shelter and covered areas	36 (27.9%)	3 (9.4%)	12 (27.3%)	64 (55.2%)
7.	Lack of disabled parking space	21 (16.3%)	0	2 4.5	36 (31.0%)
8.	Lack of places to rest	53 (41.1%)	1 (3.1%)	4 (9.1%)	36 (31.0%)
9.	Lack of paving block and tactile warning	0	12 37.5	0	0
10.	Improperly laid textured paving block	1 (0.8%)	4 (12.5%)	0	4 (3.4%)
11.	Lots of damaged paving block	2 (1.6%)	5 (15.6%)	3 (6.8%)	9 (7.8%)
12.	Lack of crossing	9 (7.0%)	5 (15.6%)	3 (6.8%)	37 (31.9%)
13.	Difficult features of crosswalks (time too short, poor marking, fast speed of traffic)	29 (22.5%)	0	5 (11.4%)	73 (62.9%)
14.	Unsuitable positioning of traffic light buttons	0	0	0	6 (5.2%)
15.	No visual (symbol green person) or not working for crossing	0	0	10 (22.7%)	5 (4.3%)
16.	No audio (beep sound) or not working for crossing	0	12 (37.5%)	3 (6.8%)	5 (4.3%)
17.	Lack of drop curb in many places	18 (14.0%)	9 (28.1%)	2 (4.5%)	68 (58.6%)
18.	Dangerous drop curb condition (too steep, icy surface, position in the middle of the street)	36 (27.9%)	12 (37.5%)	8 (18.2%)	88 (75.9%)
19.	Disabled parking space is too far from destination	27 (20.9%)	0	4 (9.1%)	54 (46.6%)
20.	Lack of bus stops and taxi stands	8 (6.2%)	4 (12.5%)	7 (15.9%)	10 (8.6%)
21.	Lack of shelters at bus stops and taxi stands	0	0	0	5 (4.3%)
22.	Inaccessible to bus (gap between platform and bus)	1 (0.8%)	0	1 (2.3%)	14 (12.1%)
23.	Lack of signage to show direction and information	1 (0.8%)	0	8 (18.2%)	3 (2.6%)

According to the table above, most walking impaired people face three main issues: obstruction on sidewalks such as vehicles, garbage, signage, utility poles, and other objects (68.2 per cent of total respondents), narrow sidewalks (67.4 per cent), and inconsistent sidewalk surface quality and conditions (67.4 per cent) (50.4 per cent). Obstruction on sidewalks such as vehicles, rubbish, signage, utility poles, and other obstructions are the top two difficulties for visually impaired people, according to 68.8% of respondents, followed by inconsistent sidewalk surface quality and conditions (50.0 per cent). In terms of hearing-impaired people, there are two major issues that respondents face: which are obstruction on sidewalks such as vehicles, garbage, signage, and utility poles, which was experienced by 81.8 per cent of the total respondents, and inconsistent sidewalk surface quality and conditions, that was experienced by the remaining respondents (54.5 per cent). Finally, wheelchair users face obstacles such as vehicles, garbage, signage, utility poles, and other objects on sidewalks (79.3%), dangerous drop curb conditions (75.9%), lack of proper sidewalks (75.0%), inconsistent sidewalk surface quality and conditions (74.1%), narrow sidewalks (69.8%) and a lack of shelter and covered areas (55.2 per cent).

The accessibility facilities in George Town still need to be improved to make it easier for PwD to get around. When using sidewalk elements to move in the built environment in Georgetown, most PwD face three main barriers: narrow sidewalks, uneven sidewalk surface conditions, and obstacles on sidewalks. Furthermore, there are particular difficulties that wheelchair users confront, such as when using drop curb features. These two elements (sidewalk and drop curb) are crucial in ensuring accessibility, particularly for Persons with Disabilities, since both assist them in moving from one location to another. In fact, if these features are not given or are constructed poorly, they can limit mobility and potentially put Persons with Disabilities at risk.

The government has made a deliberate effort to promote the rights of people with disabilities by implementing several laws and guidelines, including the Persons with Disabilities Act, Malaysian Standards, and Uniform Building By-Laws (UBBL). The Act emphasizes accessibility to a venue, public circulation, priority security, and the responsibility of each responsible party. However, there is a gap between having legislation and standards and ensuring their implementation. Based on the current findings, two crucial components, namely the sidewalk and drop curb, are fundamental challenges for PwD when navigating around George Town. The accessibility features given are insufficient; this is due to the fact that barrier-free design requirements are still not applied to accessibility elements that fulfil the needs of PwD.

CONCLUSION

This paper presents an overview of PwD' disabling experiences in the built environment in George Town and recommendations from many perspectives for

overcoming the disablement. Since built environment plays such a significant role in connecting people and places, this study aims to improve urban design, leading to better physical mobility management for PwD. As a result, it is intended that the findings and recommendations in this study would assist in improving current access to the built environment so that PwD may visit the George Town areas easily and safely.

RECOMMENDATION

As a result, future planning to develop and expand the built environment infrastructure is required, which can be done in phases. As Malaysia moves toward becoming a more developed nation, ongoing legislation and reviews are crucial for the future well-being of PwD. Aside from that, future project consultations, task force consultants, and organizing seminars on universal interior and exterior design are all examples of ways to recognize the basic needs of PwD. Professional involvement, government involvement, and PwD as reference sources can help solve difficulties in this local context. Finally, Malaysians should study countries that have effectively implemented the Universal Design principles and those that have struggled to do so in order to avoid making the same mistakes.

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KINABALU NATIONAL PARK, UNESCO WORLD HERITAGE SITE: ASSESSMENT OF ENVIRONMENTAL ISSUES, TOURIST SATISFACTION AND PARK MANAGEMENT

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Abstract

National parks serve as rural ecotourism attractions, the management of which must strike a balance between economic productivity and the protection of the park's natural value. Faced with the increased pressure of rising visitor numbers park management must give greater consideration to the tourist experience and tourist satisfaction. This paper examines the relationship between park management, tourist satisfaction, and environmental issues. Moreover, this paper considers the mediating role of environmental issues on the relationship between park management and tourist satisfaction. A questionnaire survey was administered to visitors of Malaysia's Kinabalu National Park. In total, 351 completed questionnaires were returned and 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.

***Keywords**:* Park management, environmental issues, tourist satisfaction, Kinabalu National Park

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INTRODUCTION

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 CO_2 emissions has dropped from 86 in 2008 to 103 in 2013 Blanke and Chiesa (2013). 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 been 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. Nevertheless, the increase in the number of tourists has had an adverse impact on Kinabalu Park (Abdul et al., 2020). To this end, we argue the importance of investigating best practices in the management of Kinabalu Park, environmental conservation, and tourist satisfaction.

RESEARCH BACKGROUND

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 (Abdul, 2013; ; Latip et al., 2018). 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. 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). Therefore, the investigation of tourist satisfaction is essential for ensuring sustainable park tourism management. In conclusion, efficient and systematic park management will ensure tourist satisfaction while ensuring the stability of environmental issues in Kinabalu Park. Further discussion is provided in the hypotheses of this study.

RESEARCH METHODOLOGY

This study evaluates the mediating role of environmental issues between park management and 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.

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), and sought to examine park management, environmental issues, and tourist satisfaction. The researcher selected respondents for this study in four parts in Kinabalu National Park, namely in Kota Belud District, Nalapak and Serinsim in Kota Marudu District, and Monggis in Ranau District. The respondents of this study included a sample of visitors to the area. This study used a simple random sampling method to obtain feedback from respondents. This method is used to minimize costs, save time, and obtain maximum accuracy and expectations that will occur in this research. The questionnaire was distributed among these visitors, with 482 questionnaires returned. Nevertheless, only 351 questionnaires were completed or deemed usable. Structural Equation Modelling (SEM) was employed to analyze the relationships between the variables.

ANALYSIS AND FINDING

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 (Hair et al., 2011). Table 1 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).

Table 1. Result of measurement model assessment

Construct	Items	Loading	CR	AVE
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

CR is the more suitable coefficient for PLS-SEM and should be greater than 0.7 (Hair et al., 2011). Table 1 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 (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 1 indicates 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 2 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 2. 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 (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 3 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. To this end, Table 3 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. 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.

Table 3. The result of assessment of structural model

Hypotheseses	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

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.

	$= \frac{ab}{\sqrt{a^2 s_b{}^2 + b^2 s_a{}^2}}$	[1]

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:

$$z = \frac{0.266 \times 0.282}{\sqrt{0.070 \times 0.003 + 0.079 \times 0.005}} = 3.4 \qquad [2]$$

The results in Table 4 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. 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.

Table 4. 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

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. 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). 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.

CONCLUDING REMARK

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 environmental.

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POST-CONSERVATION EVALUATION (PCE) ON HISTORIC BUILDINGS: AUTHENTICITY OF ADAPTIVE REUSE MUSEUMS IN GEORGE TOWN, UNESCO WORLD HERITAGE SITE

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Abstract

Adaptive reuse has apparently become a favourable means of built heritage conservation in the UNESCO World Heritage Site (WHS) of Melaka and George Town. In most cases, adaptive reuse implementations inflict conflicting demands to historic buildings in terms of meeting new functional needs and retaining physical authenticity. Inappropriate implementation of adaptive reuse for historic buildings within WHS may result in the violation of Outstanding Universal Values (OUVs). The purpose of this study is to determine the authenticity condition of historic buildings on their post-conservation phase, after adaptive reuse implementation. Five historic buildings namely the Penang State Museum (PSM), Made in Penang Interactive Museum (MIPIM), Sun Yat Sen Museum (SYSM), Batik Painting Museum (BPM) and Dark Mansion-3D Glow in the Dark Museum (DM) were evaluated through field observation. In accommodating the museum function, three elements were found to be intervened inappropriately at these buildings namely the internal wall, windows, and building services. The findings of this evaluative study can be useful to technical review panels appointed by heritage authorities, in scrutinising heritage impact assessment (HIA) reports and evaluating future proposals concerning adaptive reuse projects of historic buildings within WHS.

***Keywords**:* adaptive reuse museum, authenticity, city cultural heritage, historic building, post-conservation evaluation (PCE)

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INTRODUCTION

Melaka and George Town are cultural sites of Malaysia that have been inscribed in the UNESCO World Heritage List on 7th July 2008. These two historic cities carry the brand as the UNESCO Historic Cities of the Straits of Malacca, for having Outstanding Universal Values (OUVs) for their historic landscape (Criterion II), cultural tradition (Criterion III), and outstanding built heritage (Criterion IV). Ever since the recognition, protection of both tangible and intangible heritage at the two cities turned mission-critical for local conservation stakeholders.

Figure 1: Unique architectural heritage without parallel anywhere in the East and Southeast Asia resulting from the influx of cultural elements from the Malay Archipelago, India, China, and Europe.

As shown in Figure 1, Melaka and George Town possess astonishing historic buildings which represent a superior quality of Malaysian built heritage scenery originated from both traditional and colonial architecture. Adherence to legal framework is thus an imperative aspect in operationalising conservation work for historic buildings (Kwong & Badaruddin, 2017). Yet, numerous buildings in George Town failed to achieve so due to erroneous conservation practice (Zubir, 2017). In sensitising this matter, this study specifically focuses on evaluating the impact of historic buildings that have undergone adaptive reuse which typically incur physical interventions. Thus, the purpose of this study is to determine the authenticity condition of historic buildings on their post-conservation phase, after adaptive reuse implementation. The following section discusses further on the aspects pertinent to understanding adaptive reuse and authenticity condition within the context of UNESCO World Heritage Site (WHS) and is manoeuvred to operationalise their evaluation.

RESEARCH BACKGROUND

UNESCO governs cultural places that have international significance which include heritage cities that dwell valuable historic buildings. As emphasised in the Operational Guidelines for the Implementation of the World Heritage Convention, authenticity and integrity are the two essential conditions that qualify a locality to be revered as a WHS (UNESCO, 2005). Maintenance of the two conditions must be based on the Outstanding Universal Value (OUV) of a

site (Pendlebury et al., 2009; Nezhad et al., 2016). However, identifying and maintaining the authenticity and integrity conditions of cultural heritage sites are challenging (Alberts & Hazen, 2010). Since integrity condition is beyond the scope of this paper, further discussion on the meaning of authenticity condition is hence imperative.

Authenticity remains the main principle for worldwide conservation works as advocated by numerous international charters, albeit its definition and concept have been controversial worldwide due to vagueness and embedded cultural assumptions (Alberts & Hazen, 2010; Alho et. al., 2010). The term 'authenticity' is originated from the Greek word authenticos which means genuine and original. Authenticity depends on value judgements as it is related on the idea of truth or falsehood (Jamal & Hill, 2004). There is a provocation made on the quality of authenticity in the sense that an original fabric can be authentic, but an authentic fabric is not necessarily original. Albeit its definition and concept have been controversial worldwide due to vagueness and embedded cultural assumptions, authenticity nevertheless remains the main principle for global conservation agendas and being advocated by numerous international charters (Alberts & Hazen, 2010; Alho et al., 2010).

As stipulated in the Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO, 2005), nomination of properties into the UNESCO World Heritage List necessitates the authenticity condition to be met for six out of the total ten OUV criteria namely from criteria (i) to criteria (vi). Authenticity is understood when cultural values of properties are truthfully and credibly expressed through attributes such as: form and design; materials and substance; use and function; traditions, techniques, and management systems; location and setting; language, and other forms of intangible heritage; spirit and feeling and miscellaneous internal and external factors. The meaning of authenticity then has been deepened to include further contexts. Authenticity is understood when cultural values of properties are truthfully and credibly expressed through attributes such as: i. Form and design, ii. Materials and substance, iii. Use and function, iv. Traditions, techniques and management systems, v. Location and setting, vi. Language, and other forms of intangible heritage, vii. Spirit and feeling and viii. Miscellaneous internal and external factors (UNESCO, 2005).

Nara Document on Authenticity (1994) is a conservation doctrine much related to authenticity. Within its Appendix 2, conservation is defined as all efforts designed to understand cultural heritage, know its history and meaning, ensure its material safeguard and as required, its presentation, restoration and enhancement (ICOMOS, 1994). In connecting to this sense, adaptive reuse, as a prevailing means of conservation effort in the current time, should legitimately conform to the benign philosophical criteria comprising minimal intervention,

minimal loss of fabric, reversibility and legibility as mandated in various charters such as the New Zealand Charter 1992 (Article 4ii, 4iii), Bura Charter 1999 (Article 1.10, 3, 19-23) Deschambault Declaration 1982 (Article V-C), Appleton Charter 1983 (Article D) and Venice Charter 1964 (Article 12). Adaptive reuse perpetuates both retention and utilisation of historic buildings by making them physically intact, socially purposeful, and commercially viable in the contemporary age (Prihatmanti, Putri, & Devina, 2017).

Communities perceived adaptive reuse of heritage properties as beneficial in meeting their sociocultural needs which includes self-growth, health benefit, social benefit, and cultural benefit (Tu, 2020). Whilst adaptive reuse is implied as the best possible option for achieving the twofold conservation philosophy: to simultaneously preserve and develop built heritage as highlighted in Abdul Aziz (2020), it can also be either a boon or bane for historic buildings judging from their post-conservation impacts. Without adhering to appropriate conservation philosophies and principles, the implementation of adaptive reuse on historic buildings may resulted in the violation of authenticity condition. Adaptive reuse has apparently become a favourable means of built heritage conservation in Melaka and George Town. Many historic buildings at the two historic cities have undergone adaptive reuse to boutique hotels, cafes and restaurants, pubs and bars, museums, galleries and so on (Ab Wahab, 2013). Out of these conversions, Mok (2013) reported that adaptation of historic buildings to museums is the most trending implementation, which latterly has involved both government and private premises.

The architecture of museums revolves around spaces that can be used to house specific museum functions such as exhibition and display, preventive and remedial active conservation, study, management, and receiving visitors. For having to reconcile those conflicting functions, museums have even been regarded as the most difficult type of building to be designed and constructed (Cassar, 1994). Implying from this, positive impacts resulting from the implementation of adaptive reuse on historic buildings are therefore essential and necessitated in the quest to retain the OUVs of Melaka and George Town.

Historic buildings housing museum function are considerably remarkable as a tangible heritage, since both of its structures and contents bear high historical, cultural, architectural, and aesthetical significance. Interestingly, such building was even considered as the largest museum artefact, for having heritage values embedded in its very physical built (Cassar, 1994). This hence calls upon the responsibility to conserve and manage them as a part of the OUVs (UNESCO, 2013), especially when the OUVs of any World Heritage must be maintained as at its time of inscription or enhanced in the future. Failure to do so may jeopardise the honour received as the World Heritage Committee will

consider omitting any properties from the UNESCO World Heritage List if the OUV found destroyed (UNESCO, 2005).

Acknowledging that adaptive reuse of historic buildings may incur complexity and cause conflicting demands of meeting contemporary uses and expectations while obliged to retain cultural heritage values, post-conservation evaluation (PCE) on committed physical interventions can enlighten on building authenticity condition. In this regards, Ab Wahab's (2013) operational approach to assess adaptive reuse buildings is found contextually useful. Based on her approach, judgement of authenticity is made with reference to local conservation guidelines. She also considered the four criteria of authenticity stressed by ICCROM (1982) which include the aspects of material, design, workmanship and setting.

Ab Wahab's (2013) approach accentuated on the visual assessment of 16 building elements which include: i. Front façade, ii. External wall, iii. Internal wall, iv. Lower floor, v. Upper floor, vi. Column structure, vii. Staircase structure, viii. Roof structure, ix. Doors, x. Windows, xi. Roof finishes, xii. Ceiling finishes, xiii. Wall finishes, xiv. Floor finishes, xv. Building services and xvi. Architectural decorations. Collective assessment of these building elements is contributory to the overall judgement of a building. In connecting to this sense, the scale used in heritage impact assessment (HIA) for impact grading of cultural world heritage properties as shown in Table 1 can be useful match in creating a conclusive PCE on the authenticity of historic buildings that have undergone adaptive reuse implementation.

Table 1: Scale on impact grading used to indicate authenticity condition.

Impact Grading	Built Heritage Attributes
Major	Change to key historic building elements that contribute to OUV such that the resource is totally altered. Comprehensive changes to the setting.
Moderate	Changes to many key historic building elements, such that the resource is significantly modified. Changes to the setting of an historic building, such that it is significantly modified.
Minor	Change to key historic building elements, such that the asset is slightly different. Change to setting of an historic building, such that it is noticeably changed.
Negligible	Slight changes to historic building elements or setting that hardly affect it.
No change	No change to fabric or setting.

Source: ICOMOS (2011).

METHODOLOGY

Site inventory was initially performed in George Town WHS to identify buildings that are suitable for accomplishing the objective of the study. Acknowledging that adaptation of historic buildings to museums is the most trending implementation (Mok, 2013) and museum is regarded as the most difficult type of building to be designed and constructed (Cassar, 1994), only historic buildings serving museum function were considered. Purposive sampling was then adopted to refine further the building selection process. Two inclusion criteria namely location and conservation were used for this. The former criterion only considered buildings located within the demarcated Core Zone and Buffer Zone of George Town WHS whereas the latter criterion merely considered buildings of cultural, historical or architectural importance that have undergone adaptive reuse implementation. Then, two exclusion criteria were applied where buildings that were non-operational and not permissible for data collection got excluded from the selection process. In turn, five buildings made into the final list namely the Penang State Museum (PSM), Made in Penang Interactive Museum (MIPIM), Sun Yat Sen Museum (SYSM), Batik Painting Museum (BPM) and Dark Mansion-3D Glow in the Dark Museum (DM) as shown in Figure 2:

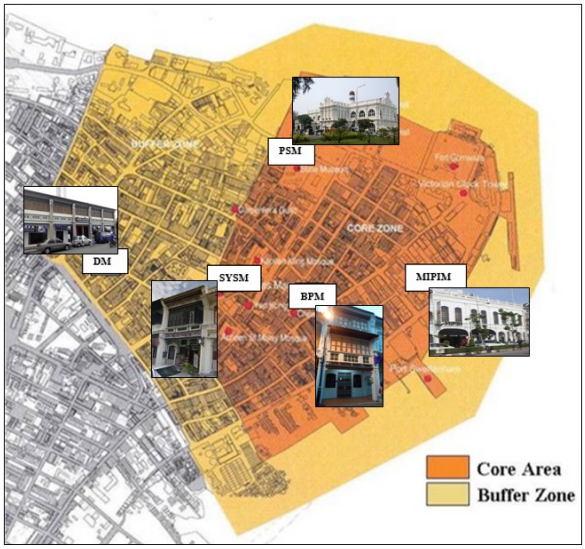

Figure 2: Location of the five shortlisted buildings within George Town WHS.

Field observation was then conducted at PSM, MIPIM, SYSM, BPM and DM. It was done sequentially, starting from PSM to SYSM, BPM, MIPIM and finally DM within a month period collectively. Observation checklist comprising 16 building elements (used as collective indicators to represent the

overall historic building unit) comprising: front façade, external wall, internal wall, lower floor, upper floor, columns structure, staircase structure, roof structure, doors, windows, roof finishes, ceiling finishes, wall finishes, floor finishes, building services, and architectural decorations was used, in line with Ab Wahab's (2013) assessment method.

These elements were individually and sequentially assessed at the five buildings, with the aid of a digital camera as well as a laptop computer for recording and storing both visual and textual data. During the field observation process, dichotomous labels of 'Yes' and 'No' were used to remark the state of authenticity for each building element investigated. The data entry was made on-site using the laptop computer mentioned. In making the judgement of whether each of the building element was authentic or inauthentic, local conservation guidelines as well as the four criteria of authenticity stressed by ICCROM were used as reference. Observation data obtained were then analysed using Ab Wahab's (2013) formula as the following:

$$\frac{Total\ no.of\ authentic\ building\ elements\ (Sum\ of\ indicators\ marked\ 'Yes')}{Total\ no.of\ building\ elements\ (Sum\ of\ all\ indicators\ involved)}\ x\ 100$$

Then, the percentage yielded based on the above formula was used to inform the level of authenticity condition. In line with the five scales of ICOMOS (2011) impact grading, the reference scales used to conclude the overall authenticity condition for individual building are listed in Table 2 as follows:

Table 2: Impact Grading

Reference Scale	**Percentage**
Unsatisfactory	0-19%
Less satisfactory	20-39%
Moderate satisfactory	40-59%
Satisfactory	60-79%
High satisfactory	80-100%

RESULTS AND DISCUSSION

Table 3 presents the results on authenticity condition of the five buildings, categorised into non-shophouse (PSM and MIPIM) and shophouse (BPM, SYSM and DM) buildings. The results are organised to show retention of authenticity condition for each of their building element. The summative score and percentage are used to conclude the authenticity of each building.

Table 3: Results on authenticity condition.

Historic Building Elements		Authenticity Remarks				
		Non- Shophouse Buildings			Shophouse Buildings	
		PSM	**MIPIM**	**SYSM**	**BPM**	**DM**
A.	Front façade	Yes	Yes	Yes	Yes	No
B.	External wall	No	No	Yes	Yes	No
C.	Internal wall	No	No	Yes	No	No
D.	Lower floor	No	Yes	Yes	Yes	No
E.	Upper floor	Yes	No	Yes	No	No
F.	Columns structure	Yes	Yes	Yes	Yes	No
G.	Staircase structure	Yes	Yes	No	Yes	No
H.	Roof structure	Yes	Yes	No	No	Yes
I.	Doors	No	Yes	Yes	Yes	No
J.	Windows	No	No	Yes	Yes	No
K.	Roof finishes	Inaccessible	Inaccessible	Yes	No	Inaccessible
L.	Ceiling finishes	Yes	Yes	Yes	Yes	No
M.	Wall finishes	Yes	No	Yes	Yes	No
N.	Floor finishes	No	Yes	Yes	Yes	No
O.	Building services	No	No	No	Yes	No
P.	Architectural decorations	Yes	Yes	Yes	Yes	Yes
Summative Score and Percentage		08/15 (53%)	09/15 (60%)	13/16 (81%)	12/16 (75%)	02/15 (13%)
Authenticity Condition		Moderate satisfactory	Satisfactory	High satisfactory	Satisfactory	Unsatisfactory

Remarks:
Penang State Museum (PSM), Made in Penang Interactive Museum (MIPIM), Sun Yat Sen Museum (SYSM), Batik Painting Museum (BPM) and Dark Mansion-3D Glow in the Dark Museum (DM)

Comparatively, SYSM recorded the highest percentage (81%) of authenticity condition whereas DM recorded the lowest (13%). These results can be linked with underlying factors such as building ownership, use history, and location. SYSM scored the best authenticity condition because the custodian of this building is a renowned historian who actively advocates for local heritage protection. It is inferred that sentimental value and sense of responsibility are vital factors contributing to the plausible authenticity retention of this SYSM since the building is inherited by the custodian. Apart from that, SYSM is situated in Armenian Street which is within the Core Zone of George Town WHS. This also explains the underlying cause of DM to have the lowest percentage of authenticity condition- associable with its location in Buffer Zone where conservation restrictions are relatively less restrictive. Besides, SYSM merely displays loose exhibitions such as collections of antique furniture and old artefacts hence the least physical intervention required. DM on the other hand has undergone some

degree of physical interventions that were intrusive to its heritage fabric, in accommodating contemporary 3D glow in the dark exhibition. This claim is made based on comparing the current condition of the building against the four criteria of authenticity stressed by ICCROM (1982) which comprised of design, material, workmanship, and setting.

Looking on the categorical comparison, non-shophouse and shophouse buildings equally achieved moderate satisfactory for their authenticity conditions. By their percentage average, non-shophouse buildings (PSM and MIPIM) and shophouse buildings (SYSM, BPM and DM) recorded 56% and 57% respectively, with very slight difference between the two. However, the collective scoring as moderate satisfactory especially for shophouse buildings should be an eye-opener for heritage stakeholders and calls for better conservation measures since George Town WHS heavily depends on the heritage shophouses and townhouses- the building typology being mentioned explicitly in the OUV Criterion IV.

The results can also be significant for discussing elemental authenticity of the buildings. For the case of non-shophouse buildings, six building elements namely the front façade, column structure, staircase structure, roof structure, ceiling finishes and architectural decorations (indicators: A, F, G, H, L and P) were commonly found to be intervened appropriately. On the flipside, four building elements namely the external wall, internal wall, windows and building services (indicators: B, C, J and O) were commonly found to be intervened inappropriately. For the case of shophouse buildings, only one building element namely the architectural decorations (indicator: P) was commonly found to be intervened appropriately. It is in fact the same building element that was found to be intervened appropriately for all the five buildings scrutinised under this study.

Overall, the three building elements that were found to be intervened inappropriately are the internal wall, windows, and building services (indicators: C, J and O). Issues inflicting these three building elements are highlighted in Figure 3, 4 and 5 to show the areas affecting authenticity of historic buildings converted to museums in George Town WHS. Physical interventions made involving the three elements clearly have direct impact on the authenticity condition of adaptive reuse museums, calling for the serious needs of adhering and respecting to design, material, workmanship and setting criteria of authenticity as stressed by ICCROM (1982).

Figure 3: Insensitive installation of partitions, removal of original wall and extensive wall decorations were among the inappropriate physical interventions found involving internal wall element.

Figure 4: Fully enclosed original windows and replacement of non-harmonious modern windows were among the inappropriate physical interventions found on windows element.

Figure 5: Intrusive installations, exposed electrical wiring and improper placement of air-conditioner compressors on building façade were among the inappropriate physical interventions found on building services element.

CONCLUSION

Conversion of historic building to museum through adaptive reuse implementation demands a certain level of physical interventions to be made. Although such requirements are highly necessitated to retrofit museum function within historic building, post-conservation impact in the sense of physical appropriateness of heritage properties within WHS must never be taken for granted for the sake of OUV protection. Changes and modifications committed must not violate the four criteria of authenticity namely design, material, workmanship, and setting. It is hoped that the revelation on the three most affected building elements discovered through this evaluative study will be influential to decision-makers and heritage consultants. The PCE findings of this study can be specifically influential to technical review panels appointed by heritage authorities, in scrutinising HIA reports and evaluating future proposals concerning adaptive reuse projects involving historic buildings within WHS. Future studies can zoom further on the operational methods to re-visit and audit historic buildings that have undergone HIA process, by focusing the impacts at building scale (micro-assessment on individual unit).

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COVID-19 OUTBREAK AND ROLE OF TOURISM DEVELOPMENT ON ECONOMIC GROWTH IN PAKISTAN

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Abstract

The current research aimed to find out the effect of tourism development on economic growth in Pakistan for the period (1995 to 2017) by using Canonical Regression Analysis (CCR) and Dynamic Least Square (DOLS) method. In addition, a unit root test is used to find out the static nature of the variables, and for the robust check, the authors utilize the Fully Modified Least Square (FMOLS) method. The results of the CCR and DOLS shows the key role of tourism development on growth, and FMOLS confirms these findings. In addition, the contribution of financial development is insignificant and positive. However, inflation harms economic growth, which depicts that the government of Pakistan will face severe challenges to achieve the targeted level of growth in future. In addition, an outbreak of Coronavirus Disease (Covid-19) is another challenge that will cause a significant decline in tourism receipts.

Keywords: Covid-19, Tourism Development, Economic Growth, Pakistan

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INTRODUCTION

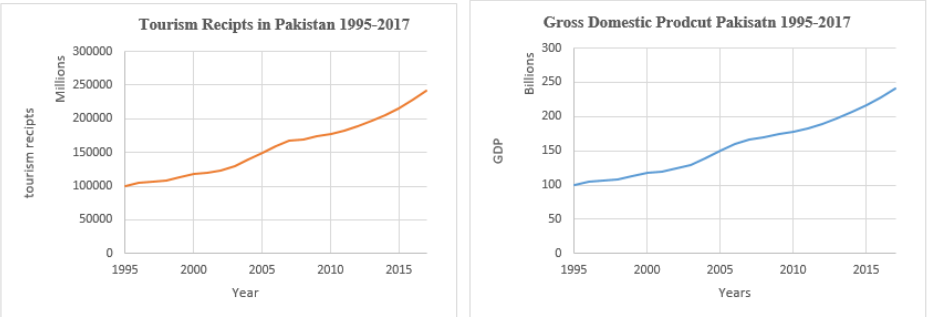
Tourism influences the global economy significantly, and currently, tourism accounts for 10% of the world's GDP and Jobs (WEF, 2020). Tourism expenditure implies the induction of new cash into the country's economic system (Archer & Cooper, 1998; Fletcher, 1994), which has a multiplier effect on the host country's economy. The travel and tourism industry has been boosting up at 4% annually, which is a significantly higher growth rate (WEF, 2015). Tourism has multipliers impact on hotels, wholesalers, restaurants, retail shops, air transport, road transport, labour such as porters, tour guides and hotel managers (Rana, 2015), and it also supports infrastructure development, culture and peace development in a region (Bahuguna, 2005). Tourism can also be counted as an essential element of green economy objectives (UNWTO, 2008). Tourism development increases the income of households, jobs creation in both formal and informal sectors and it also assists the family to come out from the poverty trap and put families on development path (Oh, 2005; Zortuk, 2009). In the rural and mountain regions of the world, tourism is the primary source of households' livelihoods. The flow of tourists in these regions enables the local populace to set up their business and earn their living (Ali and Yousuf 2019; Ali et al., 2017). Such initiative would also lead to women empowerment (Ali et al., 2016). International tourism significantly influences the economic growth of Pakistan (Manzoor et al., 2019; Jalil, Mahmood and Idrees, 2013). Therefore, the objective of the current study is to investigate the relationship between tourism development and economic growth in Pakistan. Moreover, the effects of Covid-19 are also highlighted in the study.

LITERATURE REVIEW

Tourism is one of the world's major economic sectors. It is the third-largest export category after fuels and chemicals in the global economy. For some countries, tourism can represent over 20% of their GDP. Tourism supports and provides livelihoods for millions of people in developing and developed economies. The flow of tourists to tourists' destinations has been increasing significantly over the last five years owing to improve law and situation and tourism-friendly policies of the current government. In the context of Pakistan, according to World Travel and Tourism Council (2018), in 2017, the direct contribution of travel and tourism to Pakistan economy was PKR 930.9 billion, which is 2.9% of the total Gross Domestic Product (GDP) 2017. The council forecasted that the share of contribution of travel and tourism to the GDP of Pakistan will increase 5.8% per annum during the period 2018-2028. In terms of employment generation, travel and tourism directly supported 2.5% (91.49 million jobs) of the total employment of Pakistan in the year 2017, and it remained 2.8% in 2018. It has been forecasted

by 2028 travel and tourism sector will directly generate 2.008 million jobs annually in Pakistan economy.

Figure 1: Trends of Tourism Receipts and GDP in Pakistan



Source: (WDI, 2017)

However, the outbreak of Covid-19 worldwide has severely negative consequences on the travel and tourism sector, and this pandemic has created a state of uncertainty in the world economies. The World Travel and Tourism Council (2020) forecasted that the coronavirus pandemic could reduce fifty million jobs worldwide in the tourism and travel sector. It has also warned that Asia is expected to suffer the most. The international travel industry could be negatively impacted by up to 25% in 2020, equivalent to the loss of three months of travel. Further, once the COVID-19 pandemic is over, it could take up to ten months to recover the travel and tourism industry. According to UNWTO (2020), a 20% to 30% decline in international tourists' arrival is expected in the year 2020, and this could induce a loss to 300 to 450 USD billion in global tourism receipts. COVID-19 is causing disruptions in imports and exports of Pakistan, which could cause a loss of up to 4.64% in GDP (PIDE, 2020).

METHODOLOGY

The study is quantitative; therefore, it used secondary data to determine the relationship between variables. This research investigates the effects and long-run relationship between Pakistan's tourism and economic growth. The proxy for tourism development and growth is a gross domestic product. Similarly, financial development is measured by m2 as a percentage of GDP. Lastly, the annual consumer price index measures the variable control inflation. The research period is 1995 to 2017, and data is acquired from World Development Indicators (WDI). Initially, the researchers utilized the unit root test for exploring the stationary/non-stationary variables to know the order of the integration. Later, Canonical Cointegrating Regression (CCR) and Dynamic Least Squares (DOLS) are utilized to inspect tourism development's influence on economic growth.

Lastly, for robustness check, the Fully Modified Least Square Method (FMOLS) is employed and the data is processed in E-Views 10.

The proposed regression model is given below;

$$growth_{i,t} = \beta o + \beta 1[tourism]t + \beta 2[conditioningset]i,t + uit \quad (1)$$

Where, inflation (inflat) and financial development (findev) are control variables in the research

$$growtht = o + tourism + findev + inflat + \quad (2)$$

ANALYSIS AND FINDING

The average of tourism receipts is 20.46% with a maximum of 20.84% and the minimum tourism receipt is 20.59%. Similarly, during the study period, the maximum inflation is 20.29% and the minimum inflation is 2.53%. On the other hand, the probability value of Jarque-Bera is more than 0.05 which shows that variables; growth, tourism, find and inflate are normally distributed (Table 1).

Table 1: Descriptive Statistics

	growth	*toursim*	*findev*	*inflat*
Mean	25.74643	20.45748	49.80920	8.038529
Median	25.79378	20.59430	49.86215	7.598684
Maximum	26.20747	20.84283	58.86769	20.28612
Minimum	25.32990	20.01399	38.59470	2.529328
Std. Dev.	0.273389	0.262787	5.356454	4.471212
Skewness	0.008141	-0.318666	-0.266924	0.845179
Kurtosis	1.708681	1.499624	2.478470	3.457656
Jarque-Bera	1.598279	2.546599	0.533780	2.938977
Probability	0.449716	0.279907	0.765757	0.230043
Sum	592.1679	470.5220	1145.612	
Sum Sq. Dev.	1.644317	1.519256	631.2151	
Observations	23	23	23	23

Source: Authors 2021

Canonical Regression Analysis (CCR) shows that tourism receipts have a significant and positive contribution to economic growth in Pakistan which matches the findings of (Jalil, Mahmood, & Idrees (2013); Adnan Hye & Khan (2013) and Khalil, Kakar & Malik (2007). Results revealed that a 1 % increase in tourism receipts enhances growth by 1.02 % in Pakistan, however, the lockdown of the economies around the globe due to Covid-19 significantly reduce the tourism receipts, which would reduce the growth further (Table 2). Moreover, the

impression of financial development on growth is positive and insignificant. While, inflation is retarding economic growth similar to the studies of (Barro, 1995; Andres & Hernando, 1997; Stockman, 1981) which indicate that in the upcoming year's government, could not able to achieve the desired growth in Pakistan.

The recent lock has created demand-pull inflation on one hand and the other hand supply pulls inflation is also expected in the economy due to hoarding for-profit motive.

Table 2: Estimation Results

	Canonical Cointegrating Regression (CCR)			Dynamic Least Squares (DOLS)		
Variables	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
toursim	1.020357	7.164756	0.0000	0.971283	5.306179	0.0011
findev	0.008681	1.254267	0.2258	0.009845	1.083376	0.3145
inflat	-0.032048	-5.734382	0.0000	-0.028160	-3.003997	0.0198
R-square		0.868467			0.988395	

Source: Authors, 2021

Similar results are obtained from DOLS, where tourism receipts enhance growth significantly and positively. An increase of 1% in tourism receipts will increase the growth by 0.97 %, which is almost close to the findings of CCR. At the same time, financial development has positive but insignificant, and the influence of inflation on economic growth is positive and significant. The research findings show the long-run association between tourism and growth and contribution of tourism is significant and positive. Similarly to the earlier results, an increase of 1 % in tourism receipts in Pakistan will enhance the economic growth by 1.04 % (Table 3). In line with former studies, inflation is unsuitable for economic growth, which needs to be controlled for long-run growth. Lastly, the effect of financial development is insignificant and positive in contrast to the studies of (Schumpeter 1911; Goldsmith, 1969; Beck & Levine, 2004; Jalil & Ma, 2008). The study of (Mhadhbi 2014) also shows the absence of the role of financial development in growth.

Table 3: Robust Analysis

Variables	Coefficient	t-Statistic	Prob.
toursim	1.042685	7.680174	0.0000
findev	0.006763	1.115303	0.2794
inflat	-0.030737	-5.749027	0.0000
R-square		0.876766	

Source: Authors, 2021

CONCLUSION

FMOLS method for robustness check is employed, and outcomes of the Canonical Regression Analysis (CCR) reveal the significant impact on economic growth but due to continued lockdown due to Covid outbreak substantially reduced the tourist arrivals in the international market which directly affected the tourism receipts. During the lockdown, all modes of transportation were not in operation; including the domestic flights and international flights, railway service, bus, truck, and vehicles transports, entire educational, business, sports and religious institutions were closed, and human resources working to the tourism and transportation industries were also to face the worst situations. Additionally, since growth is directly related to financial development but inflation in the national economy hinders the overall increase in economic activities, which indicates a problematic situation for the government to maintain a desirable economic growth in Pakistan. Moreover, the Covid case has created demand-pull inflation is predicted in the national economy. Although international tourism badly affected Pakistan, domestic tourism increased significantly in Pakistan, especially in the northern part. As per the government of Gilgit-Baltistan, around 1.379 million domestic tourists visited the northern mountainous region, which becomes almost equal to the population of the entire Gilgit-Baltistan, which needed to be treated as sustainable tourism development.

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BEST PRACTICES AMONGST TOUR OPERATORS ON ENVIRONMENTAL MANAGEMENT IN PULAU PAYAR

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Abstract

A beautiful island, pristine natural environment and abundant marine biodiversity essentially attract segmented tourists to visit marine parks in Malaysia. The marine protected areas (MPAs) in Malaysia are bound to comply with the regulations and guidelines in ensuring the sustainability of the marine ecosystem. However, studies focusing on environmental best practices amongst tour operators in MPAs are limited. Hence, this study attempts to examine environmental management practices amongst the tour operators in Pulau Payar. A qualitative method was adopted using observation and a semi-structured interview with registered tour operators in the designated area. Fifteen respondents participated in the interview. Based on thematic analysis, this study revealed that the tour operators' operating services in Pulau Payar had implemented best practices on environmental approaches using the following: Educate Visitors on Environmental Awareness (1), Using Environmentally Friendly Equipment (2) Conservation Efforts (3) and Waste Management and Amenities (4). In addition, the findings showed that the tour operators play an essential role in educating the tourists and role models to protect the environment.

***Keywords**:* Best Practices, Marine Park, Tour Operator, Environmental Management, Tourism Attraction

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INTRODUCTION

The emergence of ecotourism attractions in beautiful islands and protected marine areas had attracted eco-tourists and other segmented tourists. Tourism Malaysia (2020) reported that domestic travellers prefer islands and beach attractions, accounting for 68.6% of the 12,281 respondents. A marine park that is essentially rich in biodiversity and beautiful coral provides a niche tourism segment market. Establishing a marine protected area (MPA) or marine park is an essential strategy in protecting and maintaining a sustainable ecosystem. MPA is defined as any intertidal or sub-tidal terrain area, together with its overlying water and associated flora, fauna and historical and cultural features, reserved by law or other effective means to protect part of the entire enclosed environment (IUCN, 2009). One of the significant threats in MPA is poor management, which led to degradation of the coastal ecosystem because of untreated water, domestic waste management and waste from tourism activities (Plumpton, 2015). In addition, dive tourism and water sports activities have posed threats to the marine ecosystem caused by anchor damage to the seabed and trampling and touching of coral reefs and marine wildlife (Asian Development Bank, 2014). Conserving the protected areas highly depends on effective environmental management by the stakeholders in the respective areas (Pimid et al., 2020). However, ensuring the sustainability of the ecosystem has many challenges. Internal parties are often those that are directly involved on-site, such as residents, resort and chalet owners, scuba diving operators, and boat service operators(Mohd Nasir et al., 2017). Ultimately, tour operators play an essential role in protecting the natural environment. This study examines the best practices amongst the tour operators on environmental management in their service operation in Pulau Payar.

LITERATURE REVIEW

MPAs in Malaysia

Malaysia has established 53 coral reef MPAs, including 42 coral reef MPAs in Peninsular Malaysia by the Department of Marine Park Malaysia (DMPM). The Department of Marine Park governs all the activities related to coral reefs and tourism activities, whereas the Ministry of Fisheries governs all activities related to fisheries beyond the MPA water area. Fisheries Act 1985 provides the minister's powers to establish any area or part of an area in Malaysian fisheries waters as a marine park or a marine reserve. In addition, section 2(2) of the 1994 order establishes a marine park at two nautical miles seaward from the island's outermost point measured at a low watermark. Sections 43, 44 and 45 of the Fisheries Act 1985 stated that fishing, taking of aquatic animal or aquatic plants, collecting corals, constructing any structure, anchorage of any vessel and destroying any object in the marine parks without any Director–General's prior written permission are an offence (FAO, 1994). The DMPM took the initiative to

collaborate with the Reef-World Foundation under the United Nations Environment Programme in protecting the coral reefs (Marine Park Department, 2020). The tour operator's operations are subject to the Marine Parks Department designated guidelines, and they are seen as ambassadors to protect and foster a sustainable tourism destination by adopting environmentally friendly guidelines (Marine Park Department, 2020). Mohd Nasir et al. (2017) stated that the key stakeholders' roles should be recognised, and their service delivery should be improved, with the local participation in the management of coastal marine resources.

International Regulation and Codes of Conduct (COCs)

International Regulation and COCs International Coral Reef Action Network (ICRAN) were established in 2000 under the United Nations Foundation (UNF). 'A Practical Guide of Good Practice' booklet and 'Marine Recreation Checklist' serve as guidance to assist businesses on environmental practices. In addition, the guideline offers the rationale and recommendations for essential practices in mitigating the effects on the marine ecosystem (ICRAN, 2012). Furthermore, UNEP and Reef-World expand the best practices in Asia by establishing a programme known as Green Fins. The programme aims to promote environmentally friendly practices in the marine park for tour operators and visitors, particularly in Asian regions. In addition, the programme allows tour operators to participate in coral reef monitoring, conservation and management (Hunt et al., 2013). The Green Fins programme was initiated in Malaysia in 2008 under the responsibility of the Marine Park Department. Green Fins has provided guidelines for tour operators, and they must strictly follow those guidelines in their daily operations (Marine Park Department, 2020).

Environmental Practices in MPA

Environmental management emphasises resolving practical issues that arise when humans coexist with nature, resource exploitation and waste production (National Environment Commission, 2011). Environmental management includes enforcing carrying capacity and restricting hazardous activities in protected and zoning areas for specific user activities (J. Day et al., 2019; J. C. Day et al., 2015; Laffoley et al., 2018). As outlined by Orams (1999), management guidelines can be categorised into four strategies: (1) physical, (2) regulatory, (3) economic and (4) education. Physical management strategies include infrastructure for sustainable operation in the coastal area.

The regulation emphasises education management strategies to control any misconduct by human activities in the marine park and encourage voluntary behaviour change. Therefore, educational management strategies provide a beneficial situation for marine park management and tourists (J. C. Day et al., 2015; Laffoley et al., 2018). Hunt et al. (2013) noted that enhanced knowledge

amongst dive guides, recreational divers and snorkelers is a critical element in ensuring environmental sustainability for diving operations (Dearden et al., 2007; Hasler & Ott, 2008). Ordoñez and Serrat (2017) stated that the dissemination of information is the distribution of conveying knowledge to intended audiences to effect change. In addition, dive guides play an essential role in advising misconduct behaviour amongst divers to minimise contact on the reef (Hunt et al., 2013; Roche et al., 2016). Regulations and enforcement aim to manage visitors' activities in a destination, specifically in protected areas. For example, in MPAs, respective authorities regulate visitor activities, such as collecting sea life, stepping on corals, fish feeding, littering and fishing within designated areas (J. C. Day et al., 2015; Giglio et al., 2015; Wiener et al., 2009). Amongst other marine activities that may contribute to corals' degradation is the usage of fins by snorkelers. Corals and other reef species are usually damaged by inexperienced snorkelers using fins, tools or body contact (ICRAN, 2012).

One of the approaches is public and private partnerships by promoting best practices in MPA for better sustainable on-site management and operations. For example, the Green Fins programme suggests engaging the dive tourism industry and other related stakeholders to educate, facilitate and improve mutual efforts concerning coral reef sustainability (Hunt et al., 2013). For example, in Hawaii, several public volunteers and paid project activities are available for tourists and tour operators, such as whale monitoring, fish counts, beach clean-ups and charitable donations (Wiener, 2009).

Other significant issues in a marine environment that constantly attracted environmental organisations and researchers' attention are solid waste and sewage management (Gerungan & Chia, 2020; ICRAN, 2012; Lucrezi & Saayman, 2017). The trash and sewage problem is severe on islands because of a lack of treatment facilities (Dimopoulos et al., 2019; Kossmann, 2015). Gerungan and Chia (2020) posited that the sewage from the pontoon may destroy corals when released directly into the sea. Therefore, sewage disposal must be managed and channel to a certified treatment plant. Furthermore, toilets must not discharge untreated wastewater directly into the sea or freshwater areas or near sensitive regions (ICRAN, 2012; The Foundation for Environmental Education (FEE), 2018).

Background of Pulau Payar

Pulau Payar Marine Park is approximately 19 nautical miles south of Pulau Langkawi, 32 nautical miles north of Penang and 15 nautical miles west of Kuala Kedah. The Marine Park consists of four islands, namely, Pulau Payar, Pulau Kaca, Pulau Lembu and Pulau Segantang. Pulau Payar has four sandy beaches with nearly 200 m in length. Pulau Payar gained attention amongst tour operators for scuba diving, snorkelling, swimming and picnic activities because of its beautiful sandy beach and coral reef area. Decent public facilities, such as a

gazebo, public jetty and toilets, are provided for the visitors. In addition, various dive sites with unique features can be explored by divers, such as Grouper Farm, Japanese Garden, Garden Reefs and Platform Reefs.

Figure 1 : Location of Marine Park, Pulau Payar , Langkawi Island
Source: m.naturallylangkawi.my (2012) & Marine Park Malaysia Malaysia, (2020)

METHODOLOGY

This research adopted a qualitative method by using a semi-structured interview is adopted to interview 15 respondents from three tour operators; i. Langkawi Saga and Langkawi Ferry Services; ii. East Marine Holidays; iii. Eko Megah Holidays. This study adopted purposive sampling using the qualitative method. A quota sampling is used in selecting the potential respondent. The criteria for recruiting the respondents are based on those registered with the Marine Parks Department of Malaysia and Green Fins Malaysia. The respondents include officers from Marine Park Department (R1,R2), Operators Managers, Boat Captains, Supervisors, Dive Masters and Customer Service Crews (R3 -R15). The interview questions are developed by adapting works of Wiener (2009), Green Fins (2004) and ICRAN (2012). The data collection was carried out for one month. The case study area is within the Langkawi Coral's platform, beach area, Marine Park centre and two (2) dive sites, namely, Coral Garden and Pulau Kaca. Fifteen respondents agreed to participate in this research. The responses were transcribed and analysed using thematic analysis. All interviews were conducted face to face, which took approximately 45 minutes per session.

RESULT AND DISCUSSION

OPERATING SERVICE GUIDELINES AND PROCEDURES

Based on the inventory checklist, all the tour operators complied with the regulation except for one tour operator did not showcase the green fin mission statement for public view. Displaying the mission statement for the tourists

viewing is essential as listed in the best practice's guidelines and inventory checklist by the Green Fins programme. The regulation should be presented in written materials or oral notices. Two tour operators display the mission statement on the pontoon's counter and their ferries, but the Mission Statement size and placement seem to be not strategically for public viewing. Thus, Marine Park Department or Green Fins must clearly outline the mission statement's size that needs to be presented and visible for people to read. The only measure that all tour operators did not abide is distribute environmental awareness written materials, such as brochures or flyers. However, the tour operator had provided oral communication in educating the tourists. According to the ICRAN (2012), anchors for mooring commercial and recreational vessels cause substantial harm to the marine ecosystem. As shown in Table 1 (No. 5), the result shows that all tour operators complied with the guidelines using the mooring buoys and drifting techniques in their operations. Furthermore, all tour operators' boats drop off their divers at the dive location using the drifting technique whilst waiting for each diver turn. Thus, this observation shows that the tour operators comply with the guidelines provided by using designated buoys, drifting techniques and pontoon installations that will adequately protect coral reefs and other aquatic life.

Table 1: Marine Tour Operators Inventory (COC)

NO	ITEMS	Operator 1		Operator 2		Operator 3	
		YES	NO	YES	NO	YES	NO
1	Adopt the GREEN FINS mission statement	/		/			/
2	Display the GREEN FINS agreement for public view.	/		/			/
3	Practice and promote the best practices diving and snorkelling and act as responsible role models for guests	/		/		/	
4	Onboard toilets	/		/		/	
5	Actively use moorings, drift or hand place anchors for boats	/		/		/	
6	Prohibit the sale or display of corals, shells and other marine life	/		/		/	
7	Provide adequate trash facilities onboard your vessel and dispose of all waste responsibly	/		/		/	
8	Operate under a 'minimum discharge' policy	/		/		/	
9	Abide by all local, regional, national and international	/		/		/	

	environmental laws, regulations and customs						
10	No to fish feeding	/		/		/	
11	Provide life jacket whilst snorkelling	/		/		/	
12	Explaining to guests the best practices in pre-dive briefings	/		/		/	
13	Provide training, briefings, talks or information to help employees and guests understand good environmental practices for marine tourism activities	/		/		/	
14	Provide environmental materials (e.g. ID books, educational posters) for the staff and guests to read		/		/		/
15	Promote strict 'NO TOUCH' policy for all diving and snorkelling activities	/		/		/	

Based on the semi-structured interview, the tour operators had adopted Educate Visitors on Environmental Awareness (1), Using Environmentally Friendly Equipment (2) Conservation Efforts (3) and Waste Management and Amenities (4). The themes and codes were extracted based on the responses from the interviews.

THEME 1: Educate Visitors on Environmental Awareness

Code 1: Briefing on Environmental Awareness

The operators should practice and encourage environmentally friendly diving and snorkelling practices. Previous research revealed that pre-dive briefing is one of the environmental managements that significantly reduces damage in corals (Hunt et al., 2013; Mendes, 2008). During the observation, all the tour operators implemented best practices in a pre-briefing on environmental awareness. The contents of the pre-briefing are also relatively consistent to all tour operators. The briefing focused on COCs in the protected areas, no-touch policy, no-fish feeding, and others related to environmental awareness. Pre-briefing will create awareness and eventually leads the tourists to be more responsible to engage in marine activities. The tour operators' crews (R5, R8 & R15) conducted their briefing on environmental awareness, such as discouraging the selling and buying of shells and other aquatic species and touching and stepping corals. The crews will provide oral guidance to tourists if they violate the rules in ensuring that tourists adhere to the COC. A tour operator manager (R3) states that *'tourists want the guidance; they feel self-conscious about destroying the reef, but do not know how to avoid bad behavior unless they are told'*. Constant observation and reprimands

by the crews will ensure that tourists adhere to the guidelines throughout the activity. Information dissemination is the collaborative process of conveying knowledge to intended audiences to effect changes and create awareness in protected areas (Ordoñez & Serrat, 2017). Wiener (2009) mentioned that a few companies offered pamphlets, photo identification books or other materials onboard the boats for the tourist to read to have initial ideas on the dos and don'ts of activities engaged in the marine environment.

Code 2: Audio Visual Tool in Delivering Information of Environment Importance

The tour operators did not provide any printed materials, such as fish identification manuals and pamphlets for the crew members and visitors reading resources to equip them with essential knowledge on the environmental best practices. For example, the interpretation of the COCs in the Marine Park, which are generally practised onboard and during pre-activity briefings, was seen on audio-visuals. Therefore, the approach that they used is more towards audio-visual, which is more sustainable friendly. The divemaster or crew provides images or videos of the dive site and any marine animals they could encounter and remind them to abide by the best environmentally friendly diving. According to R15, *"We only remind the tourists and staff regarding the impact and prohibition of human contact with marine environment during the briefing session. No printed material available."*

THEME 2: ENVIRONMENTALLY FRIENDLY EQUIPMENT

Code 1: Prohibiting non friendly equipment

Corals and other reef species are frequently crushed and broken by irresponsible or inexperienced snorkelers using fins, tools and body parts (ICRAN, 2012). Hence, flippers (fins) are not allowed to be used inside the marine park, according to the Green Fins' COC. According to R1, before prohibiting using flippers in the marine park, most snorkelers were damaging the corals because they were inexperienced, except for divers. Both operators were observed adhering to the law by prohibiting snorkelers from wearing flippers, except for the diving activity.

THEME 3: CONSERVATION EFFORTS

Code 1: Conservation Programme

One of the approaches Green Fins seeks is to engage the dive tourism industry and other related local stakeholders to educate, facilitate and improve mutual efforts concerning coral reef sustainability (Hunt et al., 2013). One of the COCs listed is the participation of tour operators in beach and underwater clean-up events. Thus, from interview sessions with several crew members (R3, R7, R8, R9, R14 & R10), the researcher discovered that the three tour operators were

engaged in several conservation programmes, including beach and coral reef cleaning, such as restoration, beach and reef cleaning programmes on Pulau Payar.

Code 2: Demonstrate as a role model

Demonstrating essential behaviour during the diving activity by a dive guide could further decrease reef contacts by other divers (Hammerton, 2017; Roche et al., 2016). Thus, during the diving session, the divemaster made an effort to pick up waste, such as plastic and snorkel tubes from the underwaters. During study at the site, the researcher noticed that one of the operator's crew members had taken the initiative to clean up floating garbage and solid waste, such as disposable bottles, on the shore and in the water, demonstrating that the crews serve as responsible role models for the visitors. R13 mentioned that, *"Everyone in the operations as well tourists have not seen selling or buying of any marine life during their stay at Payar Island."*

THEME 4: WASTE MANAGEMENT AND AMENITIES

Code 1: Waste Management System on Vessel and Designated Area

According to Gerungan and Chia, (2020) and ICRAN (2012), the trash in the ocean can entangle, entrap and be consumed by marine animals and destroys coral colonies. Based on the observation at the study site, the researcher has identified that the garbage facilities are available on the pontoon and the main beach areas. According to R1 from Marine Park Department, an incinerator is applied to the disposal of biodegradable solid waste on individual islands, which can be easily disposed of by combustion or through high-heat methods. However, because of the high maintenance cost, the incinerator was no longer in service. According to R3, the collected rubbish was kept in waste bags and disposed of at designated areas on the mainland. The responsible practice in managing the waste revealed that tour operators and the Marine Park Department have provided adequate facilities and taken initiatives to guide tourists to maintain the cleanliness of marine park areas. In the ferry facility, they are using type three (III) marine sanitation systems, and typically, a storage tank stores waste until it is disposable at sea or the shore side (beyond three (3) miles from shore).

Code 2: Amenities at Designated Area

Human wastes contain nutrients, parasites and viruses that may lead to disease and algal bloom in the marine ecosystem of the near-shore areas (ICRAN, 2012). Toilet facilities are available on each tour operators' ferries equipped with sewage holding systems in the observation. According to the Marine Department of Malaysia, sewage on each ferry will be discharged according to regulations as follows: '*the discharge of sewage into the sea is prohibited, except when: the ship is discharging communicated and disinfected sewage at more than three nautical*

miles from the nearest land. The same approach adopted in MPA in ensuring sewage which is not disinfected at more than twelve nautical miles from the nearest land, the sewage that has been stored in holding tanks shall not be discharged instantaneously, but a moderate rate when the ship is en route at not less than 4 knots; the rate of discharge shall be approved by the Director of Marine. The Department of Marine Parks provides a public toilet located on the main beach, but the water supply is minimal. Toilets are typically attached to a waste management plant that can substantially limit untreated sewage or wastewater drainage at sea. The toilets are attached to Individual Septic Tanks in Pulau Payar and connected to the main sewage treatment plant. The residual 'sludge' will be pumped out for a specific time by a designated vessel to transport the sewage, usually every two to five years.

CONCLUSION

In conclusion, the tour operators are fully aware of environmental practices and COCs. The findings showed that the tour operators play an essential role in educating the tourists and acting as role models to protect the environment. The roles of tour operators are essential in ensuring the implementation of COC as they deal directly with visitors and the marine environment. As shown in this study, tour operators adhere to the COC responsibly and comply with International and Malaysian regulations in sustaining the environment. However, some tour operators are not aware of the importance of the mission statement and agreement that may increase the awareness amongst the tourists. Collaboration and partnership amongst key stakeholders, namely, Marine Park Department, Fisheries Department, tour operators and visitors, will benefit the sustainability of the environment and resources for the tourism industry.

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SYSTEMATIC INVENTORY FOR HERITAGE SHOPHOUSE FACADES IN IPOH, PERAK, MALAYSIA

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Abstract

Nowadays, many heritage shophouses remain intact in major urban areas in Malaysia, including Ipoh, Perak. These architectural assets are significant as they portray the glory and achievements of Ipoh over the centuries. However, some shophouses face inappropriate façade changes due to improper conservation activities performed on the heritage properties. These situations have resulted in the phenomenon of inconsistency elements of building facades. Therefore, this paper focuses on two aspects regarding heritage shophouse facades; first, developing the taxonomy of architectural styles according to the tangible elements, and second, classifying and grading the architectural styles. Then, an inventory form named eFakad was developed as a tool to evaluate 65 shophouses at Jalan Sultan Iskandar, Ipoh. The result shows that 49% of facades are in excellent condition, but the rest of the facades need to be conserved and maintained, particularly roof finishes, windows and doors. By applying eFakad inventory form, the documentation and conservation management of the heritage shophouses can be done systematically. Consequently, the stakeholders will be aware of the main problems faced by the heritage shophouses through the inventory record and appropriate actions can be taken in preserving the integrity of the facades. Additionally, the local authority may use the information to improve the existing conservation guidelines.

***Keywords**:* Heritage shophouse, façade, architectural styles, inventory, grading

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INTRODUCTION

The conservation of heritage buildings requires strong desire and dedication to preserve their cultural, historical and architectural significance so that they can serve as part of the economic indicator (Nur Shahirah & Junainah, 2021). Conservation embraces all acts that extend the life and basic functions of buildings (Arazi et al., 2010; Fielden, 2003) from being destroyed or changed in an inappropriate manner (A. Ghafar, 1997) and involves minimal intervention approaches (Tan et al., 2016). For decades, modernisation has caused the demolition of heritage buildings for urban renewal projects (Karam et al., 2017), unequivocal process of gentrification and regeneration (Pheng et al., 2014) which compel heritage shop owners to maintain the aesthetic and economic balance of the buildings (Zalina & Rodzyah, 2012) and subsequently losing their sense of place (Nur Raqena et al., 2020). Consequently, the vestiges of facades have disappeared gradually (Ju & Saari, 2010). New and old façades are sandwiched in between buildings (Shahrul et al., 2013). Some of the old buildings were left neglected, abandoned, dilapidated (Tan et al., 2016), in a state of neglect (Ummu Liyana & Noordeyana, 2021), and deterioration (Robiah & A. Ghafar, 2011) due to poor maintenance management (Arazi et al., 2010).

According to Toong and Utaberta (2015), there is an increasing number of interventions on the elements of building façades that ignore the architectural characteristics (Noorfadhilah & Shamzani, 2012; Tan, 2014; Shuhana et al., 2012, Pheng, 2014; Nur Farhana et al., 2017) due to improper activities performed on the façades and failure of following the correct rules during renovation (Omar & Muna Hanim, 2016; Karam et al., 2017; Toong & Utaberta, 2015). The situation has created a phenomenon of inconsistency among the elements of building façades that caused visual problems and has negatively impacted the historical images and identity of the place (Omar & Muna Hanim, 2016). The situation happens due to the absence of guidelines regarding the façade's design (Wan Hashimah & Shuhana, 2005), lack of technical information (Tan et al., 2016) and knowledge in building conservation. Other issues that need to be highlighted are lack of inventory (Omar and Muna Hanim, 2016) and recorded data which can be understood and kept comprehensively (Tan & Fujita, 2014). Hassani (2015) stated that any conservation project needs to be understood and data about the current physical condition of the object should be recorded before any action and intervention that might change the object are carried out. Furthermore, cultural heritage is ageing and there is no guarantee the heritage will last. Thus, the shophouses should be well documented since the data may be useful in the future for conservation purposes.

One of the most crucial parts of an inventory is classifying the architectural styles of the façades. What parameters and formulas can be used to classify the architectural styles of facades, particularly in Ipoh? Thus, this research aims to answer this question and develop a tool that includes a taxonomy

matrix of architectural styles as the parameter for classifying and grading the architectural styles of heritage shophouse facades in Ipoh for a systematic inventory, planning permission and documentation purposes.

RESEARCH BACKGROUND

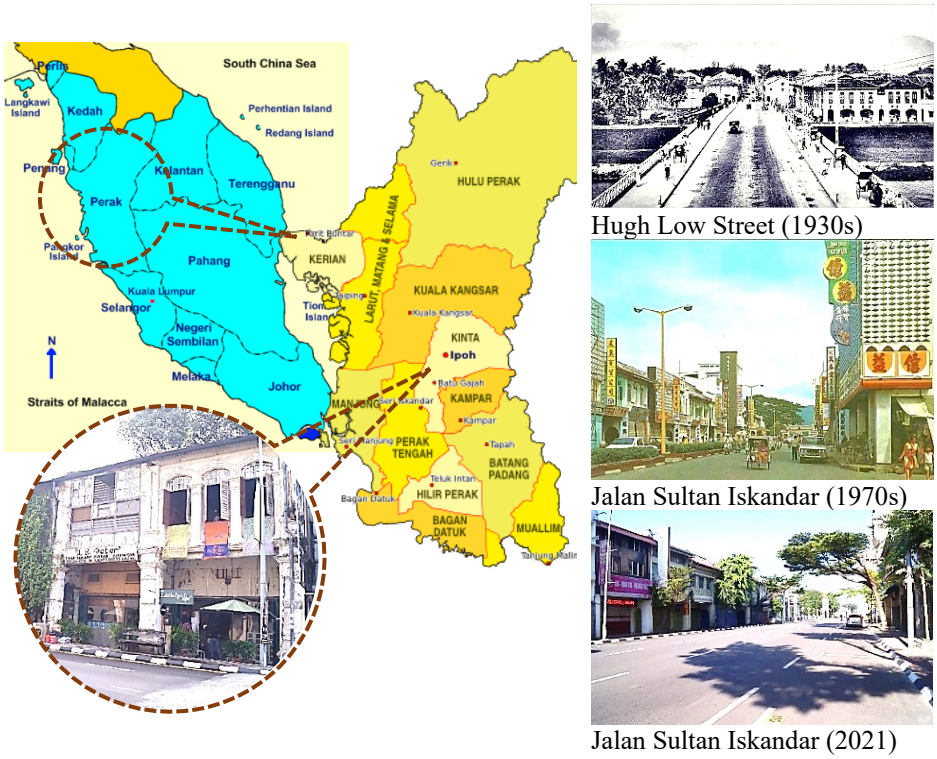


Figure 1: Heritage area of Ipoh, Perak.

Ipoh is the capital city and the administrative centre for the state of Perak Darul Ridzuan. It is located at the North of Peninsular Malaysia, approximately 200km from Kuala Lumpur (Refer to Figure 1). The city was founded in 1874 with approximately 100 attap houses and a small market. However, in 1892, a great fire broke out and destroyed most houses (Hin et al., 2013). The town then was rebuilt with brick buildings and shophouses that became the architectural asset of Ipoh. The shophouses are unique as they reflect various architectural styles from the early 1880s to the 1970s. In 1988, Ipoh was granted city status by the Sultan of Perak. On 18th December 2014 due to the provision of Town and Country Planning Act (Act 172), approximately 183.2 hectares of Ipoh City which consists of Core Zone (79.70 hectares) and Buffer

Zone (175.50 hectares), has been gazetted as Heritage Area (Ipoh City Council, 2014). Thus, 1,022 shophouses in the core zone have been listed to be preserved and conserved according to conservation principles. This research focuses on rows of shophouses at Jalan Sultan Iskandar, previously known as Hugh Low Street (Refer to Figure 1), which are very significant in the development of Ipoh.

LITERATURE REVIEW

Heritage shophouses

A shophouse is usually listed in the category of mixed-use and commercial buildings. Gurstein (1990) stated that, due to its double function as residential on the upper floor and business on the ground floor, the shophouse classification is inclined towards the mixed-use category. Nowadays, most heritage shophouses are no longer occupied for residential purposes. Thus, commercial use is more appropriate. This long-narrow building consists of a façade, commercial area, air-well, dining area, kitchen, and bedroom on the upper floor. The most significant element is the design of the front façade as a medium to convey the era when it was built and the building's function. The heritage shophouse façade, therefore, is defined as a building element facing the street consisting of structural, enclosure, opening, fenestration and ornamentation (Burden, 1996, 2003; Wooi, 2015; Curl, 2006; Ahmad Sanusi and Shaiful Rizal, 2012).

Architectural styles of façade

Special Area Plan of Ipoh 2020 (Ipoh City Council, 2014) has recorded that 1,022 heritage shophouses in Ipoh have six major architectural styles: Transitional, Eclectic, Neo-Classical, Art Deco, and Early Modern and Modern spanning over a period from the 1880s until the 1970s. The architectural styles' typology and characteristics for nine (9) tangible elements of facade are illustrated and listed in Table 1. The tangible elements include; structural (beam and column), enclosure (roof and external wall), and opening (door, window and air vent), fenestration and ornamentation. These tangible elements are the parameters for the indicator in classifying the styles and grading the integrity level of the façades.

Table 1: Taxonomy matrix of architectural characteristics for heritage shophouse facades at Ipoh.

	Traditional			**Modern**	
Transitional (1890-1900s)	Eclectic (1890-1950s)	Neo-Classical (1880-1920s)	Art Deco (1925-1950s)	Early Modern (1940-1970s)	Modern (1970s)

Traditional		
Transitional	**Eclectic**	**Neo-Classical**
Used of timber for the upper floor beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles. Wall is painted in pastel or white finishing. Some shophouses use timber wall at the upper floor. The door is two timber shutters, or vertical timber or metal folding panelling. Transoms light or fanlight infilled with glass, often combined timber carved or radiating bars. Two or three bay windows full-length shutters at the upper floor. Top part shutters has louvres, bottom part is a flat panel. Architrave framed the window openings sometimes with a keystone at the top. Some of the facades have full-width timber louvred shutters. Timber or steel lattice above door height along the wall at the ground floor for natural ventilation. Simple design with minimal ornamentation.	Used of timber for the upper floor beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles. Bright colour painted on the wall. The door is two timber shutters, or vertical timber or metal folding panelling. Transoms light or fanlight infilled with glass are often combined timber carved. Two or three bay windows full-length shutters at the upper floor. Top part shutters has louvres, bottom part is a flat panel. Pilasters and architrave framed the window openings. Decorative plasterworks of flora motifs with various ethnic tradition influence.	Used of timber for the upper floor beam. Engaged column at the upper façade and free-standing column below. Cornice at the parapet, upper floor beam and column. Dentil below the beam cornice. Adaptation of Classical order such as fluted columns or pilasters. Pitch roof hidden behind parapet or a Grecian pediment. Wall is painted in pastel or white finishing. The door is vertical timber or metal folding panelling. Transoms light infilled with glass. Two or three bay windows full-length shutters at the upper floor. Top part shutters has louvres and sometimes infill with glass, bottom part is a flat panel. Architrave framed the window openings with a keystone at the top.

Cont'…

…Cont'd

Art Deco	Modern Early Modern	Modern
Reinforce concrete beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles sometimes hidden behind high pediment or parapet wall. Granulated render known as Shanghai plaster applied on wall. Door is timber or metal folding panelling. Metal frame windows infilled with glass. Concrete shading devices above the window frame. Concrete air vent slots at the upper floor facade. Windows are arranged in group typically three sets. Geometric design highlights straight lines or forms arranged either vertically or horizontally. Flagpoles and relief writing date of building construction on the facade.	Reinforce concrete beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles sometimes hidden behind parapet wall. Painted in shade colour or white finishing. Door is metal folding panelling. Two or three bays windows, used of glass and steel framework and sometimes with glass louvres. Horizontal and vertical reinforced concrete shading fin. Various shape of concrete air vent slots at the upper floor. Relief writing date of building construction on the facade. Devoid any decoration and craftsmanship.	Reinforce concrete for the upper floor beam. Five-foot walkway sometimes built without columns. Some building exceeds two storeys height. Flat roof is hidden behind the parapet wall. Common used of wall tiles. Metal folding panelling door for ground floor access and single-leaf door for upper floor access. Large glass window with steel frame. Front façade usually built without vent hole. Windows are arranged in group. Geometric design in cuboidal form. Devoid any decoration and craftsmanship.

Heritage Building Inventory

Developing an inventory is part of the process of preserving heritage buildings and cultural landscapes because identification and documentation are the first steps towards preservation (Thornes, 1992). Thus, the Special Area Plan of Ipoh City (2014) documentation was prepared to create an urban design that combines urban development and the conservation of heritage buildings. One of the important tasks stated in the report is that there is a need to prepare an inventory of heritage buildings to be used as the primary reference in; i) Planning and building control, ii) Preserving significant heritage buildings, iii) Mapping the history of the building and the area, and iv) Preserving cultural heritage and urban activities.

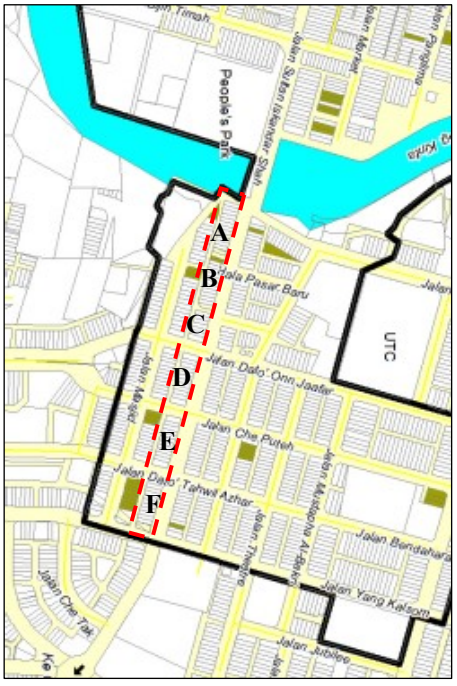
METHODOLOGY

The data for this research was collected using multiple methods. Firstly, related documents were reviewed to identify the architectural characteristics of the buildings whether they are Transitional, Eclectic, Neo-Classical, Art Deco, Early Modern and Modern. Data sources for the review were articles, books, dictionaries, and government reports ranging from local to international authors.

The relevant characters or parameters were finalised using thematic analysis: beam, column, roof, wall, door, window, air vent, fenestration and ornamentation to form a taxonomy of architectural styles (See Table 1). Secondly, the inventory form named 'eFakad' was developed with a specific mathematical formula to give the total value for each selection of architectural criteria. A pilot test for eFakad was then conducted. Thirdly, after a few improvements, fieldwork involving 65 shophouse facades (see Table 2) at Jalan Sultan Iskandar, Ipoh which represent a sample size of approximately 6.4% of the population (the total number of heritages shophouses at Ipoh is 1,022) was conducted. Finally, an analysis and report were prepared to complete this research paper.

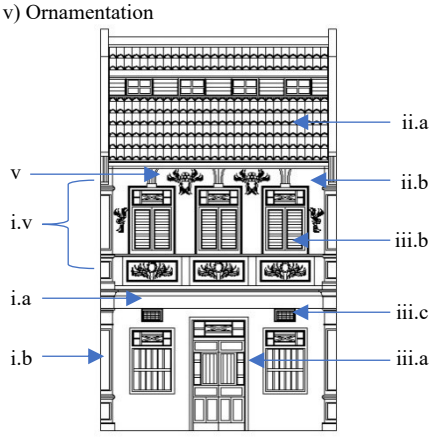
FINDING AND DISCUSSIONS

Table 2: Analysis of architectural styles of heritage shophouse façades at Jalan Sultan Iskandar, Ipoh, Perak.



Tangible Elements of Heritage Shophouse Facade

Main Tangible Elements	Sub-elements
i) Structural	a) Beam
	b) Column
ii) Building Enclosure	a) Roof
	b) Wall
iii) Opening	a) Door
	b) Window
	c) Air-vent
iv) Fenestration	
v) Ornamentation	



Architectural Styles	Block A	B	C	D	E	F	TOTAL	%
Transitional	6	2	4	1			13	**20**
Eclectic				7	6	11	24	**37**
Neo-Classical							0	**0**
Art Deco		4					4	**6**
Early Modern	5	3	1	1	1		11	**17**
Modern		3		3	3		9	**14**

Others	1	1	2				4	**6**
TOTAL	**12**	**13**	**7**	**12**	**10**	**11**	**65**	**100**

The selected rows or blocks of heritage shophouses at Jalan Sultan Iskandar are shown in Table 2. Each block was coded from A (12 shophouses), B (13 shophouses), C (7 shophouses), D (12 shophouses), E (10 shophouses) and F (11 shophouses). There are nine (9) codes namely i.a, i.b, ii.a, ii.b, iii.a, iii.b, iii.c, iv and v which are used identify the elements of the facades that represent; structural (beam and column), enclosure (roof and external wall), and opening (door, window and air vent), fenestration and ornamentation. The design of each element portrays the character of the architectural style of the facade it depicts, as described in the taxonomy matrix of architectural styles (refer to Table 1). Therefore, it was found that the classification of architectural styles for heritage shophouse façades via eFakad is more systematic as the evaluation process is based on the architectural characters outlined in the taxonomy matrix. From the inventory, there are 13 (20%) shophouses of Transitional, 24 (37%) shophouses of Eclectic, 0 (0%) of Neo-Classical, 4 (6%) of shophouses Art Deco, 11 (17%) shophouses of Early Modern, 9 (14%) shophouses of Modern and 4 (6%) shophouses are of other styles or unidentified. Block F shows consistency in maintaining the same styles of facades followed by Block D and Block E. Other blocks portray a mix of architectural styles that require further research to be conducted to identify the reasons behind the dissimilar architectural styles within the same row of shophouses. The most common architectural style found at this road is Eclectic (37%).

Table 3: Analysis of architectural styles of heritage shophouse façades at Jalan Sultan Iskandar, Ipoh, Perak.

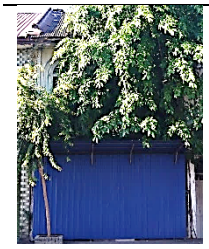
	Architectural Styles										**Total All Block Grade**		
Block	Block A			Block B			Block C						
Grade	A	B	C	A	B	C	A	B	C		**A**	**B**	**C**
Transitional	4	2		1	1		3	1			8	5	0
Eclectic											11	13	0
Neo-Classical											0	0	0
Art Deco				2	2						2	2	0
Early Modern	2	3		2	1		1				6	5	0
Modern				1	2						5	4	0
Others			1			1			2		0	0	4
TOTAL	**6**	**5**	**1**	**6**	**6**	**1**	**4**	**1**	**2**				
	Architectural Styles									**Total**	**32**	**29**	**4**
Block	Block D			Block E			Block F			**%**	**49**	**45**	**6**
Grade	A	B	C	A	B	C	A	B	C				
Transitional		1											
Eclectic	7				6		4	7					
Neo-Classical													
Art Deco													
Early Modern	1				1								
Modern	3			1	2								
Others													

TOTAL	**11**	**1**	**0**	**1**	**9**	**0**	**4**	**7**	**0**

The physical and design conditions of the heritage shophouse façade is graded according to its preservation level to measure its integrity in retaining the facade's architectural design. There are three grades; A, B and C. A - Very Good: The original architectural style of the facade is easily recognised as most of the significant elements are retain (Score 70-100); B – Good: Architectural style of the facade can still be recognised even if there is a significant element has been replaced by a new element (Score 40-69); and C - Poor Architectural style of facade is difficult to be identified as the significant elements have been redesigned, modified, or replaced (Score 1-39). From the analysis of the inventory, 32 (49%) shophouses are Grade A, 29 (45%) shophouses are Grade B and 4 (6%) shophouses are Grade C. Block D is the most preserved façade as there are 11 facades which are given Grade A. The data is shown in Table 3.

Four (4) facades are classified as Grade C or in poor condition. The styles of the facades is difficult to be identified as the significant elements have been modified or replaced (Score 1-39). Types of intervention on the facades according to their elements are shown in Table 4. Only 2 to 4 elements of the facades are preserved or deteriorated, whereby the designs of the elements are still in their original form. At least 5 to 6 elements have been replaced or are facing problems such as the façades are covered by vegetation, signage, wall panels or curtain walling, which is categorised as 'Others'. Thus, these problems caused the facades' inventory and assessment to be obstructed since the architectural styles of the façades cannot be identified and the streetscape is also affected.

Table 4: Photos of Grade C's facades.

				
Intervention	**(a)Block A**	**(b)Block B**	**(c)Block C**	**(d)Block C**
Preserved	Fenestration	Door, air-vent	Beam, door	-
Deterioration	Wall	Beam, column	Column, air-vent	Beam, column, air-vent
Replacement	Roof	-	-	Roof, door
Redesign	-	-	-	-

Others	Beam, column, door, window, air-vent, ornament	Roof, wall, window, fenestration, ornament	Roof, wall, window, fenestration, ornament	Wall, window, fenestration, ornament

CONCLUSION

All buildings, including heritage buildings, are ageing and facing intervention processes such as preservation, deterioration, replacement or redesign. In order to restore and conserve the original design of the heritage shophouses facades, there is a need to refer to complete data regarding the architectural styles and materials as outlined in the taxonomy matrix other than conservation approaches to maintain the design. It is believed that the taxonomy matrix has sufficient data as a basic design guideline in preserving the original form of heritage shophouse facades. Therefore, inventories and documentation are essential in the conservation procedure of the heritage building as a reference for conservation purposes in the future. In addition, theoretical and technological improvements in inventory technique and information seem necessary. To achieve the goal, it is recommended that the inventory form, eFakad, be applied in software such as Mapinfo or other relevant software to facilitate the local authorities in data search for each documented façades.

Based on the fieldwork analysis, 49% of the facades are classified as Grade A. Most are Eclectic styles. Even though they are classified in excellent condition, most of the facades have been through change at least once, such as roof finishes which has been changed from terracotta roof tiles to zink or asbestos and steel roller shutter at the entrance door are now used instead of timber panels. Facades which are classified as Grade B (45%) have gone through changes mainly on the roof, windows and entrance door. The windows, for instance, have been changed from traditional window frames to modern steel frames with dark glass infilled. This kind of improper action should be avoided as the windows are the most significant elements that can be seen from the roadside. In the presence of such information, the local authority can advise the building owners to do restoration and maintenance works to the affected elements. Four (4) facades are categorised as Grade C and need to be conserved before the integrity of the facade vanishes due to refurbishment, renovation, demolition or redesign. Conservation management should be more effective because it is afraid that improper actions against facades will continue to increase due to business survival in attracting customers or tourists. Lastly, it is recommended that this research procedure and eFakad inventory form be used at other heritage areas in Malaysia as a tool for grading the integrity level of the heritage shophouse facades to identify and propose appropriate actions to be taken in conserving the heritage shophouse facades.

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SAFETY, SOCIAL RELATIONS AND SATISFACTION IN POST-DISASTER RESETTLED COMMUNITIES: A CASE OF KEDAH, MALAYSIA

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Abstract

This research aims to study the changes in physical and social patterns among tsunami victims in Kedah, Malaysia by examining the relationship between their perceptions of safety and satisfaction. Data were obtained through a questionnaire survey on 109 respondents who live in Taman Permatang Katong, a new housing area built by the federal government. Results indicated the positive relationship between perception of safety and satisfaction. Meanwhile, social relations played a mediating role on the relationship between perception of safety and satisfaction. This finding implies that those who perceived the new resettlement area to be safer reported higher levels of social relations and, consequently, higher levels of satisfaction. Overall, the majority of residents in Taman Permatang Katong are satisfied with their new houses after the tsunami and feel safe in their area of residency. In conclusion, the resettlement programme should be well planned and should consider both social and physical aspects to improve the well-being of residents.

Keywords: Relocation, resettlement, physical well-being, social well-being, satisfaction, tsunami

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INTRODUCTION

Southeast Asia is a region that is often threatened by natural disasters. Exposure to disasters such as volcanic eruptions, earthquakes, tsunamis and landslides and climate disasters such as floods, droughts and storms has left many communities living in these at-risk areas vulnerable to the threat of these disasters, including Malaysia. Based on the International Tsunami Information Center (2021), the tsunami phenomenon results from a series of large waves. The length and duration of the waves are also very long and are usually caused by a disturbance or chaos under the sea. The tsunami tragedy that hit Indonesia in December 2004 was one of the most dangerous events that caused loss of life and massive property damage. The destructive force generated by the tsunami was so strong that it left a huge impact on human lives and social relationships that were vulnerable to the risk of this disaster. In 2004, the disaster had a devastating effect on several settlements close to the coastal areas of Malaysia, such as Kuala Muda, Kota Kuala Muda, Langkawi and Batu Feringgi (Saraf et al., 2019).

The importance of satisfaction in resettlement areas needs to be emphasised in planning the redevelopment of areas after disasters (Saraf et al., 2019). Research shows that boundaries like the area of the disaster region and the extent of the damage (e.g. resettlement, relocation, reconstruction, etc.) influence the choices of planners (Einali et al., 2020). The satisfaction of communities in resettlement areas is critical as far as assuring the sustainability (Bakar & Osman, 2021) and achievement of post-disaster housing development projects (Fatma, 2021). Two years after the tsunami disaster, more than 2,000 villagers living in the coastal areas in Kota Kuala Muda were given assistance to occupy about 600 units of terrace houses nicknamed ‘Tsunami Bungalows’. The housing areas are equipped with a surau, multipurpose hall, playground and other basic facilities. Most of the victims are still living in the original locations of their damaged homes while some have already been evacuated through the first phase. In addition, the first phase of 126 housing units was implemented for the category of destroyed houses. This housing was built in Taman Permatang Katong, Kota Kuala Muda, two years after the tsunami. The tsunami tragedy that hit the region in 2004 is still fresh for the people of Kota Kuala Muda, even though 14 years have passed. The incident snatched 11 lives in Kota Kuala Muda, and the residents also had to bear huge losses when the boats belonging to the fishermen were severely damaged because of violent waves. In addition to residential houses, many other properties were lost, such as fishing boats, household appliances, vehicles and clothing. The damage to and destruction of tsunami victims’ property were felt because the average resident of Kota Kuala Muda was a full-time fisherman. Even more unfortunate, most tsunami victims suffered the loss of family members during the tsunami disaster, resulting in stress from the horrific tsunami experience. Emotional distress due to the loss of family members and property is a significant challenge that tsunami victims face. Therefore, there

is a need to examine the levels of perceptions of safety, social relations and satisfaction among residents in new resettlement areas.

RESEARCH BACKGROUND

According to Jagath and Udya (2017), it is essential to establish a consistent set of housing and resettlement guidelines and practices as part of disaster preparedness and determine the responsibilities of all stakeholders. Resettlement must be complemented by a long-term support system that reflects the needs of the beneficiaries. Therefore, resettlement must also be development oriented, and planning must ensure that the safety, social relations (Marzbali et al., 2020) and satisfaction of the residents can meet their holistic needs. This resettlement plan is important to many parties, especially the residents who live in locations close to natural areas, because they are the group that will be severely affected in terms of property loss, including lives that will also be lost. Hence, this resettlement plan can provide an overview and assurance to the residents about the development that will take place in the stipulated time. The plan is also intended to prevent the out-migration of people to other areas for fear of being at risk of facing the same disaster faced again. In addition, the occurrence of this natural disaster is unpredictable. Consequently, this plan can be seen as an initial action that can be taken to prepare in the event of a similar disaster. These natural disasters have an impact on humans and the environment. They negatively impact the biological aspect through the damage and destruction of plant ecosystems, animals and marine life. Although humans cannot completely avoid these disasters, safety measures can be taken to reduce their adverse impacts. The community should be aware and learn about the actions they should take in the event of a disaster in the future. Through the study results, it is hoped that the authorities can prepare some preliminary action plans for this resettlement plan.

Natural Disasters

Earthquakes, hurricanes, floods and other weather-involved events such as landslides and tsunami can physically affect communities, and the human and economic decline associated with these effects is rising due to increased population density. Governments, local private institutions, international non-governmental organisations and local and foreign business firms are the organisations involved in providing housing schemes equipped with infrastructure facilities for settlers or victims in new areas (Weerasena et al., 2018). Previous studies have shown that many reconstruction projects failed due to housing not responding to relocation needs. For example, resettlement may have negative consequences, such as loss of livelihood, disrupting the daily activities of previous residents, disruption in terms of social networks and even conflict in the community (Tavakoli & Marzbali, 2021). In other words, resettlement is related to the principle of ‘expelling human life’, which

characterises human movement from the habitual place of living and working (Weerasena et al., 2018). New settlement refers to the process by which residents relocate to a new area either temporarily or permanently. It is planned or chosen at random. Well-planned resettlement planning and disaster development processes can reduce disaster risk, but there are many major challenges in the success of the redevelopment process.

Perception of Safety, Social Relations and Satisfaction

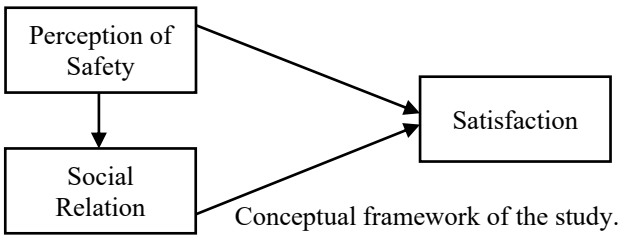
Without a doubt, the neighbourhood environment can improve the satisfaction of residents when associating with safety (Abdullah et al., 2021; Gheda & Ilmi, 2019; Tilaki et al., 2021) and their social relations (Taiwo et al., 2021). Based on Oo et al. (2018), user satisfaction is critical to the success of post-disaster recovery projects. Jagath and Udya (2017) studied beneficiary satisfaction 10 years after the tsunami disaster in Sri Lanka and pointed out the two main challenges of their research. Firstly, personal satisfaction is highly subjective and depends on personal qualities and time dimensions. It changes with the gradual increase or decrease of the beneficiary's economic level. The second is that interviewees often do not reveal their true feelings to avoid being asked a series of questions that require explanation. The conceptual framework of Oo et al. (2018) links user participation in housing reconstruction with the project delivery method and process, the attributes of permanent housing and final long-term residential satisfaction. User participation problems are not common in construction especially under normal circumstances. It is essential to check the interaction between users and the reconstruction process, which will affect their long-term satisfaction (Ghazali et al., 2021).

Kennedy et al. (2008) indicated that satisfaction of the local community area in resettlement programmes is imperative to guarantee the long-term sustainability and use of the housing resettlement programmes. As noted in Ophiyandri (2011) contention, community-based resettlement programmes form community satisfaction, which in turn prompts a feeling of proprietorship, which is advantageous in creating disaster-resilient communities. Each resettlement programme also needs to be planned with additional elements for the comfort of the community. Perera et al. (2013) further found that basic amenities and facilities, such as electricity, should be given simultaneously as individuals are resettled. Furthermore, Steinberg (2007) noticed that the long-term satisfaction of individuals in housing resettlements is related to community empowerment. He said that community participation plays a fundamental and helpful part to restore communities and their lives. Housing reconstruction, engaged by the community, will improve community satisfaction and expand the resilience of communities to confront future debacles.

The Current Study

The aim of this study is to identify the impact of resettlement on victims' perceptions towards their new living area in Kota Kuala Muda and thus examine the positive and negative impacts on victims. Developing a sustainable redevelopment plan is crucial to many parties involved in resettlement development, especially the people who live in a location close to natural areas because they are the ones who will be badly affected in terms of loss of property and lives. Therefore, this redevelopment plan can provide a picture and a guarantee to the people who live in these areas about the development that will take place within the prescribed timeframe. This plan is likewise intended to prevent out-migration of the population to other areas for fear of facing the same disaster risk. Therefore, this plan can be regarded as an early action that can be taken to prepare for the exact disaster. As shown in **Figure 1**, the purpose of the study is to examine the level of perception of safety and social relations among victims in the resettlement area. Furthermore, the study investigates the impact of perception of safety and social relations on the satisfaction of residents. On the basis of the above discussion, we propose the following hypotheses:

H1. Perception of safety is positively associated with the social relations of residents in resettlement areas.
H2. Perception of safety is positively associated with the satisfaction of residents.
H3. Social relations are positively associated with the satisfaction of residents.
H4. Social relations mediate the relationship between perception of safety and satisfaction of residents.



Conceptual framework of the study.

RESEARCH METHOD

The Study Area

Taman Permatang Katong was chosen as the study area because it is a resettlement centre for the 2004 tsunami victims in Kota Kuala Muda. The study area is in the district of Kota Kuala Muda and is located near Sungai Muda. Two years after the tsunami disaster, Syarikat Perumahan Negara Berhad managed to provide a housing area for the tsunami victims. Taman Permatang Katong, better known as 'Tsunami Bungalow', is the assistance given by the government to victims who suffered damage to their homes due to the tsunami disaster. The location of the study area is 1.05 km from the coast of Kuala Muda. **Figure 2**

shows the site plan of the study area, Taman Permatang Katong. Taman Permatang Katong has 126 units of detached houses that the government provided as assistance to tsunami victims. However, only 105 residents live in the area, 4 people rent houses there with monthly rental prices ranging from RM 200 to RM 250 and the rest are unoccupied. Most of the tenants were single and unmarried respondents. Among the reasons they rented the house was because the original owner did not live there and rented the house to those who work in the surrounding area. Each family received a detached house measuring 92.9 square meters. Each house is equipped with three bedrooms and two bathrooms. The areas are also equipped with public facilities, such as surau, multipurpose hall, playground and other basic facilities. **Figure 3** shows the condition of the house provided to tsunami victims.

Figure 2: Study area.
Source: *Draf Rancangan Tempatan Kuala Muda (2020)*

Figure 3: House examples in the study area.
Source: *On-Site Observation*

Survey Instrument

The study is quantitative in nature. A questionnaire survey was used to collect data to address the research questions. In this study, the population was the 2004 tsunami victims in Kota Kuala Muda, Kedah, who were transferred to Taman Permatang Katong. There are 126 housing units in the resettlement area; however, 17 units were uninhabited during the time of the survey. With the use of the census method in this resettlement area, 109 households participated in the survey.

The survey prompted the participants to respond to a series of questions in the questionnaire survey. In addition to providing their demographic information, the participants likewise responded to 21 items that reflected their

social relations and perception of safety and satisfaction. **Table 1** presents the study variables with their respective indicators.

Table 1: Study variables with their respective indicators

Construct	Item	Description
Social relations: Items were adapted from Marzbali et al. (2019, 2021) (1 = strongly disagree, 5 = strongly agree)		
	SR1	My relationship with my neighbours is very close and friendly.
	SR2	My house is close to the house of relatives.
	SR3	The park has a lot of community activities.
	SR4	I often follow community activities in this park.
	SR5	I am comfortable staying in this community.
	SR6	I am satisfied with the location of this community.
Perception of safety: Items were adapted from Marzbali et al. (2019, 2021) (1 = strongly disagree, 5 = strongly agree)		
	PS1	I feel safe in this neighbourhood.
	PS2	There has never been any criminal case in this park.
	PS3	There are committees in charge of safety in this park.
	PS4	The involved parties often patrol within the park to reduce crime cases.
	PS5	My house is very close to the police station.
Satisfaction: Items were adapted from Isa et al. (2021) (1 = strongly disagree, 5 = strongly agree)		
	Sat1	I often use the multipurpose hall provided in this park.
	Sat2	I often use the surau provided in this park.
	Sat3	I am satisfied with the public facilities provided in this park.
	Sat4	The health centre is very close to my home.
	Sat5	The education centre is very close to my home.
	Sat6	Playgrounds are often used by the public.
	Sat7	It is easier to get daily supplies.
	Sat8	I received clean water supply.
	Sat9	I received electricity.
	Sat10	I received a good phone line.

RESULTS

Respondent Profiles

The proposed model and hypotheses were tested by conducting partial least squares (PLS) analysis using the SmartPLS3 software (Ringle et al., 2015). A nonparametric bootstrap method with 10,000 replications was conducted to determine the significance of the path coefficients among the latent variables.

There were 109 tsunami victims involved in this study. The head of each family was selected to answer the survey questions. Most respondents were within the range of 35–44 years old. Of the 109 respondents, 71% were married and living with their family. All respondents were Malay, with the majority of them

educated at higher school level. Information on total household income suggests that the majority of households in the survey population belong to 'RM 3861–4499'.

Measurement Model Results

In this study, PLS structural equation modelling was used to test the research hypotheses. Several criteria were considered to determine the validity and reliability of the measurements. An evaluation of the measurement model requires outer loadings, convergent validity, composite reliability and discriminant validity **(Table 2)**. As suggested by Hair et al. (2017), the outer loadings should exceed 0.4. Based on the first round of analysis, 5 items (i.e. SR3, SR6, Sat1, Sat2 and Sat6) had low factor loadings and were thus excluded from the subsequent analysis. As shown in Table 4, the smallest outer loading value is 0.547 (PS1). To assess reliability, the threshold value of Cronbach's alphas and composite reliability for a given construct was 0.7. Table 4 shows that all constructs have reliabilities of more than 0.70. Convergent validity was measured by the average variance extracted (AVE), which had a threshold value of 0.5.

Table 2: Measurement model results for the latent constructs

Construct	Items	Loadings	Cronbach's Alpha	Composite reliability	t value	Average variance extracted
Social relations	SR1	0.728	0.703	0.811	7.247***	0.520
	SR2	0.776			7.825***	
	SR4	0.618			5.078***	
	SR5	0.753			7.546***	
Perception of safety	PS1	0.547	0.811	0.865	5.212***	0.567
	PS2	0.729			7.297***	
	PS3	0.725			8.316***	
	PS4	0.847			15.714***	
	PS5	0.873			20.464***	
Satisfaction	Sat3	0.719	0.842	0.880	9.167***	0.515
	Sat4	0.803			14.742***	
	Sat5	0.839			17.311***	
	Sat7	0.759			12.494***	
	Sat8	0.558			5.202***	
	Sat9	0.673			8.164***	
	Sat10	0.632			6.096***	

Note. *** $p < .01$

To examine discriminant validity, Heterotrait–Monotrait (HTMT) ratio and confidence interval (CI) should be less than 0.85 and 1, respectively (Henseler et al., 2015). The results show that the HTMT ratios and corresponding

CIs for each pair are less than 0.85 and 1, respectively, thereby indicating that the model possesses both convergent and discriminant validity.

Assessment of the Structural Model

Table 3 presents the results of path analysis that was conducted to test the hypothesised direct effects among the main variables. The impacts of perception of safety on social relations ($\beta = 0.310$, $p < 0.01$) and satisfaction ($\beta = 0.302$, $p < 0.01$) are positive and significant. In line with previous studies, those respondents who perceived high levels of perception of safety report high levels of social relations and satisfaction. As hypothesised, social relations have a positive and significant impact on satisfaction ($\beta = 0.372$, $p < 0.01$), thereby supporting H1 to H3. The R^2 value for satisfaction is 0.30.

Table 3: Path coefficient and hypothesis testing (direct effects).

Hs	Relationship	*β*	*t* value	Decision	f^2	*VIF*
H1	Perception of safety →Social relations	0.310	3.516***	Supported	0.107 (Small)	1.000
H2	Perception of safety →Satisfaction	0.302	2.579***	Supported	0.118 (Small)	1.107
H3	Social relations →Satisfaction	0.372	4.225***	Supported	0.178 (Moderate)	1.107

Notes: Beta = regression weight. The *t* values are computed through bootstrapping with 300 cases and 10,000 samples. *** $p < 0.01$. VIF: variance inflation factor.

This study estimates a mediating relationship, and results show that the *t* value of the indirect effect (H4) is significant at the 0.05 level ($\beta = 0.115$, *t* value = 2.410). Therefore, H4 is supported. Computing the strength of mediation is important in making decisions related to mediation effects. The strength of a mediation effect was computed by considering the variance accounted for (VAF), where VAF > 80% implies full mediation, 20% ≤ VAF ≤ 80% indicates partial mediation and VAF < 20% does not indicate any mediation (Hair et al., 2017). VAF was calculated to estimate the magnitude of the indirect effect by dividing the indirect effect by the total effect (Shrout & Bolger, 2002). The VAF value indicates that approximately 27.6% of the total indirect effect of perception of safety on satisfaction is explained by the partial mediating effect of social relations.

The effect size (f^2) was also calculated to estimate the extent of influence of an independent latent variable on the dependent variable. Effect size was calculated based on the change in the coefficient of determination (R^2). The values 0.02, 0.15 and 0.35 indicate that the effect size is small, moderate and substantial, respectively. Perception of safety shows only small effects on social relations (0.107) and satisfaction (0.118). However, the results show that social relations have a moderate effect on satisfaction (0.178). Multicollinearity among

the variables in the model was also tested, and the results did not highlight any cause for concern in using the variance inflation factor, whose values were all below the suggested threshold of 5.00 (Hair et al., 2017).

CONCLUSION

From the above discussion, the resettlement programme is one that provides comfort, safety and well-being through basic facilities, social perceptions and physical changes to tsunami victims after they receive the assistance. The results of this research are expected to provide some beneficial contributions to all parties as follows. i) This research will produce a sustainable resettlement plan that can help reduce the impact of out-migration of the population and be a mechanism to reduce the risks that the population will face in the event of a similar natural disaster. ii) This study can also be used as a guide to certain parties in planning area development plans to ensure that the development carried out meets the scopes of development in areas that are frequently or likely to be hit by natural disasters. iii) The results of this study can be used as motivation to other researchers to produce new findings that are more effective and efficient. Overall, the majority of the residents are satisfied with the area where they live now, which is Taman Permatang Katong. This is evidenced by previous studies that this resettlement programme has brought about changes in public facilities, social perceptions among the population and physical development after the tsunami. The tsunami disaster has changed people's lives in the Permatang Katong areas for the better because the changes that took place after the tsunami led to positive development, especially from the social and physical aspects. The resettlement programme is an initiative taken by the government to provide assistance to victims affected by natural disasters. This study proved that resettlement has brought changes in both physical and social terms. Changes in terms of public facilities and physical changes of development have been evidenced in this study and the social perceptions of the residents after living in this government-provided assistance housing. In general, new houses in these resettlement areas provide changes in terms of public facilities, building materials and design of better infrastructure buildings. Similarly, in terms of the social perception of the population on the impact of change due to this resettlement area, the majority of households are satisfied with the assistance they received from the government, especially this assisted housing scheme. This study proved that this resettlement programme has a positive impact on the residents because their condition here is better than before. It can be concluded that the tsunami disaster in Kota Kuala Muda has improved the condition of their homes and has thus changed their lives. However, the condition of public facilities, especially public halls that are not maintained, can affect the well-being of the residents here. In conclusion, resettlement needs to be well planned to help those affected by disasters in the future.

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ASSESSING BORDER SHOPPER'S MOTIVATION AT PADANG BESAR, PERLIS

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Abstract

Shopping tourism had evolved over the years in becoming the main generator for the tourism industry, especially in Malaysia border areas like Padang Besar, Perlis. Even though there are carrying capacity issues and inadequate facilities, people continue to visit Padang Besar, especially during weekends and public holidays. Accordingly, this study investigates shopper motivation factors to shop at Padang Besar. The findings indicated that four push motivation factors and six pull motivation factors were important. Three categories of shoppers were identified from these factors, namely: the hunter shopper, prudent shopper, and comfortable shopper. The contribution of this study also presents a holistic view of border shoppers and various types of shoppers who visit Padang Besar, thereby helping stakeholders obtain valuable information to implement strategies for developing this area as a border shopping destination. It is anticipated that this study's results will help improve Padang Besar's development in building good facilities and infrastructure as demanded by visitors.

***Keywords**:* Shopper, motivation, border tourism, Padang Besar, Malaysia

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INTRODUCTION

In popular tourist destinations, shopping activities have become the main economic activity; enticing agencies to develop their surroundings to attract international tourists (Filipović, Jovanović, & Kostić, 2013; Leick, Schewe, & Kivedal, 2020). These activities involve the exchange of money, which positively impacts the development of infrastructure and facilities at shopping centres; thus, providing benefits to individuals' psychological, social, and political needs (Choi, Law, & Heo, 2018). The contributing factors and visual signs of successful development of the tourism industry are based, not only on attraction, but on marketing materials, such as physical amenities and facilities (Hall & Page, 2014; Makkonen, 2016). Previous studies on shoppers focused mostly on the perceived value of shopping items (del Río, Agüera, Cuadra, & Morales, 2017); shopping behaviour (Amar, Djafar, Arip, & Hassan, 2020; Lin, Yan, Zhou, & Kaluri, 2020), shopping as the primary motivation to travel (Battour, Ismail, Battor, & Awais, 2017; Kong & Chang, 2016; Sthapit, 2018), and travel motivation to identify the typology of shoppers (Assiouras, Skourtis, Koniordos, & Giannopoulos, 2015; Egresi, 2017; Peter & Anandkumar, 2016). However, further studies need to be undertaken to better understand the nature of shoppers; especially the motivational factors that influence them to shop in particular shopping areas.

In Malaysia, border areas become popular shopping destinations - especially for local visitors - given the variety of products and low prices. For example, the development of a border shopping area at the town of Padang Besar does not require local visitors to carry travel documents, due to various Thailand-made products sold there. Furthermore, most sellers are Thai nationals that speak Malay fluently, with some holding dual citizenship. Given this uniqueness, the number of shoppers at this border area reveals a higher demand among local visitors to shop at Padang Besar (Azmi, Hamid, Ahmad, & Ramli, 2017). However, the visitor infrastructure and shopping facilities are poorly maintained, inadequate, and unsatisfactory (Azila, 2013; Azmi et al., 2017). The cleanliness of public amenities, such as public toilets, food courts, and prayer rooms, is in a deplorable condition (Amir Salim, 2002). With various products on offer, the facilities developed at Padang Besar have attracted visitors to this shopping destination - despite the inadequate infrastructure and facilities on offer. Therefore, this paper intends to investigate shopper motivation factors to shop at Padang Besar.

SHOPPING MOTIVATIONAL FACTORS

The literature explains that 'motivation' arises from a state of tension within individuals generated by needs and wants (Egresi, 2017). As stated by Bakar & Osman (2021), the majority of human needs and wants significantly increase life satisfaction. Therefore, shopping activities are taken as a counteraction to release

stress by satisfying individual internal psychological factors. In the debate regarding motivation in shopping tourism, Tauber (1972) inspires the following question "Why do people shop?" Since then, shopping motivation has continued to be an element of study within shopping tourism research. Travel motivation and shopping are not a strange connection regarding this topic; since one study showed that travel motivation is a determinant of shopping venues (Tammy R. Kinley, Josiam, & Lockett, 2010). In this study, a comparison between 16 classes of human motivation by McGuire's Psychological Motivation Theory (PMT) (McGuire, 1974), Shopper Motivation (Tauber, 1972), and Typology of Shoppers (Arnold & Reynolds, 2003), have been used to identify similar motivational factors that are suitable and related to Padang Besar. As shown in Table 1, four similar push motives and five pull motives were identified from the comparison of these theories.

Table 1: Comparison between the motivational theories

	Motivational Factors	
McGuire Psychological Motivation (1974)	**Push Motivation (Internal)** • Consistency • Autonomy • Tension reduction • Assertion • Categorisation • Teleological • Ego-defensive • Identification	**Pull Motivation (External)** • Attribution • Stimulation • Expression • Affiliation • Objectification • Utilitarian • Reinforcement • Modelling
Shopper Motivation (1972)	**Personal Motive** • Role-playing • Diversion • Sensory simulation • Physical activity • Self-gratification	**Social Motive** • Social experiences outside the home • Communication with others having similar interest • Peer group attraction • Status and authority • Pleasure in bargain • External reason
Typology of Shopper (2003)	• Simulation • Expression • Affiliation • Gratification • Tension reduction • Categorisation • Identification • Assertion	

Source: Compiled from Babin, Darden, & Griffin (1994); Guido (2006)

Push Motivation Factors (Internal)

i.Tension Reduction

Tension reduction is important to maintain one's inner equilibrium (McGuire, 1974) and self-gratification benefits while shopping (Tauber, 1972). Arnold & Reynolds (2003) stated that the motive is clearly to relieve tension or stress and a replacement to erase problems while shopping. Besides that, shoppers can also recognise the value of escapism, therapeutic feeling, and avoidance of depression or stress while shopping (Khuong & Ha, 2014). In the context of tourism, most visitors travel to escape from their normal routine of life, daily routine, and getting out of a busy working environment (Tammy R. Kinley et al., 2010; Yoon & Uysal, 2005).

ii. Assertion

McGuire (1974) mentioned that assertion refers to human perception, such as achiever, the motivation that develops potential and enhances self-esteem. According to Arnold & Reynolds (2003), a shopper will be motivated when they succeed in the bargaining process and adhere it give them satisfaction after achieving a personal bargain. This motive relates to a feeling of joy by looking for a discount, sale, and low-priced products. Therefore, they feel positive when they succeed bargain before making a purchase (Timothy, 2005).

iii. Categorisation

Categorisation refers to a motive that a person needs structure, order, and knowledge (Arnold & Reynolds, 2003). This motive also corresponds to the shopper's need to know, learn, and enjoy browsing information about the products (Tauber, 1972) or discover new products that are new to the shopper (Wagner & Rudolph, 2010). In the context of tourism, the categorisation motive helps visitors to experience new tourism products, the latest trends, and different lifestyles. Yoon & Uysal (2005) mentioned that visitors are motivated to experience new food and to meet new people.

iv.Identification

According to Tauber (1972), identification motive is related to the positive effects of the shopper's social role following a process of shopping. The concept of recreational shopping in tourism begins when tourists travel and visit shopping malls, then return with a gift for family and friends. As mentioned by Timothy (2005), it is important for a person who travels to bring a souvenir as a present after going on a vacation. However, Wagner & Rudolph (2010) mentioned that consumers purposely go shopping as their main task before turning it into an enjoyable activity.

Pull Motivation Factors (External)

i. Sensory Stimulation

The sensory stimulation motive is referred to as an individual's need to be in a pleasant environment and maintain optional stimulation (Wagner & Rudolph, 2010). This motive can be produced when the customer exits a shopping location, exploring a new environment and experiencing interesting sights. Furthermore, this motive is related to the motivation of shoppers in finding ways or practices on how to use products (Arnold & Reynolds, 2003). In other words, this motive refers to an activity of seeking or trying a new product (Guido, 2006) while shopping.

ii. Expression

The influence of expression motive normally depends on the attractiveness of desired characteristics or occupies an esteemed role (McGuire, 1974). The expression motive may link with sensory stimulation because simulation relates with sensory through play and creativity among human organisms (Arnold & Reynolds, 2003). Tauber (1972) mentioned that the expression motive is also related to authority and status. Likewise, the expression motive may refer to an individual's desire to enhance one's self-concept through the tolerance of others. Guido (2006) stated that the expression motive is part of status and authority tendency where the customer enjoys personal attention by the seller and the act of being pampered by the salesperson. The expressive motive was used when the shopper intends to show their social identity (Solomon, Russell-Bennett, & Previte, 2012).

iii. Affiliation

According to (Arnold & Reynolds, 2003), shoppers seek a personal relationship while shopping. This is because the affiliation motive makes an individual desire social interaction with others, communicating with those who have similar interests, and doing similar activities with others in groups (Tauber, 1972). According to Rohm & Swaminathan (2004), consumer who motivated by social interaction normally prefer shopping at physical store rather than online store. Therefore, it can be concluded that a shopper likes to be cohesive and seeks affection in the interpersonal relationship because of the affiliation motive. Thus, socialising has a positive effect on the friendliness of salespersons (Wagner & Rudolph, 2010).

iv. Objectification

The objectification motive refers to needing external information and guidelines to generate a good perception and sense among shoppers (Arnold & Reynolds, 2003). This motive could be included with shoppers' attitude, a person who is browsing for information about the products available, journey, and comparison

before making a particular purchase. This motive is also closely related to the utilitarian motive that refers to a wrong action, a consequence of wrong judgement. As a good shopper, browsing information and making a comparison before making a purchase is derived from this motive (Kinley, Josiam, & Kim, 2003; Kinley et al., 2010; Rohm & Swaminathan, 2004). Indeed, comparing makes the consumer explore various items before finding the best item to purchase (Kinley et al., 2003; Wagner & Rudolph, 2010).

v. Attribution

The attribution motive refers to the attribution of the success or failure towards the number of efforts undertaken (McGuire, 1974). In the context of shopping activities, the attribution motive may refer to shopping malls attribution (Guido, 2006). Retail environments and shopping centre attributes, such as family-friendly, clean, safe, and convenient location are important determinants of shopping venues among tourists (Kinley et al., 2010; Yoon & Uysal, 2005). According to Timothy (2005), the location of the store, the value of purchase, varieties, quality and physical design are important aspects to motivate shoppers to visit and shop at the store. In addition, the cleanliness of the store, accessibility, and variety of stores is important to shoppers (Bellenger & Korgaonkar, 1980). Previous research by Zakariya, Haron, Tukiman, Rahman, & Harun (2020) also stated that tourism facilities and infrastructure is integral and need to be well-managed due to it enhance overall tourists experience. Therefore, facilities and convenience at shopping destinations are important to attract visitors to visit the destination.

RESEARCH METHODOLOGY

A preliminary study was first undertaken by observing the people in Padang Besar, Perlis during the weekend, public holidays, and weekdays to understand crowd motive to shop at the border area. Following the observation, an intensive literature review was performed to obtain information from secondary sources. As shown in Figure 1, this study focused on the Padang Besar Arcade Complex (PBAC). A descriptive quantitative study with formal and systematic numerical data collection was utilised to obtain the information linking to the objectives of this study. This quantitative research design was employed using an online survey questionnaire to describe motivational factors and shopper typologies better. The survey was aimed at the 1.3 million passengers who visited the Padang Besar KTMB station in 2019, having a minimum age of 18 years. Based on the Raosoft calculation, the sample size was estimated at 385 respondents. At the beginning of the study, simple random sampling was used as the sampling technique. However, since the coronavirus 2019 global pandemic (COVID-19), and the Movement Control Order (MCO) imposed by the Malaysian government the sampling technique was changed to convenience sampling.

Figure 1: *Location plan of Padang Besar shopping area*

A descriptive analysis, factor analysis, cluster analysis and chi-square test were employed as the statistical techniques in this study to analyse the data. Once collected, the data were entered and coded into Statistical Package for the Social Sciences (SPSS) software version 22.0. In this study, the first stage of the analysis involved data cleansing and crosschecking during the data entry process. Next, the reliability analysis was performed to ensure all the items were reliable for analysis. The exploratory factor analysis was undertaken next for grouping the items according to shopper motivation factors. The factors were then used to categorise and form different types of shoppers. Next, the hierarchical cluster analysis was performed using a linkage between the group method to determine the number of clusters in this study.

RESULTS

Profile of Respondents

As showed in Table 2, the respondents for this study were aged between 18 and 60 years of age, comprising domestic (99.7%) and international shoppers (0.3%). It also showed that the respondents aged between 36 and 45 years (38%) were the main shoppers at Padang Besar, followed by those aged between 26 and 35 years (30%), between 18 and 25 years (22%), between 46 and 55 years (9.3%), and above 56 years (0.7%). Most of the respondents were Malay (95.3%), followed by Indian (2.9%), and Chinese (1.8%). Regarding marital status, 61.5% of respondents were married, 37% were single, and 1.5% were divorced. Furthermore, the result showed that most respondents received a monthly income below RM1500 (28.9%). Therefore, it can be concluded that most shoppers at Padang Besar fell within the B40 group (average monthly salary). Besides that, the highest number of respondents came from Kedah (38.5%), followed by Perak (20.1%), Perlis (12.4%), and Pulau Pinang (10.3%). As such, it can be concluded that Padang Besar attracts Northern Malaysia shoppers

.

Table 2: Profile of the Respondents

Variables	N	Value	Number of Respondents	Percentage (%)
Gender	387	Male	80	20.7
		Female	307	79.3
Age	387	18-25 years old	85	22.0
		26-35 years old	116	30.0
		36-45 years old	147	38.3
		46-55 years old	36	9.3
		Above 56 years old	3	0.7
Ethnicity	387	Malay	369	95.3
		Chinese	7	1.8
		Indian	11	2.9
Nationality	387	Malaysian	386	99.7
		Foreigner	1	0.3
Marital status	387	Single	143	37.0
		Married	236	61.5
		Divorce	6	1.5
Monthly income	387	Below RM1500	112	28.9
		RM1501-RM3000	110	28.5
		RM3001-RM4500	77	19.9
		RM4501-RM6000	75	19.3
		RM6001-RM7500	5	1.3
		Above RM7501	8	2.1
Origin state	387	Perlis	48	12.4
		Kedah	149	38..5
		Pulau Pinang	40	10.3
		Perak	78	20.1
		Selangor	12	3.1
		Kuala Lumpur	3	0.8
		Melaka	1	0.3
		Negeri Sembilan	2	0.5
		Johor	20	5.2
		Kelantan	13	3.4
		Terengganu	3	0.8
		Pahang	14	3.6
		Sabah	2	0.5
		Sarawak	2	0.5

Motivation Factors

i. Push Motivation Factor

The main group of push motivation factors included task-fulfilment, bargain hunting, inspiration, and food hunting. As shown in Table 3, all 16 items were

categorised under four main groups of push motivation factors. Task- fulfilment signifies the motivation of shoppers that go shopping given their respective roles. This motivation makes shoppers meet with new friends and enjoy their role to avoid feelings of depression or worrying. The second main group of factors is bargain hunting which is the motivation that encourages a shopper to shop when they enjoy a bargain, discounts, and low-price products. The inspiration factor is a motivation that inspires the shopper to portray their expression of love and curiosity regarding the latest trends. Lastly, food hunting was experiencing new foods given the person's motivation to travel and shop because of food.

Three categories of mean value were listed as having a low range (1.00 to 2.33), medium (2.34 to 3.66), and high (3.67 to 5.00). In this study, the mean value showed which variables influenced shoppers to shop at Padang Besar. The results derived from the analysis indicated that the mean value of three items, fun or thrill (M = 4.36), discount (M = 4.24), and bargain (M = 4.18), were perceived respectively as an important influence in push shopping motivation. The reliability test was next conducted among all four main groups of push motivation factors. The Cronbach's alpha value for task-fulfilment was 0.827, bargain hunting (0.771), inspiration (0.746), and food hunting (0.866). All these factors were reliable given the reliability value above the accepted benchmark value of 0.7.

Table 3: The result of Push Motivation

Push Factors	Factor Loading	Mean	Standard deviation	Compute Mean	% of variance	Cronbach's alpha value
Factor 1: Task - Fulfilment						
Personal role	0.753	2.91	1.353			
The role of work	0.739	2.21	1.298	2.81	19.94	0.837
Avoidance of worrying or depression	0.708	2.83	1.233			
The role to others	0.694	3.59	1.079			
Meets with new friends	0.593	2.12	1.104			
Mental therapy	0.684	3.26	1.139			
Factor 2: Bargain Hunting						
Discount	0.772	4.24	0.810			
Advantage of sales	0.760	4.03	0.869			
Bargain	0.726	4.18	0.864	4.02	18.09	0.771
Fun / thrills	0.658	4.36	0.857			
Escapism	0.472	3.53	1.080			
Low price products	0.518	3.82	0.947			
Factor 3: Inspiration						
Updates with the latest trends	0.808	2.60	1.083	3.01	14.87	0.746

Needs to know	0.770	3.32	1.122			
Role of expressing love	0.646	3.13	1.185			
Factor 4: Food Hunting						
Experience new foods	0.853	3.91	0.934	3.91	8.10	0.866

ii. Pull Motivation Factor

In contrast to the push motivation factor, 24 items relating to the pull motivation factors were categorised under six main groups: hospitality features, excitement features, shopping simplicity, facility resources, unique destination, and convenience. The hospitality features motivation factor focused on the experience of the shopping environment regarding hospitality and services provided by the seller, such as attention, prompt customer service, and respectfulness. The excitement features factor occurred when the shopper was motivated by a convenient location, having activities in groups, trying a new product, enjoying transportation, and feeling there is value with the purchase. Shopping simplicity is derived when the shopper realises that they could purchase an item when needed, making comparisons during shopping or simply being at the shopping destination. The facilities resources motivation is a factor that attracts shopping at the shopping destination due to the facilities provided at the area, such as parking, family-friendly facilities, and advertisement. Unique destinations make shoppers feel motivated to shop at the shopping destination because of the attributes of the destination, the design, and the variety of shopping items. Aside from that, convenience is a motivation factor that involves safety and cleanliness as important determinants to certain shoppers before shopping at the shopping area.

Based on the results shown in Table 4, the exciting features and unique destination were the most important determinants for shoppers to shop at Padang Besar. Meanwhile, the least pull determinant of the destination was facility resources. The reliability test was conducted among all six main groups of push motivation factors. In addition to the six factors, only four factors were deemed reliable with the Cronbach's alpha value of more than 0.70. The four factors were hospitality features (0.843), excitement features (0.745), facility resources (0.714), and unique destination (0.722). The other two factors, shopping simplicity (0.684) and convenience (0.618), were unreliable due to the Cronbach's alpha value being less than 0.70.

Table 4: The result of Pull Motivation Factor

Push Factors	Factor Loading	Mean	Standard deviation	Compute Mean	% of variance	Cronbach's alpha value
Factor 1: Hospitality features						
Attention	0.789	3.59	0.918			0.843
Giving prompt customer service	0.759	3.51	0.920			

Push Factors	Factor Loading	Mean	Standard deviation	Compute Mean	% of variance	Cronbach's alpha value
Respectfulness	0.657	3.80	0.821			
Experience a new shopping environment	0.633	3.49	0.923	3.61	14.73	
No pressure to buy	0.529	3.68	0.878			
Social interaction with others	0.512	3.70	0.762			
Communication with those have similar interest	0.363	3.54	1.051			
Factor 2: Excitement features						
Having activities with others in groups	0.656	4.18	0.821			
Convenience location	0.595	3.76	0.792	3.84	11.22	0.745
Transportation	0.573	3.66	0.929			
Trying a new product	0.535	3.83	0.845			
Value of purchase	0.501	3.78	0.803			
Factor 3: Shopping simplicity						
Just to be around with other people	0.790	2.39	1.317	2.95	10.65	0.684
Purchase item when needed	0.725	3.38	1.052			
Making a comparison using a price tag	0.484	3.10	1.140			
Factor 4: Facility resources						
Parking area	0.832	2.95	1.238			
Family-friendly facilities	0.810	2.82	1.087	2.73	9.80	0.714
Good information via advertisement	0.571	2.44	1.140			
Factor 5: Unique destination						
Exciting place	0.667	3.73	0.824			
Exploring variety of items	0.649	3.95	0.821	3.82	9.80	0.722
Exploring shopping item	0.640	3.77	0.967			
Design	0.587	3.86	0.795			
Factor 6: Convenience						
Safety	0.711	2.93	1.028	3.22	7.23	0.618
Cleanliness	0.489	3.52	0.815			

Typology of Shoppers at Padang Besar

In this study, a cluster analysis was performed on clustering shoppers according to their motivation factors. Three clusters were found, namely hunter shoppers (Cluster 1), prudent shoppers (Cluster 2), and comfortable shopper (Cluster 3) identified from the K-means analysis. These clusters were named based on the descriptive characteristics, as shown in Table 5. The hunter shopper represents those shoppers likely to hunt for food and bargains but prefers to shop at a

destination that provides good facilities. This type of shopper enjoys bargains, low-price products while shopping and they also prefer to travel to the destination that provided facilities (i.e., family-friendly facilities and parking areas). Nevertheless, the prudent shopper is a person who is concerned about the services provided at the shopping destination. They enjoy the attention, respectfulness from the seller, and tend to make a comparison while purchasing a product that they needed. Lastly, the comfortable shopper refers to those who care about convenience during their travel to the destination and shopping. This type of shopper tends to visit shopping destinations that are clean, safe, easily accessible, convenient location, and a destination that provides extra-mile facilities.

Table 5: Cluster centroid from K-means Analysis

Motivation Factors	Cluster			f	Sig.
	Hunter shopper	Prudent shopper	Comfortable shopper		
Task-fulfilment	-0.967	0.769	-0.104	149.068	0.000
Bargain hunting	-0.656	0.792	-0.305	109.662	0.000
Inspiration	-0.812	0.765	-0.191	117.612	0.000
Hospitality features	-0.938	0.864	-0.203	185.503	0.000
Excitement features	-1.046	0.708	-0.005	150.042	0.000
Shopping simplicity	-0.884	0.850	-0.222	165.204	0.000
Facility resources	-0.632	0.404	0.018	34.701	0.000
Unique destination	-0.986	0.837	-0.152	183.948	0.000
Convenience	-0.934	0.490	0.118	81.849	0.000
Food hunting	-0.639	0.453	-0.021	39.438	0.000

DISCUSSION AND CONCLUSION

This study aimed to investigate the motivation factors that influence shoppers to shop at Padang Besar. The findings indicate that four push motivation factors and six pull motivation factors are present in this study. Previously, shoppers were motivated to travel to shopping destinations through the value of avoiding negative feelings, and escapism (Arnold & Reynolds, 2003; Khuong & Ha, 2014; Tammy R. Kinley et al., 2010). However, this study shows that shoppers go shopping due to task-fulfilment; as one of their push motivations factors. Meanwhile, shopping simplicity and unique destination is the main pull motivation factor of border shoppers at Padang Besar. Similar to previous studies, socialising and destination attributes are important factors that motivate shoppers to travel for shopping activities (Belisle, 2011; Boonchai & Freathy, 2020; Tammy R. Kinley et al., 2010; Mehta, Sharma, & Swami, 2014); because shoppers perceive the enjoyment of shopping, while communicating or socialising with others and being attracted to the shopping destination's characteristics. However, to develop Padang Besar as a border shopping destination, effort needs to be taken by each stakeholder interested in Padang

Besar as a border shopping tourism destination. For example, the government should re-examine the current development plan and policy towards Padang Besar as a border shopping tourism destination. The result could provide the impetus to provide attractions, infrastructure, and services to visitors.

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APPLICATION OF KERNEL DENSITY ESTIMATION TO IDENTIFY MOTORCYCLE THEFT HOT SPOTS IN KUCHING, SARAWAK

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Abstract

Motorcycle theft is the most frequently reported cases worldwide, including in Malaysia. This study aims to identify the hot spot areas for motorcycle theft in Kuching. The spatial data include police station sector boundary, road data and latitude and longitude data while attribute data consists of motorcycle theft by year, address of the incident and time. Kernel Density Estimation (KDE) helps to find the hot spot areas of motorcycle theft. Motorcycle theft in Kuching has been reported as more frequent during the day at 54.8% and at 45% during the night from the year 2015 to 2017. Hot spot locations change by year and time. The study found that most of the hot spot areas of motorcycle theft were detected within the Sentral boundary. This indicates that the city centre is an area with a high density of motorcycle theft. This study can help authorities to improve the prevention measures for motorcycle theft while the findings can help in preventing motorcycle theft by police sector boundary.

***Keywords**:* Kernel Density, Motorcycle Theft, Hot Spots, Kuching

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INTRODUCTION

Vehicle Theft Reduction Council of Malaysia Berhad (VTREC) (2021) reported that a vehicle is stolen every one hour 15 minutes in Malaysia (Bernama, 2021). According to Road Transport Department of Malaysia (2020), the total number of registered motorcycles in Malaysia in 2015 was 12,094790 or 45.9%, which was highest in Malaysia compared to the ownership of cars at 45.1%. This growth was due to motorcycle being cheaper than car, and takes up less space for parking. National Insurance Crime Bureau (2020) showed that the top 10 states in the world for motorcycle thefts in 2018 were California, Florida, Texas, New York, South Carolina, North Carolina, Indiana, Missouri, Georgia and Colorado. Besides that, theft of motorcycles is most commonly reported in the Philippines (Godoy, 2020) and it is also contributing a major form of property crime in Nigeria (Ogundipe & Ojedokun, 2017). In Malaysia, government preventions of motorcycle theft are being carried out through better lighting hot spot parking areas, promotion of use of anti-theft U-locks, and using decoys (Hamidi, 2015). Figure 1 shows the trend of property crime in Malaysia by types from 2012-2016. It clearly shows that motorcycle theft cases are most frequently reported in Malaysia.

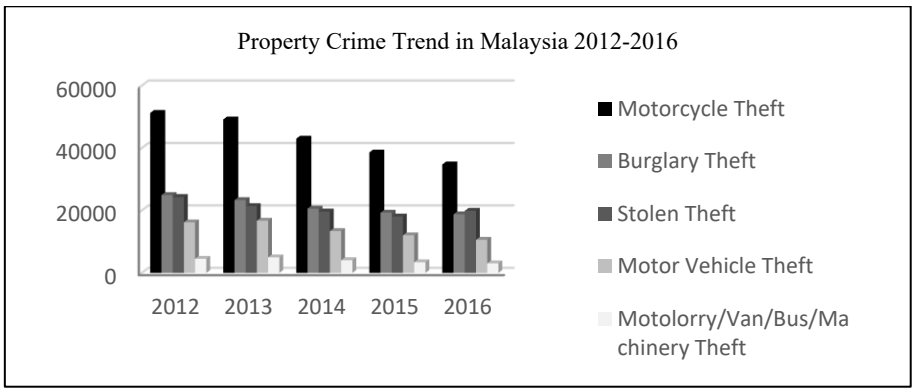

Figure 1: Property Crime Trend in Malaysia 2012-2016
Source: PDRM, (2018)

Statistics 2012-2016 showed that motorcycle theft cases in Malaysia occurred at 42%, followed by burglary cases at 20.7%, while theft cases occurred at 20%, car theft cases 13.3% and the lowest was motorcycle/van/bus/heavy machinery theft cases with 3.8%. Even though the rate of motorcycle theft continues to decrease annually, the total case of motorcycle theft is still alarming high among the category of property crime. The frequent occurrence of motorcycle theft has become a major concern in Malaysia.

LITERATURE REVIEW

Mao et al, (2018) used clustering analysis to identify crime focus areas while spatial autocorrelation technique works to detect areas with high and low clustering. Besides that, other study found the offender pick motorcycle off the ground and load it into a van (Godoy, 2020). This tactic shows that the offender can steal motorcycle when opportunity presents itself. Makrit and Vichuwanich (2021) study spatial analysis of crimes related to motorcycle thefts in Thailand and Cambodia from 2017-2018. Their study found that there was a high density of motorcycle theft cases in the area with high population. Ogundipe & Ojedokun, (2017) found that the thieves steal motorcycle anytime when opportunity arises. This was supported by Ikoh (2011) who suggested that offender always seeks the opportunity to commit crime especially in the areas with low surveillance and security. Jubit et al., (2020a) conducted a study using global Moran's I to identify spatial patterns of property crime in Kuching, Sarawak. The same group of researchers also conducted a study analyzing the property crime hot spots by spatial temporal in Kuching, Sarawak using Getis Ord Gi* (2020b). In Malaysia very few studies focus on the hot spot of motorcycle theft in space and time.

METHODOLOGY

The study area is located in Kuching Sarawak using the database from the Criminal Investigation Division of IPD Kuching (2018). From 2015 to 2017 statistics showed that motorcycle theft cases are the most frequently reported cases compared to other types of property crime in Kuching which is 44%. Thus, the main contributor to property crime in the study area is motorcycle theft. As shown in Figure 2, the police stations for this study consists of 57 sector boundaries. The number of sector boundaries is determined by the PDRM Kuching to increase the effectiveness of patrols and crime prevention. The purpose of using the sector boundary as the unit of analysis in this study is to increase the effectiveness in the prevention of property crime hot spots. This is because the use of smaller units of analysis is more effective as it makes it easier for police to focus on crime prevention involving small areas as opposed to large areas (Braga & Hureau, 2012).

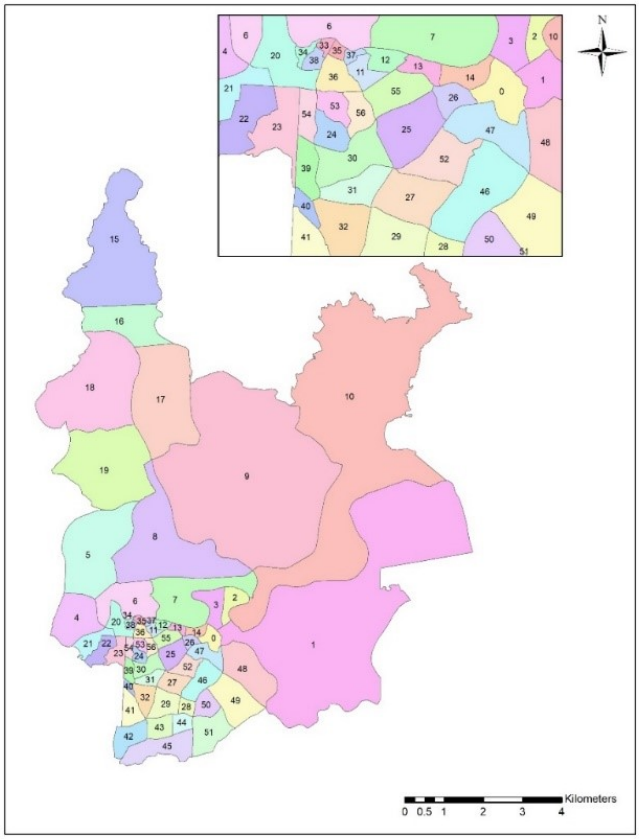

Figure 2: Study Area

ID	Police Station Sectors	1D	Police Station Sectors	ID	Police Station Sectors	1D	Police Station Sectors
0	Bintawa Sector 1	15	Santubong Sector 1	30	Sekama Sector 7	45	Sg Maong Sector 7
1	Bintawa Sector 2	16	Santubong Sector 2	31	Sekama Sector 8	46	Tabuan Jaya Sector 1
2	Bintawa Sector 3	17	Santubong Sector 3	32	Sekama Sector 9	47	Tabuan Jaya Sector 2
3	Bintawa Sector 4	18	Santubong Sector 4	33	Sentral Sector 1	48	Tabuan Jaya Sector 3
4	Gita Sector 1	19	Santubong Sector 5	34	Sentral Sector 10	49	Tabuan Jaya Sector 4
5	Gita Sector 2	20	Satok Sector 1	35	Sentral Sector 2	50	Tabuan Jaya Sector 5
6	Gita Sektor 3	21	Satok Sector 2	36	Sentral Sector 3	51	Tabuan Jaya Sector 6
7	Gita Sector 4	22	Satok Sector 3	37	Sentral Sector 8	52	Tabuan Jaya Sector 7
8	Gita Sector 5	23	Satok Sector 4	38	Sentral Sector 9	53	Sentral Sector 4
9	Gita Sector 6	24	Sentral Sector 6	39	Sg Maong Sector 1	54	Sentral Sector 7
10	Gita Sector 7	25	Sekama Sector 2	40	Sg Maong Sector 2	55	Sekama Sector 1
11	Padungan Sector 1	26	Sekama Sector 3	41	Sg Maong Sector 3	56	Sentral Sector 5
12	Padungan Sector 2	27	Sekama Sector 4	42	Sg Maong Sector 4	30	Sekama Sector 7
13	Padungan Sector 3	28	Sekama Sector 5	43	Sg Maong Sector 5	31	Sekama Sector 8
14	Padungan Sector 4	29	Sekama Sector 6	44	Sg Maong Sector 6	32	Sekama Sector 9

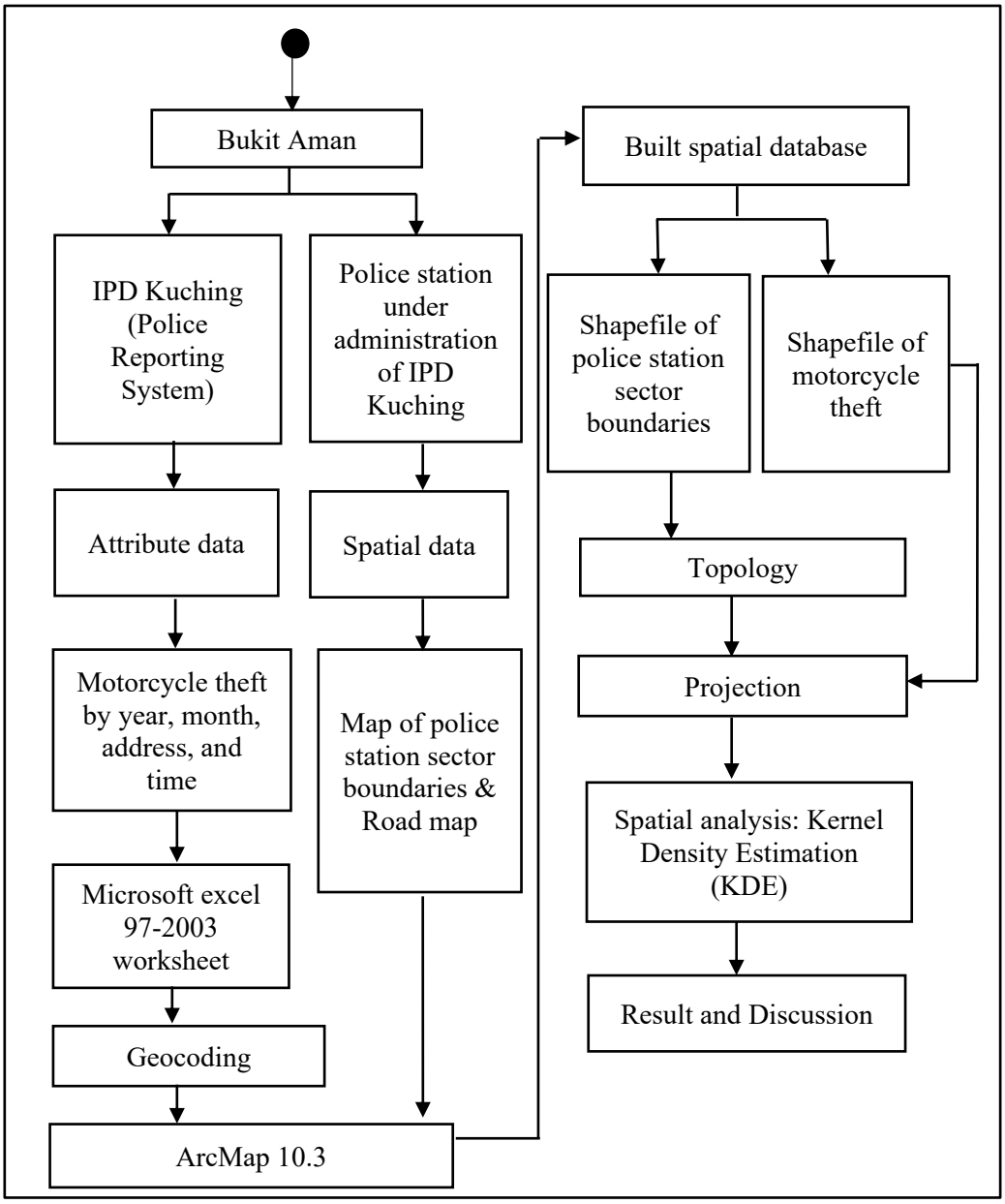

Figure 3: Process of Mapping and Data Analysis

Figure 3 shows the process of mapping and data analysis. Attribute data was taken from the Police Reporting System at IPD Kuching which consist of motorcycle theft by year, month, address of the incident and time (daytime = 7 a.m-6.59 p.m.) and (nighttime = 7 p.m-6.59 a.m.) This data was then compiled in Microsoft Excel 97-2003 worksheet. The geocoding process was carried out to obtain latitude and longitude data. Spatial data was obtained from police stations under the administration of IPD Kuching. This included a map of police station sector boundaries (57) and a road map for digitizing. The next process was to build spatial database. Spatial data was change to shapefile, then transform into a topology to clean up data entry errors and to verify data while attribute data was also converted into shapefile. The spatial data and attribute data then went through the process of projection. The last step was to run the Kernel Density Estimation analysis to get the result. A kernel density shows the hot spot of motorcycle theft across the police station sector boundary by concentration density of point. There are five classificationss of point density, namely lowest risk, low risk, moderate risk, high risk and higher risk. The function of kernel density is to calculates the density of features in a neighbourhood around those features. Kernel density is also use in creating a continuous map of feature density. The feature located close to the point shows greater weighting, while a feature located some distance away receives a negligible weighting (King et al., 2016). Besides that, Sari et al., (2020) found that kernel density using interpolation of points distribution with the grid-based distribution to identify hot spots area. It also estimates the intensity through the calculation of the amount which is detected in a specific area.

RESULTS

HOT SPOT OF MOTORCYCLE THEFT IN KUCHING 2015-2017

Figure 4 (a) shows the result of motorcycle theft 2015 by using the kernel density. Ten police station sectors were identified as hot spots for motorcycle theft cases in 2015, namely sector 1 in the Satok border, sectors 1, 2, 8, 9 and 10 in the Sentral sector border and sectors 1 and 2 in the border of Padungan and Sg. Maong. In 2016, most of the hot spots were detected in the Sentral police station sector boundary, including sectors 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10. Motorcycle theft case hot spots were also identified in sector 1 in the sector boundary of Satok, sector 3 located at Gita boundary, sector 1 located at Sekama sector boundary. The analysis found that sectors 1 and 2 in the Padungan boundary were also classified as hot spots of motorcycle theft in 2016 (Refer Figure 4(b). In 2017 a total of 10 sectors in the Sentral boundary were classified as hot spots of motorcycle theft cases. Sectors 1 and 2 which located at Padungan boundary and sector 1 located at Gita boundary as well as sector 1 located at Satok boundary also detected as hot spots as shown in Figure 4(c).

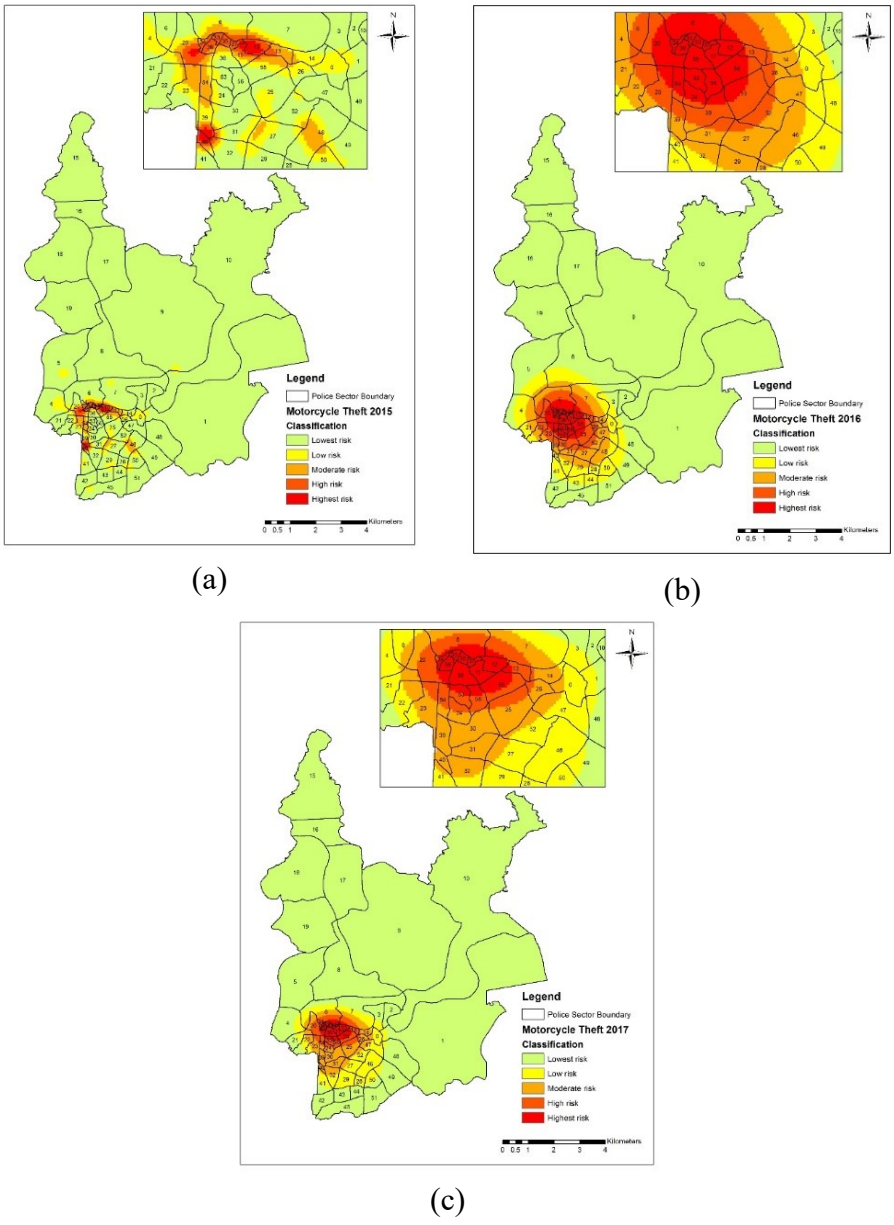

Figure 4: Hot spot of Motorcycle Theft in Kuching, Sarawak for (a) 2015, (b) 2016 and (c) 2017

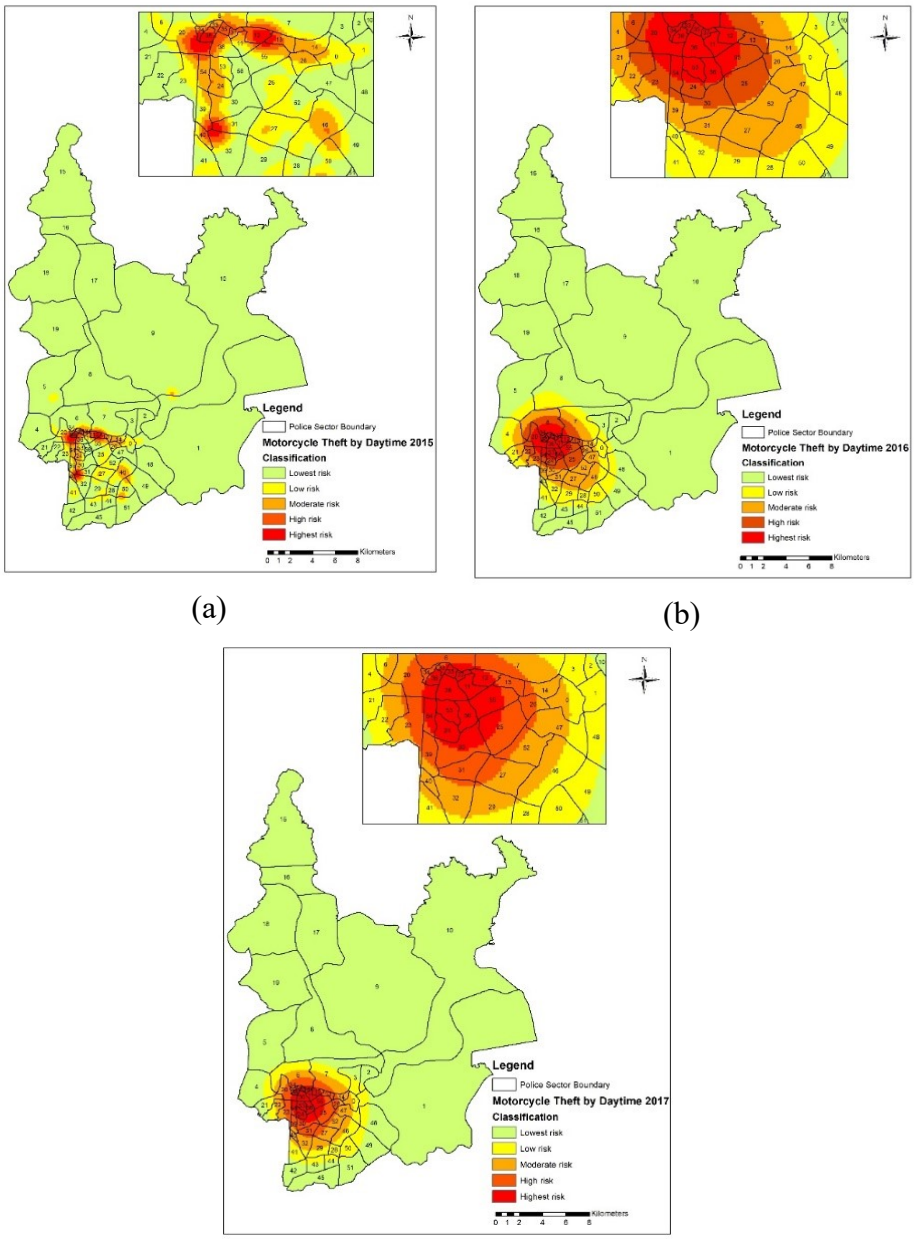

Figure 5: Hot spot of Motorcycle Theft by Daytime in Kuching, Sarawak for (a) 2015, (b) 2016 and (c) 2017

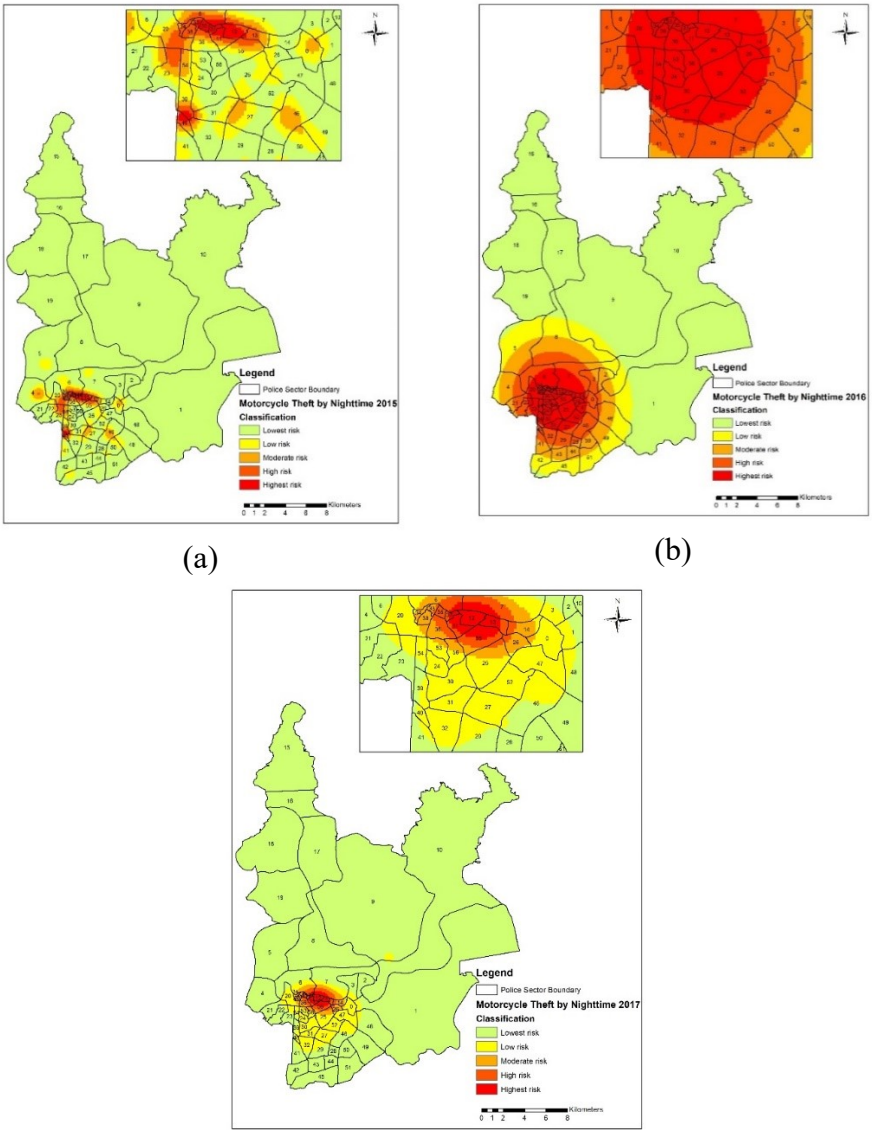

Figure 6: Hot spot of Motorcycle Theft by Nighttime in Kuching, Sarawak for (a) 2015, (b) 2016 and (c) 2017

Figure 5 shows hot spots of motorcycle theft by daytime in Kuching, Sarawak from 2015-2017. In 2015, there were 7 areas detected to have the highest clustering of motorcycle theft (Refer Figure 5a). In 2016, there were 13 areas reported to register the highest clustering rate and were categorized as the most

at risk of motorcycle theft cases in Kuching as shown in Figure 5(b). In 2017, the areas that were classified as motorcycle theft hot spots increased to 14 areas. However, only 3 areas were involved, namely the Sentral, Padungan and Sekama boundaries as shown in Figure 5(c). Figure 6 shows the hot spots of motorcycle theft at nighttime in Kuching, Sarawak for the year 2015-2017. This study found that 5 sectors were classified as hot spots of motorcycle theft at nighttime in 2015 as shown in Figure 6(a). In 2016 the number of hot spot areas for motorcycle theft have increased [Refer Figure 6(b)]. In 2017, the number of hot spots was detected at 5 areas [Refer Figure 6(c)].

DISCUSSION

The visualization classified from lowest risk into highest risk proves to be useful in visually identifying hot spots of motorcycle theft in Kuching, Sarawak. From this study, kernel density helps to identify the concentrated point. The findings here show that hot spots of motorcycle theft mostly occurred in Sentral boundaries sector. This is because the Sentral area is an area that is often the focus of the public. There were more people concentrated in Sentral because this area has a shopping complex, waterfront, eateries, hotels and many motorcycle parking facilities. The frequency of motorcycle theft in Sentral boundaries indicates that motorcycle parking is unsafe and the environment has a high opportunity of crime. Crime occurs influenced by space and the present of victims at daytime and night-time. The results indicate that motorcycle theft is mostly around CBD, however the lowest risk was detected away from the city centres. In Kuching, motorcycle theft mostly occurred during the daytime from 7 am to 6.59 pm which is 54.8% while at night between 7 pm to 6.59 am and the number of cases reported was 45% in the period 2015-2017. This shows that motorcycle theft in Kuching has something to do with routine human activities. During the daytime most motorcycle owners go out of the house, go to work, shop and do various activities that contribute to the high presence of motorcycles in the downtown area. The lack of surveillance and the presence of criminals has created a high chance of motorcycle theft.

CONCLUSION

Areas with high crime clustering densities cannot be detected without using GIS analysis especially when involving the spatial element such as the boundaries of the police station sector. This is because the PDRM detects hot spots based on the number of motorcycle theft cases that has been reported. The IPD Kuching classified area as hot spot depends on total cases that has been reported which is the police station with highest cases of motorcycle theft will be identified as hot spots, while if the police station were identified with lowest cases will be classified as cold spots areas. However, the identifying of hot spot areas based on the number of cases that has been reported could not detect the motorcycle theft

hot spot by sector boundaries with the highest criminal case clustering density. Thus, Kernel Density Estimation analysis helps to detect areas or sectors of the hall that are classified as hot spots and preventive measures can be done more effectively. This study contributes to policy makers in spatial crime prevention decision making. In addition, this study helps to reveal property crime hot spots and crime prevention areas that should be focused by local authorities such as North Kuching City Hall (DBKU), South Kuching Municipal Council (MPKS) and Padawan Municipal Council (MPP).

ACKNOWLEDGEMENT

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LANDSLIDE MONITORING USING CLOSE RANGE PHOTOGRAMMETRY

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Abstract

This paper presents the preliminary results of a simulation study on the production of low cost Digital Elevation Model (DEM) for a landslide study area in Seri Iskandar, Perak. The important objective of this paper is to present the potentiality of Close Range Photogrammetry (CRP) as a data acquisition tool in producing a Digital Elevation Model (DEM) by using data from surface measurement. This method was applied using stereopair photographs captured data from ground level detection, or known as close range photogrammetry with the use of a digital camera mounted on a tripod as a tool for data collection. Close Range Photogrammetry (CRP) applications is useful for mapping of areas that are difficult and risky to point manpower on terrain that consist of steep and dangerous slopes. Conventional methods require measurement using Electronic Distance Measuring (EDM), but this method is very costly and requires a survey team placed on the land site area. The research data were carried out with two different epoch data. The outcome proves that CRP can produce DEM with less cost compared to other methods.

Keywords*:* Digital Elevation Model (DEM); Close Range Photogrammetry (CRP); stereopairs; digital camera; Electronic Distance Measuring (EDM)

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INTRODUCTION

The hill slope monitoring performing that had been antecedently applied by some researchers will be discussed. However, the methods used before had some constraints that limited the monitoring work in terms of how to access the area and the time required to effectively complete the work. Thus, the UAV and CRP method present in this research study will help the country to figure out the problem of not accessing dangerous slopes of the hills and the method will significantly improve the monitoring of landslides.

The CRP technique is used because constant monitoring of the slope in our country is very crucial to detect the movement of soil structure that can change to the occurrence of landslides. The monitoring of landslides should be done more often in nearby regions of continual human activity like the slopes around highways, in residential areas and so on. The constant monitoring can reduce the occurrent of landslides by providing early warning to the authorities about the weakness on the slopes so that proper action can be taken.

Choosing the monitoring method and equipment suitable for the study of ground movement in certain areas depends exclusively on the kind of slopes that is being studied. This is because the in-situ monitoring work affects the slope stability analysis. However, the proposed UAV and CRP method offers a novel remote monitoring method to conduct slope stability analysis. This part will be thoroughly discussed further in this chapter as a new approach to monitor landslides

Photogrammetry has been defined by (American Society for Photogrammetry and Remote Sensing) ASPRS as the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring, and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena (Wolf, 2000).

In general, close-range photogrammetry (CRP) is a technique of representing and measuring 3D objects using data stored on 2D photographs, which are the basis for rectification. In order to obtain 3D information, two photographs of the same objects are necessary. CRP is a part of terrestrial photogrammetry but has dissimilarity in camera to object distance. In CRP, the limit of camera to object distance is less than 100m (Meneses, 2005). CRP is mostly used for deformation measurement of structures, architectural mapping, modeling buildings, documentation of artifacts, reverse engineering purposes, or remodeling traffic accidents and crime investigation. Architectural and archaeological photogrammetry are examples of CRP applications that have widely been used since the 1960s (John, 1999).

The technique is implemented through stereo aerial photogrammetry and continuously developed parallel with the advancement of computer and digital technology (Ellen,2007). Images on close-range photogrammetry can be captured using three types of camera: metric camera, semi-metric camera and non-metric camera (Sunhui, 2005). Measurements by using these digital cameras offer a low cost imaging process, an attractive alternative to mapping data collection tools.

The accuracy of photogrammetric depends on camera resolution, quality of camera calibration, geometry of the camera position and the precision of marking location on the images (Q. Zhang, 2010). Most of the photogrammetry works need accuracy in the project. High accuracy work requires a well calibrated camera. Landslides on sloped areas can be well detected by calculation of Digital Elevation Model (DEM) from at least two different epoch data, or by profiling of longitudinal section or cross section over the DEM observed slope area.

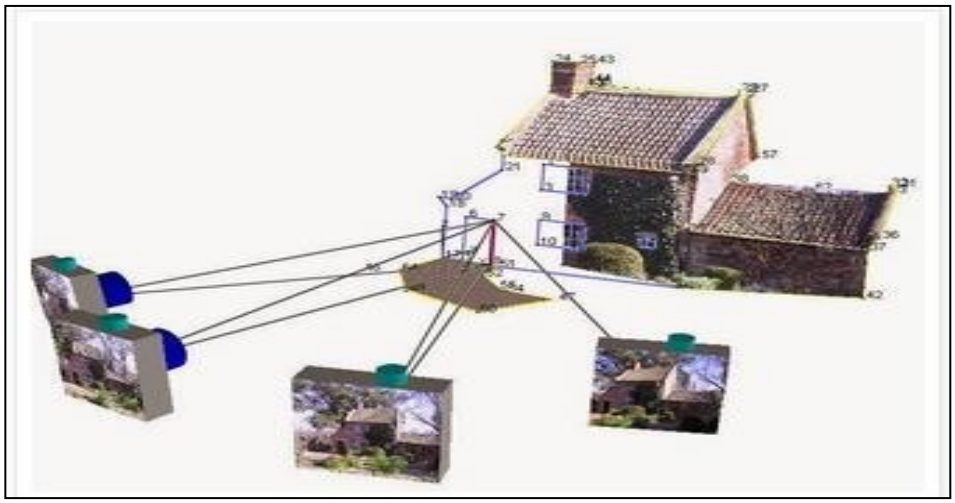

Figure 1: Terrestrial and close range Photogrammetry concept
(Source: http://fotomito.blogspot.com/2014_10_01_archive.html)

LANDSLIDE CLASSIFICATION

Landslides can be defined as the steeply downwards motion of sliding rock, debris or materials on the surface of the earth under high pressure. Most of the landslide occurrences are favored by steep slopes. The steeper the slope condition the greater the potential for landslides. Among the reasons for the occurrence of landslides are natural factors like an earthquake, volcanic eruption activity, heavy rain, and changes in the level of underground water as an agent that can weaken the rock or soil naturally. Look on the type of movement of the hill slopes,

landslides are classified into fall (shaped debris), flow (earthflow) and slides (Z. Othman, 2011).

In Malaysia, landslides are one of the most dangerous natural disasters after floods. Malaysia has high total annual rainfall (tropical) which is one of the main factors contributing to the occurrence of landslides that can cause loss of life and property damage (H. Lateh, 2011). According to H. Lateh (2011), the Malaysian average annual rainfall is between 2000 and 2500mm. From 1970 to 2008, referring to a statistical report issued by PDW more than 300 landslides occurred throughout Malaysia. Soil failure usually occurs in the form of flow (mudflows) which are associated with the water content in the soil.

In fact, (H. Lateh, 2011) found in his research that most of the landslides in Malaysia are shallow landslides triggered by heavy rains that increase the water pressure in the slopes and its eventual collapse. The follow-up of statistical reports propose the need to take urgent action to create knowing to the public about the importance of studies about landslide monitoring on the slope of hills (Husin, M. Z., M. S. Usman, I., & Suratman, R. (2021) The studies are in particular important to the professionals connected with the work of monitoring the slope of hills in Malaysia.

Different from other natural disasters, the incidence of landslides in Malaysia is usually controlled by factors like earthquakes and floods caused by heavy rainfall in certain areas during the monsoon (November to February). The meteorological department is responsible for raising awareness so that people can take precautionary measures and prepare themselves in case of any natural event since they are all concerned about their own safety and properties as well (Suliman, S., Samsudin, S., & Ahmad, M. H. (2021). Landslide occurrences are often fast and without warning especially on slopes of areas undergoing development projects without good planning and not in accordance with the authority standards. This happens because activities like highway construction, mining, etc., accelerate the instability of the slopes.(.H. Lateh,2011).

MATERIALS AND METHOD

For respective years, there have been early in technology that can effectively help researchers to improve remote data collection, whether from a satellite, aerial photo platform (balloon, kite) or manned aircraft. The next paragraphs discuss the application of the CRP method for monitoring landslides by previous researchers.

CRP can be used to observe landslides on the slope of a hill. His research focused on unstable slopes in a former sand mining area at Taman Bandar University, Seri Iskandar, Perak, Malaysia. Two DEMs of the same area were produced using CRP data collected. Results were obtained by comparing the quality of DEM data with data obtained using a reflectorless total station.

Stereo images of the front view of the hill slopes were captured from a baseline distance of 8 meters and the distance from camera to object (slopes) of 50-65 meters for both epoch1 and 2.

The study used a common selection method for the variety of the control point to generate a 3D DEM. Long cross sections of the DEM were used to calculate the amount of translation in the slope of the hill.

This study was conducted in Parit, Seri Iskandar, which is located approximately at 4°23'04.03"N in latitude and 100°56'34.89"E in longitude. There are two different study sites to be used in this research. The aim of this research is to demonstrate the capability and effectiveness of CRP as a data acquisition tool in generating DEM and inaccessible landslide monitoring

The most important step to be carried out in this preliminary work is establishing a control point at the study site located in Seri Iskandar, Perak. It is needed to rectify images and produce 3D models. At least three or four control points are needed in the rectifying process and six control points in producing 3D. The list of equipment used in establishing control points include one total station (Laser Reflectorless GTS -750 series), two tripods, prism and measuring tape.

Data are observations developed from monitoring the real world. Data are collected as facts or evidence that may be processed to give them meaning andthen transferred into information. The data for this research were generated from field investigations at the study site.

DIGITAL ELEVATION MODEL (DEM)

Digital Elevation Model (DEM) is a three-dimensional creation of digital data of an object (towards the east, north and height) that is produced using data from a variety of data collection techniques. Among these methods is a close range photogrammetry (CRP) that uses two-dimensional (2D) photographs as input to obtain geometric information of three-dimensional (3D) objects by extracting the stereo model (R. Scholar, 2012).

In addition, other techniques are used to generate a Digital Elevation Model (DEM) using data from sources like topographic survey, Global Positioning System (GPS), digitised topographic maps, aerial and terrestrial photogrammetry, and laser scanning. Figure 2 illustrates the main framework process for producing and analyzing DEM in several applications.

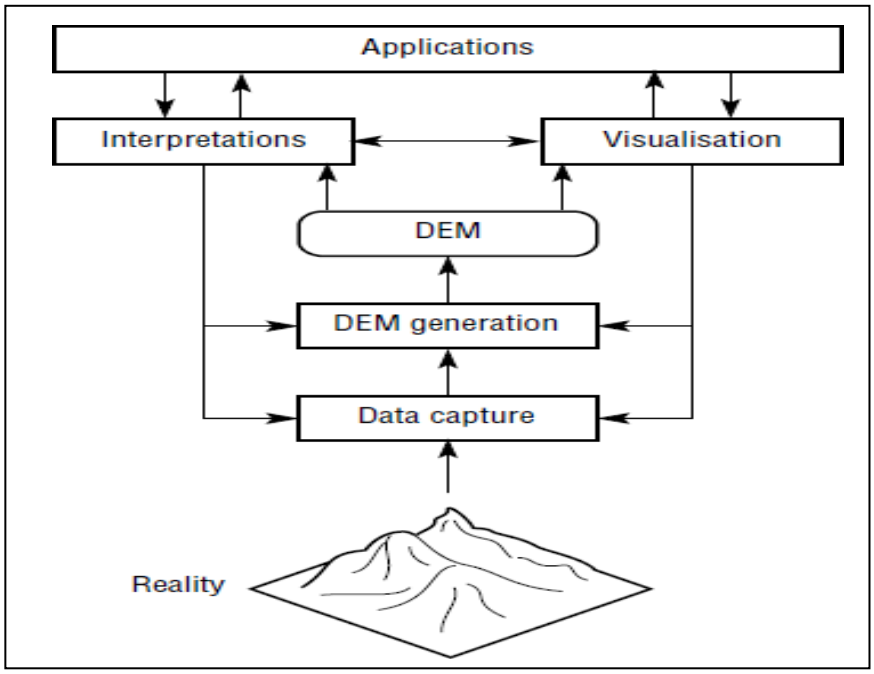

Figure 2: Framework for DEM application. *(Source: M. F. Hutchinson,1996)*

Furthermore, DEM is an elevation data model representing the actual state of the real terrain that helps to monitor the movement of slopes in a related study. Thus, the DEM generated from Photogrammetry sources is an important model for predicting changes in terrain (P. D. Savvaidis,2003).

Finally, DEM is a origin for mapping the relevant characteristics of a terrain such as topography slopes and the quality of DEM representing surface topography is essential in determining the characteristics of the existing topography on the map.

As a further indication, according to S. Suganthi (2010), DEM has the advantage of providing information about the height of the real terrain. In addition, DEM is a representation of a three-dimensional grid based on the height of the real terrain and it is an important aspect of GIS datasets and GIS-based analysis. As mentioned previously, various data reference (mainly contours or data points) can be used to generate a DEM. DEM data is also a valuable source of data for many applications, especially those related to the movement of surface slopes. Therefore, the accuracy of the DEM will be represented by the height and spatial resolution data [40].

FIELD WORK OBSERVATION RESULTS

The results of processing data from the study site consists of three-dimensional points that have coordinate values for each of the Cartesian axes (X, Y, and Z). A 3D model is a set of connected 3D points, edges, curves, and cylinders or shapes representing an object. The results represent the result of a 3D image generated from the collected data from the field site. A DEM represents a regular array of elevation points. The quality of a DEM can influence the accuracy of terrain measurements including slope and aspect (Kang,2008). Slope and aspect play a regular role in hydrologic modeling, snow cover evaluation, soil mapping, landslide delineation, soil erosion and predictive mapping of vegetation communities (Kang, 2008).

The 3D Analyst extension allows 3D GIS data management and creation of layers with 3D viewing properties. Terrain mapping and analysis can use raster data, vector data, or both as inputs. Contouring is the most common method for terrain mapping. Contour lines connect points of equal elevation, the contour interval represents the vertical distance between contour lines, and the base contour is the contour from which contouring starts (Kang,2008).

Imagine a DEM has elevation readings ranging from 44.883 to 62.628 meters. The conception of 3D modeling description of the shape of an object consist of determination of its main frame of reference and if required, creation of the textural database for the selected surfaces of structure. The arrangement and pattern of contour lines reflect topography. For example, contour lines are closely spaced in steep terrain and are curved in the upstream. Each commercial software has different advantages in processing the data. No measurement technology can be perfect, and all measurements involve performing approximations. ArcGIS 9.0 is no different. Not all the 3D coordinate results can be of the same quality.

The slope measures the rate of change of elevation at the surface location. Slope may be expressed as percent slope or degree slope. For this paper, the result of slope is shown in degrees. Aspect Model is the directional measure of slope. Aspect starts with 0 degree at the north moving clockwise and ends with 360 degree also at the north. Slope and aspect were derived extremity from the contour map.

Table 1: Typical elevation accuracy from different data source used to compare DEM Accuracy (Source: T. Hengl, 2003)

Collection Method	**Main Characteristics**	**Examples systems used**	**DEM Accuracy**

Ground survey	Highest accuracy; Small sampling; High costs	DGPS systems, Tacheometry (total station), levelling systems	≤ 1m; 1mm- 1m; ≈ 1mm
Stereoscopic imagery	High sampling density; Can be semi- or fully automated; vegetation is a constraint;	Aerial photography, Satellite imagery (SPOT, ASTER)	0.1-1m;10m (20m)
Laser scanning	Placed in the airplane navigated with GPS; The raw data require filtering and resampling before it can be used	Airborne laser scanning (LIDAR)	≈ 0.2-1.0m

There are various methods that had been implemented by many researchers in the previous studies regarding to the monitoring of landslides. At present, it is possible to predict the location of potential landslide occurrence. However, there limitations and constraints in methods that are being implemented and consequently better methods are necessary to improve the monitoring of landslides. Most of the methods discussed cannot be implemented in areas that are inaccessible and dangerous taking as example steep slopes nearby a highway. In addition, monitoring of slopes using existing methods require extensive manpower in the study area, the period of time to obtain complete information is quite long and the total budget is high. Therefore, in order to effectively address the concerns mentioned above, this research study proposes a novel method of monitoring landslides by Close Range Photogrammetry as a platform for collecting data especially in areas that are not accessible. Finally, the slope profile depicting soil displacement and physical changes is extracted and analyzed using the DEM covering the potential landslide area.

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THE EVALUATION OF PEDESTRIAN FACILITIES ON *HAJJ* CROWD BETWEEN *ARAFAT* AND *MUZDALIFAH* PEDESTRIAN STREET

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Abstract

Makkah is the holy city of Muslims which is located in the southwest of Saudi Arabia. It is the being visited by pilgrims from all nationalities every year for the annual Islamic Pilgrimage (*Hajj*). *Hajj* is the fifth pillar of Islam which is the largest annual religious pilgrimage event in the world. The Hajj management authority specifies that the current pilgrimage's performance is challenging due to the increase of pilgrims every year. Pedestrian conflicts and uncomfortable walking environment are the crucial issues that have been identified, which are due to insufficient pedestrian facilities. Hence, this paper presents the pedestrian facilities assessment between *Arafat* to *Muzdalifah* road. The objectives of the study are to determine the available pedestrian facilities for pilgrimage from *Arafat* to *Muzdalifah*, and to suggest the suitable solution for pedestrian facilities in every 5 minutes walks. Meanwhile, qualitative methods of site inventory and observation were applied to gather the related data on the selected study area. Possible pedestrian facilities design is suggested for the purpose of future *Hajj* improvement.

Keywords: Pilgrims, Hajj, crowd, pedestrian facilities

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INTRODUCTION

The meaning of *Hajj* (Meaning of Hajj), a program of movement from *Arafat* to *Muzdalifa*

The annual Islamic Pilgrimage (*Hajj*) is a unique religious gathering for millions of Muslims worldwide to be at one place (city of Makkah, Saudi Arabia) within specific days every year. Generally, *Hajj* is one of the five pillars of Islam, and it is a set of worship act to be performed in and around Makkah at least once of a Muslim's lifetime who satisfies a particular condition. Felemban et.al (2020), stated that *Hajj* is the massive gathering of Muslim events with around 3 million pilgrims visit Makkah every year. The Hajj pilgrimage consists of several religious rituals with complex movements. Moreover, the journey of *Hajj* usually completes over five days, and Makkah has hosted the annual pilgrimage for the last 14 centuries. According to the current statistics by the General Authority for Statistics in Kingdom of Saudi Arabia (GASTAT), the pilgrims number are expected to increase every year (Alabdulkarim et al., 2016) .

Understanding crowd management in the context of *Hajj*

In the normal condition of *Hajj* gathering , the massive pilgrims crowd had led to uncomfortable environment and uncompromised safety during the pilgrimages (Alabdulkarim et al., 2016). Crowd presence had reduced the physical bubble space of an individual and resource struggling (Gifford.2007). Pilgrims' behaviour particularly the changes of body sway had cause repetitive crowding disasters (Alnabulsi & Drury, 2014). Kingshott (2014) specified that the crowd behaviour is vary depending on social, religious, emotional, cultural composition and intentions. Handling huge pilgrim crowd's movement in the holy city is complicated (Rahman et al,2017). Upon arriving to the Holy City of Mecca, the pilgrims are bounded by specific religious obligations and event during the Hajj pilgrimage which required to be completed within specific time limit. As for consequence, in some cases, the huge crowd event had led to fatal accidents among the pilgrims. Fruin (1993) stated that crowd management is understood as a systematic planning for the arranged movement and assembly of members as people. Therefore, the improvement on pedestrian facilities provided is essential to ensure smooth flows of the pilgrim's event and comfort. In fact, providing an excellent service for pilgrims is among the main concern of Saudi's *Hajj* management (Yamin & Albugami, 2014). The fact that it is quite challenging to alter the pilgrim's facilities considering the pilgrims health, safety, and security, however, this effort will bring benefit to the future pilgrims.

LITERATURE REVIEW

Pedestrian movement and traffic condition during Hajj

Makkah is still expanding, and the Hajj pilgrims is expected to rise up to 5 million according to the vision of 2030 (Saeed et al., 2021). However, due to Covit-19

pandemic, the Saudi government had announced that there is no Hajj in 2020 until further notice. To handle the pilgrim crowds, the Saudi government has constructed three mobility types that connect the old city of Mecca to the new districts by the current tunnel networks, namely i) vehicle-only, ii) vehicle and pedestrian, as well as, iii) pedestrian-only tunnels. Based on Figure 1, during the *Nafrah* of pilgrims, the pedestrian's movement and vehicles from *Arafat* to *Muzdalifah* experience severe bottlenecks due to huge pilgrim crowd's arrival in *Muzdalifah* after the dawn of "*Fajr".* As a result, the *Hajj* pilgrims experience discomfort and stressful condition, as they are required to reach the next destination within stipulated time.

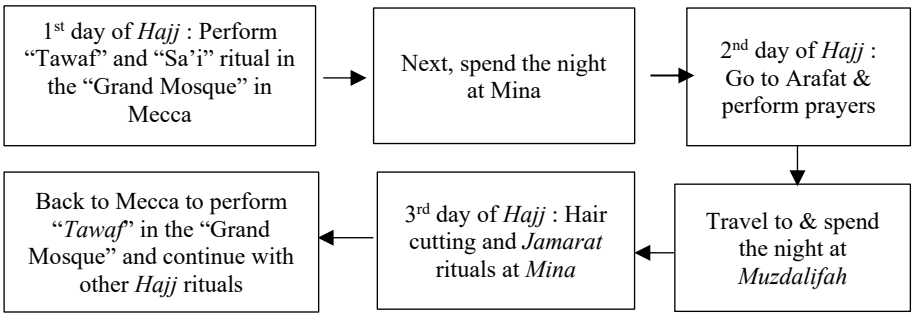

Figure 2: Main Activity of performing Hajj in *Mina, Arafat and Muzdalifah*
Source: Adapted from Yamin & Albugami (2014)

The *Arafat* is the most crowded site during the 2nd day of *Hajj*. Hence, the existing facilities at Hajj areas turn more congested due to overcrowding of pilgrims and causing limited pedestrian movements (Owaidah, et.al (2019). Abdelghany et al. (2012), estimated that the peak pedestrian flow rate between *Arafat* and *Muzdalifah* had reached 500,000 pilgrims per hour and expected to increase by years. Friberg & Hjelm (2015), emphasized that pedestrian overcrowding may lead to rushes, traffic and human bottlenecks, counter flows, stop-and-go waves, crowd turbulence, and panic among the pilgrims. Therefore, the *Hajj* traffic department had developed traffic plans, to reduce the traffic congestion, including *Nafrah* from *Arafat* to *Muzdalifah*, by constructing expensive corridors along roads for wagons (Alkharoubi, 2020). Unfortunately, this issue still remains until today. The *Hajj* authorities has specified four roads for pedestrians and five roads for vehicles to reduce the issues of critical pedestrian-vehicles conflict within the *Arafat-Muzdalifah* Road. During this time, around half a million pedestrians choose to walk to *Muzdalifah*. At sunset, a massive traffic jams with slow vehicle movement causes some passengers decide to walk for the rest of the distance.

The significant of pedestrian facilities during Hajj

Kaya (2009) emphasizes that one of the important approaches to solve the crowd tragedy is to improve the level of services on pedestrian facilities aspect. Moroever, the level of street friendliness, pedestrian safety (Sangeeth & Lokre, 2019), comfort, attractiveness and accessibility (Quednau, 2018) are strongly influenced by the pedestrian facilities provided at particular areas. Hence, it is important for the Saudi government to consider these aspects, particularly for such important event of *Hajj* pilgrimage. Indeed, street walkability increases when the street offers comfortable, safe and accessible pedestrian infrastructure to its users, (Litman (2016), Kinyingi, Mugwima & Karanja, 2020).When the street offers comfortable environment with smooth pedestrian flow and easily accessible street, the pilgrims would have more time to focus on their *Hajj* activities, without being distracted by other factors such as being lost or anxious while performing *Hajj*. Additionally, the *Hajj* crowd had resulted to stress (Alsolami, Embi, & Enegbuma 2017) and decreased of positive emotion (Kim, Lee, & Sirgy ,2015), which affect the pilgrims' satisfaction. In this study, it can be suggested that the pedestrian street for *Hajj* does not necessarily attractive. However, factors such as safety, comfortable and accessible need to be taken seriously, to ensure the *Hajj* pilgrimages efficiency.

RESEARCH METHODOLOGY

Qualitative research method of site inventory and analysis were applied to achieve the aim and objectives of this paper. Observation was made based on the prepared site inventory checklist, formulated based on previous literature reviews. Google earth mapping is produced to investigate the existing facilities on one of the walkway roads between *Arafat* and *Muzdalifah* (Saunders et al., 2018). The case study focuses on *Nafra* access roads, from *Arafat* to *Muzdalifah* (Figure 4.1). By analyzing the current facilities between *Arafat* and *Muzdalifah*, the researchers will have the ability to determine the existing services between the two locations (Langley & Klag, 2019).

Site inventory and analysis

Figure 4.1 below demonstrates the selected pedestrian route from *Arafah* to *Muzdalifah* which are divided into eleven (11) segments with 400m to 500m length each (Meenakshi,2011; Garau, Annunziata and Yamu,2020). Each segment was divided based on the comfortable walking range of 5 to 10 minutes walking suggested from numerous walkability study. The assessments look into either the nearest facilities provided are easy to reach or vice versa. Azmi, Karim and Amin (2012), suggested that the accepted threshold for walking to local facilities is within 400 m, while 800 m is a suggested threshold for walking to a town centre. Hence, in this study, the range of 400m to 500m were applied for

walking threshold to the pedestrian facilities provided for selected route of this study.

Figure 4.1: The location and key plan for Nafra, from *Arafah* to *Muzdalifah*
Source: Google Map (2021)

Availability and Access to Pedestrian facilities

Table 4.1 below presents the findings for each pedestrian facility provided along the selected street from Arafat to *Muzdalifah* for 400m to 500m range of walking.

Table 4.1: Findings on pedestrian facilities available at selected pedestrian street

Region number	Length	width	Toilets complex	Bench (Charis)	Water fountain	Health Center	Axis with the disability Road	Informational	Shaded chair	Close to the train
1	400	30	√	√	√	√	x	√	x	x
2	400	30	√	√	√	x	√	√	x	x
3	400	30	√	√	√	√	√	x	x	x
4	400	30	√	√	√	x	√	√	x	x
5	400	52	√	√	√	x	√	x	x	x
6	460	22	√	√	√	x	√	x	x	x
7	450	22	√	√	√	√	√	√	√	x
8	450	22	√	√	√	x	x	x	x	x
9	400	52	√	√	√	x	x	√	x	x
10	400	52	x	√	√	x	x	x	x	x
11	490	52	√	√	√	√	x	x	x	√

*√ - available , x – not available *Sources: Author (2021)*

Pedestrian lane

Table 4.1 evidenced the pedestrian lane width provided along the route were inconsistent where segment one until four were designed with 30 m in width. Meanwhile, the fifth, and nine to eleventh were designed with 52 m in width, segment 6 until 8 demonstrated of 22 m width. The pedestrian lane inconsistent with width because certain segments were merged together. Hence, resulted in

larger pedestrian lane of 52m width, for instance segment number 5, 9, 10 and 11. Figure 4.2 illustrates the merging of pedestrian segments of number 5 and 9.

Figure 4.2: The dotted red line illustrate the merging of two sidewalk for segment no. 5 and no.9

Based on the observation, the merging of two separated pedestrian lanes shared the same pedestrian facilities and services which includes benches, water cooler, signage and lighting elements. Hence, it can be suggested that different paving material could be applied for two pedestrian lane segment that merged together to avoid discomfort and conflict among pedestrian. The safety of pilgrim is also uncompromised in *Hajj* condition as the crowds are rushing to reach the stipulated destination within limited time. Nashar (2018) highlighted that pedestrian comfort is measured through their freedom to change the body directions at any time and to walk freely whenever they feel like it without any conflict. Harun,Nashar and Bachok (2020), emphasis that street walkability is associated with other attributes such as visual quality, attractiveness, safety and comfort. In this context, safety and comfort of pilgrim are two important that need to be taken into consideration. Based on the arguments, the existing pedestrian lane width provided does not provide comfort to the pilgrims (Figure 4.3).

Figure 4.3: Pedestrian crowd along the route from *Arafat* to *Muzdalifah*

Figure 4.4: Pilgrims wait for their turn to use the toilet provided

Toilet complex

Table 4.1 evidenced only segment no.10 is not equipped with toilet facilities. However, the observation indicated that more toilets should be added to ease the pilgrims' *Hajj* journey and to minimize waiting time to use the toilet (Figure 4.4). Walking affordance are varied based on the different group ages and backgrounds. Older people have slower walking pace as compared to the younger group age. In a case of emergency, people with slower walking pace might face discomfort and difficulties. Azmi, Karim, & Amin (2012), supported that the maximum walking distance for the elderly from Asian countries or are only 190 meters,191 m to 380 m of walking distance for children. Maximum distance for adults is from 381 m to 600 m. Over 600 meter is considered as uncomfortable distance to walk.

Benches, shaded chair and water fountain

Based on Table 4.1, the benches and water fountains are available and functional at every segment from *Arafah* to *Muzdalifah*. However, shaded chairs are only available at segment no.7. Hence, it can be indicated that the presence of shaded chair is essential, particularly in a country that experience both rainy and hot humid climate (Figure 4.5). In hotter and more humid cities, walking affordance may end up shorter in open and unshaded street. Hence, improving the walking environment by installing overhead canopies or shades can significantly increase the pedestrian comfort and willingness to walk. Indeed, shading elements in any form is essential to offer pedestrian comfort from hot and humid environment or climate (Babu, Subbaiyan & Tadepalli, 2016), helps to decrease paving heat and temperature including low albedo materials (Kasim et.al, 2019).

Figure 4.5: Pilgrims are resting under uncovered bench during rainy season

Figure 4.6: Aluminum bench material is unsuitable for hot and humid climate

Figure 4.7: Water fountain stop point provided for the use of pilgrims

In terms of water fountain, each segment has been provided with water cooler station which provides free water for the pilgrims to boost up their energy especially during hot and humid climate.

Healthcare centre, signage and proximity to train station

The presence of healthcare centre is essential to *Hajj* journey particularly during an emergency case. According to Table 4.1, few segments provided with the healthcare facilities including segment no.1, no.3., no.7 and no.11. However, the color selection for the healthcare building does not attract the pedestrian eyes and some pilgrims might overlook the healthcare building. To add, the healthcare centre signage font is unreadable from the other pedestrian lane area (Figure 4.8). The information signage on availability of pedestrian facilities and location were provided only at certain checkpoint. Nevertheless, the signage condition of font size and colors are not attractive and readable to the pilgrims (Figure 4.8). Hence, bright and contrast color for signage font can be applied to improve the signage legibility and to make it more visible for the pedestrians. The object with higher contrast, enable pedestrians to read the signage easily (Rapport, 1990). The signage readability is very crucial for those pilgrims that are not familiar with the area. This statement is supported by study conducted by Bohari, Bachok and Osman (2014), that familiarities is one of the important measures to influence the pedestrian walking speed and avoid lost in a particular destination. If the walking speed increase, less walking time is required to reach the destination.

Figure 4.8: Unattractive health centre and signage condition provided at selected segment of pedestrian route

Finally, based on Table 4.1, the results showed that only segment 11 is the nearest checkpoint to the train station, with only 400m to 450m distance away. Countries that experience hot and humid climate rely more on public transport commuters. Hence, few more checkpoints to the commuters would ease the *Hajj* journey considering the pedestrian comfort and safety of walking. As majority of pedestrians and public transport commuters depends mainly on walking as primary mode of daily travelling, it is essential for the authority to improve on pedestrian facilities and provide better public transport system. Indeed, other

studies also suggested that besides safety and accessibility, street infrastructure is one of the important design elements to ensure the pedestrian comfort. In this context the pedestrian refers to the pilgrims who is performing the *Hajj*.

Conclusion

In summary, based on the presented findings and analysis, majority of the existing pedestrian facilities provided are insufficient to support the numbers of pilgrims that keep increasing by years, coming from different countries and age groups. Modern facilities for *Hajj* are adequate for just two million people. On the other hand, since pedestrian walking affordances are vary depending on age and pilgrim's background, this research suggests the common walking radius to access the pedestrian facilities provided. The distance use to conduct the analysis, is by considering pedestrian's comfort, security, and safety for pilgrims during their movement between the holy sites which are *Arafat to and from Muzdalifa, as well as to and from Mina*) (Haase et al., 2016). It is hoped that the implication from this research would help to improve the existing condition of the busiest routes during *Hajj* pilgrimages to increase the pedestrian comfort and safety in the near future.

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ISSUES FACED BY TENANTS IN HIGH-RISE STRATA RESIDENTIAL: CASE STUDY OF KLANG VALLEY

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Abstract

Recently, demand for high-rise residential has increased every year and shifted residential development patterns from vertical to horizontal development. Living in high-rise residential will require residents to share common facilities and resources. For that, a management body is known as Management Corporation (MC) or Joint Management Body (JMB) is established. This management body is responsible to collect the service charge from residents, as well as managing and maintaining the buildings and common property. However, a review of the literature has found out gaps between the MC responsibility and residents' satisfaction. Driven by study objectives, this study focuses on exploring issues faced by the tenants living in the selected high-rise strata housing. Through a questionnaire survey, responses are randomly collected and analysed. A descriptive table, Relative Importance Index (RII) and correlation test are used in the analysis to provide findings for the study.

***Keywords**:* High-rise strata, JMB, MC, common facilities

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INTRODUCTION

Living in stratified properties is becoming a common lifestyle especially in a major urban area in Malaysia. Recently, demand for high-rise residential buildings has increased annually due to land scarcity for the development of landed property in urban areas especially Penang, Kuala Lumpur, Selangor and Johor Bahru. The construction of high-rise buildings or also known as strata development is seen to address the scarcity of land in addition to rapid development and increased demand for housing.

In general, a strata building consists of a building divided into parcels consisting of the accessory parcel and a provisional block (if any), and everything else is considered common property such as corridors, lifts, external walls, open space, and water tanks. According to Section 4 of the Strata Titles Act 1985 (Act 318) and Section 2 of the Strata Management Act 2013 (Act 757) interpret a simple definition of common property as a piece of land in the strata that is owned by two or more owners of parcels and that does not include any specific subdivision of parcels. It also can simply define as a single property within a larger integrated development that shares the same facilities. To keep the building and facilities well-maintained, the residents are required to pay for a service charge as a fee while the Management Corporation (MC) is appointed to be responsible for managing the facilities provided. This is to ensure efficient management of strata properties which will contribute towards sustainable development. However, reviews of the literature have found out gaps between the MC management responsibility and residents' satisfaction. This paper will address and analyse the issues faced by tenants living in strata property in Klang Valley.

HIGH-RISE STRATA DEVELOPMENT IN MALAYSIA

The term 'strata' was first introduced legally in 1985 in response to the massive growth of multi-storey buildings due to rapid urbanisation in major Malaysian cities. However, only after the amendment of the Strata Management Act 2013 (Act 757) in 2015, the strata get a great deal of attention. Reena Kaur Bhatt (2018) describes the term 'strata properties' as a development or housing scheme that have a different lot or is referred to as parcels that are carved out of the building or land. In the other words, strata properties include such as flats, condominiums, townhouses as well as landed homes in gated and guarded (G&G) neighbourhoods are included in residential strata properties. The Strata Titles Act 1985 (Act 318) sets out the framework that determined the ownership of the parcel including the airspace. It also specifies the upkeep of the shared facilities or known as the common property. The Building and Common Property (Maintenance and Management) Act 2007 (Act 663) was enacted to provide for the proper upkeep of the common property in all the strata properties. According

to Section 2 of Act 663, “common property” in the strata development area is related to the structural elements of the building. Besides, it also includes the exterior of all common parts of the building as well as all other facilities and installations and any part of the land used or capable of being used or enjoyed together by all the residents of the building. In relating to the right of common property, all the individuals or proprietors have rights and obligations in common with all other users or proprietors to use and maintain the property.

In referring to the statutory definition of common property (Act 663, Section 2), 'common property' is defined as the development area as is not comprised in any parcel, including;

- the structural elements of the building;
- stairs, stairways and fire escapes;
- entrances and exits, corridors and lobbies;
- fixtures and fittings;
- lifts;
- refuse chutes and refuse bins;
- compounds;
- drains, water tanks, sewers, pipes, wires, cables and ducts that serve more than one parcel;
- the exterior of all common parts of the building;
- playing fields and recreational areas;
- driveways, car parks and parking areas;
- open spaces, landscape areas;
- walls and fences;
- all other facilities and installations; and
- any part of the land used or capable of being used or enjoyed in common by all the occupiers of the building.

Under the Strata Titles Act 1985 (Act 318) gives the framework for forming up the Management Corporation (MC) to undertake and manage the strata scheme. Before the establishment of Management Corporation (MC), Joint Management Body (JMB) will be set up acting as an interim body to operate from the time the developer has delivered the vacant property to the buyers. Based on the amendment of the Strata Title Act 1985 in 2007, it stipulates that the MC can only be formed after 25 per cent of aggregate share units transferred either after the Joint Management Body (JMB) period if without strata titles or after the developer period if strata title was issued.

The formation of a Management Corporation (MC) is required in all strata schemes. The MC is a body formed by a committee board consisting of owners or owners of strata units. The MC plays a significant function to manage strata schemes properties in Malaysia, under the Commissioner of Building (COB) as stipulated in Act 318 and Act 757. For parcel owners and common

property, the MC is responsible to oversee the funding, upkeeping, and management. The MC consisting of the owner of the parcel is also responsible to ensure that all the facilities are repaired in good and operable condition. In terms of maintenance and management of the strata property, the general powers of MC and JMB are set out in Section 21(2) of Act 757 which includes collecting charges and contributions to the sinking fund from parcel owners based on the allocated share units, carrying out maintenance and management of the buildings and to recover any cum expended by the JMB from parcel owners.

An individual includes a normal person, corporation, or other such entity according to the relevant law is referred to as 'tenants'. The satisfaction of the tenant has become a key concern in the housing market. The modernization of housing trends has several aspects that drive the needs and alternatives of residents and have a large impact on how they are satisfied (Khalfan & Haq, 2019). Based on Gibler et al., (2014), tenants are customers who like to receive additional rental services at the cost they pay. Due to additional fees for transactions, satisfied tenants are less interested in changing their houses except for the time they are looking for and relocating to a new home. Jiboye (2009) declared that the housing satisfaction of the tenants varies and is affected by housing, the surroundings and the management systems.

As shown in Table 1, a growing number of transactions on high-rise residential property development especial for Kuala Lumpur and Selangor indicate that a higher demand for that kind of properties development. Moreover, Figure 2 shows statistics on the increasing number of high-rise developments with their average price in Kuala Lumpur.

Table 1: Residential Property Transactions by Type in Major States Q1 2020

Residential Property	**Major States (units)**				
	WP Kuala Lumpur	Selangor	Johor	Pulau Pinang	Perak
Terrace	383	4974	3221	766	2320
Condo/ Apt	1,317	1907	433	417	159
Semi-D	48	696	417	244	352
Detached	66	447	260	126	478
Low-cost	310	2545	879	593	570
Vacant Plot	34	611	1195	76	1312
Others	263	1022	299	526	153

(Source: REHDA Institute, 2020)

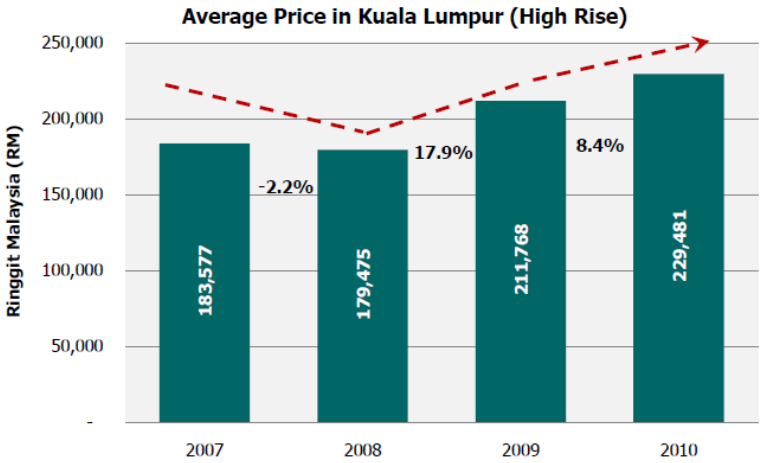

Figure 2: No of high rise residential units sold with average price in Kuala Lumpur
(Source: REHDA Institute, 2011)

Among the reasons why people choose to stay in a vertical residential area is the facilities and services served for the residents are commonly within the house area. Several studies (Nor Amira Abdul Samad et al., 2018; Isma Haniza Fakhrudin et al., 2011; Tawil et al., 2010) indicate that preferences to living in high-rise property are varied, from lifestyle by the current living trend to having more opportunities for the residents to enjoy complete common facilities and for future investment. Thus, a responsible management body and ownership structure are essential to create a quality living experience for the residents and ensure that all strata properties are maintained (Tiun, 2009).

RESEARCH METHODOLOGY

For this study, the methods used are quantitative and qualitative research. For qualitative research, a review of literature, journals, published data from various secondary sources was employed. Driven by the objective formulated based on qualitative analysis, a quantitative method is used to answer the research question.

Population living in strata scheme in Klang Valley under the jurisdiction of the local authority of Selayang Municipal Council (MPS) was selected as the sampling for this study. The selection of the study area was based on the fact that the development of the high-rise residential is highly concentrated in the area. Since the data collection was planned during the pandemic and Movement Control Order (MCO), the strata residential in the study area was randomly selected based on the agreement by the MC to assist in data collection. The questionnaire was distributed through MC to the target population while site inventory was done by the researcher during the collection of the survey form. Due to the low number of participations from the target population, a convenient sampling method was applied that is based on the availability and willingness of respondents. Overall, 400 samples were targeted for the preliminary stage of data collection, however, the study only managed to get 100 responses.

For the data analysis, several methods including descriptive analysis by using frequency and percentage tables are presented in this paper. Besides, the Relative Importance Index (RII) was also done to present analysis related to respondents' satisfaction with facilities and damages that happen in their residential area. In addition, inferential analysis using the Spearman Rho was also conducted to explore the relationship between respondents' socio-economic background with their level of satisfaction.

FINDINGS AND ANALYSIS

Respond from 100 respondents were analysed in this study. Table 2 shows the socio-economic background of respondents involved in the study.

Respondents' Background

Table 2: Summary of Respondents' Background

Variables	Components	Percentage (%)
Gender	Male	60
	Female	40
Age	21 - 40 years old	80
	41 - 60 years old	18
	Above 61 years old	2
Race	Malay	96
	Chinese	0
	Indian	4
Marital status	Single	8
	Married	92
Education level	Degree	10
	Diploma	12
	Certificate	28
	SPM	50
No. of Household	1 – 3	14
	4 - 6	44
	7 - 9	30
	10 and above	12
Employment Sector	Government (Regular)	6
	Government (Contract)	6
	Private (Regular)	32
	Private (Contract)	16
	Self-employed	36
	Unemployed	4
Monthly income	< RM1000	4
	RM1001 - RM1500	38
	RM1500 - RM2000	28
	RM2001 – RM2500	16
	RM2501 >	14

Source: Field Survey, 2021.

Condition of Common Facilities Provided

A question related to respondents' satisfaction with the provision of common facilities in their residential area was stated in the survey form. Responses based on a rating scale of 1 very unsatisfied and 4 very satisfied are used then the Relative Importance Index (RII) for each facility are calculated based on respondents' scale of preferences in the survey form. The result of RII is presented in Table 3 below.

Table 3: RII result on Satisfaction level on common facilities provided

Common Facilities	RII = ΣW / (A*N)	Rank
Surau	0.72	1
Mailbox	0.685	2
Dumpster	0.68	3
Landscape	0.67	4
Playground	0.56	5
Stairs	0.56	5
Parking Space	0.555	6
Open Space	0.55	7
Fence	0.52	8
Main Pipe Tank	0.51	9
Multipurpose Hall	0.44	10
Lift	0.415	11

Source: Author's Calculation, 2021.

12 common facilities are identified to be provided in the study areas. From the result, the highest RII score ranked as first is 0.72 on satisfaction towards the condition of Surau, followed with second highest is mailbox condition (RII 0.685) and dumpster ranked as third (RII 0.68). Playground and stairs shared the same fifth rank with an RII score of 0.56 respectively. On contrarily, respondents claimed they were dissatisfied with the condition of lift that based on RII score is ranked as the last rank with a score of 0.415. Based on an interview with several respondents, the conditions of common facilities that were provided in their residential areas were different based on maintenance and management practice.

Types of damages often reported by a tenant living in high-rise strata property are identified from various literature reviews. The damages are listed in the questionnaire survey and respondents were asked to rate based on their agreement that damages often happen with a scale of 1= totally disagreed, 2= disagreed, 3= agreed, 4= totally agreed. The result of the survey is presented in Table 4 below.

Table 4: RII result on types of damages often happen in the residential property

Types of damages	RII = ΣW / (A*N)	Rank
Vandalism	0.91	1
Water tank leaking	0.905	2
Pipes leaking / clogged	0.9	3
Surau / hall damaged	0.89	4
Roof leaking	0.89	4
Manhole clogged	0.885	5
Garbage house poor maintenance	0.875	6

Gutter / rainwater pipe down clogged	0.86	7
Playground damaged beyond repair	0.86	7
Apron / drainage clogged	0.855	8
Retaining wall crack	0.855	8
Floor / wall leaking	0.84	9

Source: Author's Calculation, 2021.

Table 5: Spearman test between types of damages often happen in the respondents' residential property with socio-demogarphic background

Correlation Coefficient (CC)						
Types of damages	**Age**		**Monthly Income**		**No. of Household**	
	CC Value	**p-Value**	**CC Value**	**p-Value**	**CC Value**	**p-Value**
Vandalism	-0.550**	0.000	-0.191	0.057	-0.284**	0.004
Water tank leaking	-0.521**	0.000	-0.191	0.057	-0.145	0.150
Pipes leaking / clogged	-0.491**	0.000	-0.273**	0.006	-0.317**	0.001
Surau / hall damaged	-0.569**	0.000	-0.173	0.084	-0.259**	0.009
Roof leaking	-0.446**	0.000	-0.209*	0.037	-0.331**	0.001
Manhole clogged	-0.450**	0.000	-0.098	0.332	-0.308**	0.002
Garbage house poor maintenance	-0.485**	0.000	-0.206*	0.040	-0.278**	0.005
Gutter / rainwater pipe down clogged	-0.396**	0.000	-0.202*	0.046	-0.242*	0.016
Damage of Playground equipment	-0.293**	0.003	-0.206*	0.039	-0.295**	0.003
Apron / drainage clogged	-0.321**	0.001	-0.273**	0.006	-0.276**	0.006
Retaining wall crack	-0.321**	0.001	0.047	0.645	-0.223*	0.026
Floor / wall leaking	0.0252*	0.012	0.098	0.332	-0.306**	0.002

Note: CC = Correlation Coefficient
** & * Correlation is significant at the 0.01 level (2-tailed).

The result of the Spearman test on the type of damages often reported by a tenant living in high-rise strata property against their background is tested. As shown in Table 5 above, since all p-values for types of damages with variables age are less than 0.05, thus the null hypothesis can be rejected, similar to the result for variables number of households. However, only several results for variables monthly income that tested has a p-value with less than 0.05. Overall, all significant results indicate there is a negative relationship between the variables that show as an increase in age, monthly income and number of households, increase the agreement towards claimed damages to often happen in the residential property.

Respondents were also asked about their satisfaction on overall living condition in the strata residential property. Their responses are tested against their socio-demogrpahic background and the result is recorded in Table 6.

Table 6: Spearman test between respondents' satisfaction on with socio-demogarphic background

Correlation Coefficient (CC)						
Level of Satisfaction on overall living condition in the strata residential property	**Age**		**Monthly Income**		**No. of Household**	
	CC Value	**p-Value**	**CC Value**	**p-Value**	**CC Value**	**p-Value**
Condition of the dwelling	-0.317**	0.001	0.067	0.510	0.269**	0.007
Relationship with homeowners.	-0.080	0.430	0.277	0.100	0.005	0.100
Safety of the neighbourhood	-0.292**	0.003	-0.147	0.145	0.129	0.201
Safety of the residence	-0.657**	0.000	-0.036	0.724	-0.113	0.262

Note: CC = Correlation Coefficient
** & * Correlation is significant at the 0.01 level (2-tailed).

The result in Table 6 indicates that there is no relationship between the monthly income variable with all items of overall living condition in the strata residential property as all the p-Values are more than 0.05. However, the result in the table shows that the null-hypothesis of no relationship between variables can be rejected since the p-value are less than 0.05 for age variable with 'condition of the dwelling' (p-value=0.001), 'safety of the neighbourhood' (p-value=0.003) and 'safety of the residence' (p-value=0.000). In addition, the correlation coefficient of the tests shows there is a negative relationship between the variables. The negative relationship indicates that respondents with older age are more dissatisfied with the conditions of the condition of the dwelling (cc = -.317**), the safety of the neighbourhood (cc = -.292**) and safety of the residence (cc = -.657**). On the other hand, since the p-value is less than 0.05 for households' number variable with 'condition of the dwelling' thus the null hypothesis can be rejected. The result also shows there is a positive relationship (cc = .269**) that implies the higher the number of households, the more the satisfaction level on the condition of their dwelling.

CONCLUSION

Respondents who participated in this study were coming from various socioeconomic backgrounds with a majority of 80% aged between 21 - 40 years old. 92% of them were married and 30% earned more than RM2000 income a month. From the RII result, the study found out that the majority of the respondents claimed they were satisfied with the condition of surau while least satisfied with the condition of lift. About types of damages often happen in the residential property, the RII result revealed that most respondents claimed vandalism and water tank leaking are kinds of damages that often happen. Meanwhile, the least damages rarely happen was the floor or wall leaking. This study finding reveals that there are various damages often reported happened in the highrise strata property that concerns the safety of the property dwelling. Under the Strata Management Act 2013, a homeowner has the right to report and negotiate a solution with the MC or JMB.

In addition, the Spearman rho test conducted shows that an increase in age, monthly income and number of households, increases the agreement towards claimed damages to often happen in the residential property. The test also indicates the higher the number of households, the more the satisfaction level on the condition of their dwelling. Moreover, the negative relationship from the result indicates that respondents with older age are more dissatisfied with the conditions of the condition of the dwelling, the safety of the neighbourhood and the safety of the residence.

Often, small damage can lead to other larger problems within the building. For highrise strata property, it is the responsibility of MC to deal with common building defects to avoid serious accidents, emergency evacuations and in the worst-case scenario loss of life and property. Hence, parcel owners and management committee members need to be more aware of their duties and rights when it comes to managing and maintaining common property.

As the development of strata properties has become widespread in Malaysia, there is a need to lay out strict enforcement by the authority such as the Commissioner of Building (COB) and compliance by all parties involved to the provisions of Act 757 for the strata management to be improved. The review and amendment of the Act are also necessary to be more comprehensive and dynamic enough to cater for any issues which may occur due to the fast development.

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THE CONTRIBUTIONS OF PUBLIC SPACE TO THE SOCIAL SUSTAINABILITY OF TRADITIONAL SETTLEMENTS

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Abstract

Landscape is a dynamic system in geography that has a spatial structure created by natural and cultural causes. Landscapes are made up of geophysical, which are formed by physical terrain elements (mountains, hills and water bodies and streams), living elements (indigenous plants), man-made elements (land uses, buildings, and structures), and temporary elements such as lighting and weather conditions. Traditional settlements are one of the key cultural land-uses and landscape assets in terms of history, customs, culture, and architecture. Modernization and continuous development have sometimes radically altered the physical terrain environment over time, obliterating traditional settlements in favor of more modern land uses with public facilities. Will these facilities continue to operate as a social sustainability accelerator for residents living in traditional settlements? This research aims to address the roles of the public infrastructure in determining the social sustainability of the people in two traditional settlements in Kuala Terengganu. A mixed-methods strategy was used in this study, which comprised of observation and survey questionnaires. To identify the important components that determine social sustainability, a questionnaire survey was employed that collected data from 400 residents. The major conclusions emphasize three most significant characteristics of public space under the most preferred public infrastructures selected by the residents: They are: (i) adequate amenities; (ii) public spaces that support a variety of activities; and (iii) public spaces that are accessible to the general public. The research implicates that a better socio-cultural and traditional heritage will be generated and preserved as a result of a more organised settlement, underlining the value of culture and history in developing a sense of community and belonging.

***Keywords**:* physical landscape; public spaces; social sustainability; traditional settlement

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INTRODUCTION

The study aims to analyse how the multiple physical aspects of public infrastructure and traditional settlement environment around Kuala Terengganu play a role in supporting the welfare of the community. This is in line with a report from PlanMalaysia through the National Happiness Index Study 2018 and 2019, which lists Kuala Terengganu as one of the ten happiest places in Malaysia to live, achieving more than 90% of the index. The initial goal is to figure out the kinds of public infrastructure exist in traditional Malay settlements. The second goal is to examine the functions of public infrastructure in sustaining the traditional Malay settlement and the community's social sustainability.

A traditional settlement is one of the fundamental assets of significant value from the aspects of history, customs, culture, and architecture. It can help to shape a country's identity. The traditional Malay settlement in this study is defined as an area inherited and inhabited by the Malay community for generations. It is an integrated village environment with a Malay architectural character, and a physical landscape based on the Malay settlement concept (Pelan Induk Kampung Tradisional, 2011; Li Wei, 2015). Nonetheless, the existence of traditional settlements near modern cities is regarded as vulnerable and underdeveloped, potentially leading to their diminish for the sake of development. As a result, the traditional Malay settlement is also losing its identity. Malaysia in particular has undergone a rapid economic and social transformation, with many new developments are built in and around village land or traditional settlement areas since the late 1970s.

Consequently, the modernization and progress have changed the local way of life and identity over the years, directly and indirectly. The growth of new cities in the country has reduced the physical and cultural landscape, particularly in the traditional settlements (Ariffin, 2007). Similarly, the study discovered that Malaysia's rapid development of new cities after the country's independence had a significant impact on the structure of society, economy, social, and the environment of the local cultures. Several studies have found that the loss of local identity has increased, particularly in historic districts. As Relph asserted in his concept of 'placelessness' (1976), eventually the events damage the character of a place and eliminate the sense of place. The loss of local identity is caused by two major issues: the ambiguity of functions of the importance of the physical landscapes, and the changes in space patterns caused by development.

LANDSCAPE AND PUBLIC INFRASTRUCTURE ELEMENTS

A settlement's ‘progressive’ development is most often built without regard of the population's interests, thereby eliminating the community's social interaction in a place. This refers to the growing number of housing projects in rural areas that are constructed with disregard for Malay societal values and culture, which have been practised in the areas for generations. According to Rasdi (2011), the

lack of space for activities of community ceremonies such as weddings and funeral arrangements is increasingly being overlooked by most newly built homes today. According to Ghoomi et al. (2015), the development of a modern city lowers the quality of social relations in a society and alters the physical pattern of the residential area.

Furthermore, one of the factors contributing to the decline on the importance of a traditional settlement's is a lack of research emphasising on the physical landscape of the settlements. Physical landscape elements are discovered to be important only in the context of municipal and recreational park studies. There have been very few studies on the conservation of physical landscapes in traditional settlements. As a result, only few people are well-versed in the functions and significance of the physical elements found in traditional settlements. As such, there is a cultural neglect or ignorance toward heritage conservation efforts. In general, everyone in a society, not just the authorities, must be aware of the importance of preserving cultural heritage elements.

Landscape is a dynamic system with a spatial structure generated by natural and cultural factors in geography (Bobek & Schmithüsen, 1998). Landscape is made up of geophysically-formed physical elements of terrain such as mountains, hills, and water streams such as rivers, lakes, ponds, and seas. The living elements are such as the indigenous plants, and the man-made elements include various land uses, buildings, and structures. In addition, it has temporary elements such as light and weather conditions (McKean, 2005). According to Leibenath and Gailing (2012), landscape is: (1) a physical space or complex of ecosystems; (2) a context for the relationship between humans and the environment; (3) a figurative expression; and (4) a social construct or phrase used in everyday speech. Regarding the word ‘physical landscape’, Berglee (2012) defines it as a term used to describe any natural area on the planet. According to Pickering (1994), a physical landscape functions as a component of the cultural landscape, fusing the physical landscape with the social landscape immortalised as a model to ensure that location and life coexist together on both symbolic and material levels. Pickering (1994) also states that a physical landscape serves as a proxy for the social landscape, specifically through the characteristics of settlement patterns, the spatial and temporal spread of historical occupations, topographic and environmental features, and the characteristics of major drainage areas. Meanwhile, the phrase 'cultural landscape' refers to the interplay of humans and nature that should be seen broadly, including cross-cultural and historical research (Rapoport, 1976). In other words, culture acts as the agent, the natural environment (physical landscape) serves as the medium, and the cultural landscape serves as the outcome (Sauer, 1925).

The aforementioned definitions show that a physical landscape is a critical component of a cultural landscape. In this study, a physical landscape is

defined as any physical factor that shapes human life optimally and can establish durable social traits, regardless of whether it is man-made or natural. The public infrastructure refers to public space, namely a gathering space or social space that is generally open and accessible to the public (Sakip, Akhir and Omar, 2015). Public space should be freely accessible, provides a diverse range of activities, have functions that contribute to its attractiveness and can be used for social activities so that it fosters social interaction (Barrera et al., 2016). A well-designed public space is critical to connect people to their environment, promotes and provides space for physical activity, improves health and community relations. Public space can be quantified in terms of the availability of facilities, have sufficient areas that accommodate various activities at different times including active physical activities such as sports and recreational activities or for comfort and tranquility. According to Abdul Rahman, Shamsuddin, and Ghani (2015), it is vital for people's comfort or well-being to engage in activities in public spaces that contribute to a vibrant and comfortable community atmosphere. Bagwell et al., (2012) corroborate this assertion by stating that physical landscape design, which includes planning and landscape design, is for the user's comfort, safety, and convenience, as well as having a strong symbolic and aesthetic dimension. A well-distributed and well-linked space are easily accessible physically and aesthetically and can influence the space's positive and security functions (Rad and Ngah, 2013). Additionally, a well-designed public space can accommodate several activities that appeals to a diverse range of users. Additionally, the most critical feature of public space is the provision of possibilities for social contact. When engagement occurs, people develop a stronger sense of belonging to their community and space. This component may be quantified and analysed using data on attendance, social media, and the lives of various social groups.

SOCIAL SUSTAINABILITY

Social sustainability incorporates the social welfare discourse often seen through the social capital framework. Social sustainability is generally defined as the maintenance and improvement of the well-being of current and future generations (Michael & Peacock, 2011). According to McKenzie, (2004), this includes equity of access to key services (including health, education, transportation, housing, and recreation), as well as equity across generations, which means that the activities of the current generation also benefit future generations. However, Davidson and Wilson (2009) suggested that social sustainability is a system of cultural relations wherein the positive aspects of different cultures are valued and promoted. According to the Youth Foundation in its framework of creating a new community, social sustainability is defined as the process of creating a sustainable place and succeeds to promote well-being, by understanding what the community needs (Woodcraft, Hackett & Caistor-Arendar, 2011).

Continuous social interaction is a two-way communication process that involves two or more individuals or groups at a particular place and time (Bardis, 1979; Lotfata & Ataöv, 2020). In this process, each individual strives and expects each other to understand the behavior of other individuals in their society. The process of adaptation begins with formal or informal meetings, especially in the neighborhood. Through greetings, shaking hands, chatting, visiting, and helping each other, social interaction can initiate friendships (Katiman & Ismail, 1997; Kader & Mahmoud, 2019). In this study, the social interaction relationship takes place in public spaces and fosters understanding, tolerance, cooperation, making acquaintances, and helping each other for everyone's benefit. These qualities are essential for the formation of a progressive, integrated, and harmonious society.

RELATION BETWEEN PHYSICAL LANDSCAPE AND SOCIAL SUSTAINABILITY

We will not be able to achieve a prosperous quality of life if we only assess social sustainability based on non-physical elements such as employment, education, health, governance, and so on. This participation can be enhanced when residents can interact with each other such as being easily contacted, living close to others, and having a suitable space to carry out activities (Festinger et al., 1950). Proximity, both functional and physical is crucial in terms of encouraging social interaction (Widiyastuti & Ermawati, 2020).In achieving quality social sustainability, physical aspects such as public spaces need to be given due attention. Public space, also known as the physical landscape, plays a key role in determining the prosperity of life and encouraging social participation in society (Roberts, 2003; Moulay, Ujang & Said, 2017). This means that sustainable social prosperity should integrate physical design with social design as well. For example, providing infrastructure to support social and cultural life, systems involving communities, space for people and space to evolve (González, Henríquez & Sierra, 2020). In addition, the character of the residential environment and social spaces is also one of the key elements in the foundation of social sustainability to ensure a quality social and community development.

METHODOLOGY

STUDY AREA

Kampung Pulau Duyong is famously known as a seafarer's village developed in the late 16th century. The village is separated from the mainland by the Terengganu River with a distance of 870 metres and the displacement between the two is 495 metres. The settlement is made up of more than 10 villages, namely Pulau Ketam, Kampung Kelab Ayer, Kampung Duyong Sekolah, Kampung Wan Su, and Kampung Pulau Duyong Kecil. Before 1985. Currently with 686 houses, Pulau Duyong has strategic access connected by either land or water and is about

2.7 square kilometres. The locals maintain the Malay culture and way of life, with over 40% of the population work as fishermen.

Kampung Losong is located near the Kuala Terengganu River with 11 sub-villages opposite Pulau Wan Man. Historically, the villagers of Kampung Losong are well-known for their expertise in marine sciences passed down by the Bugis community. At the same time, the local people of Kuala Terengganu are also skilled in carpentry. As a result, these skills were cleverly combined to produce high-quality boats since the early 18th and late 19th centuries. The socio-economic activities of the Kampung Losong villagers are songket textile businesses, small-scale trading, and fishing. Nowadays, the village is growing exponentially, with more people working in the city and managing small businesses.

Figure 1: Map of the study area
(Source: Google Maps, 2020)

DATA COLLECTION AND DATA ANALYSIS

The quantitative approach involved a series of survey distributed to over 400 respondents comprising of local residents. Respondents were selected using cluster sampling and they were asked to evaluate the physical attributes criteria affecting social sustainability on a 5-point Likert scale ("1" = strongly disagree and "5" = strongly agree). Cluster sampling is a data collection for a sampling method where the participants of the population are selected at random (Surbhi, 2016). All the respondents were chosen from randomly selected clusters. For this study, the sample representing the units of analysis was local residents living in Kampung Pulau Duyong and Kampung Losong. There are more than 800 local residents' houses in total, where the majority are the Malays. The data gained from the questionnaire survey was analysed using descriptive analysis in the

Social Science Statistics Package (SPSS) version 25. To summarise, descriptive statistics are used to describe data in the form of numerical calculations, charts, and tables. Factor analysis and reliability analysis were adopted in this study to analyse the data. Factor analysis was used to identify the underlying factors affecting the social sustainability of physical attributes.

FINDINGS

RESIDENTS PROFILE

The following figures report the results from the questionnaire survey conducted in Kampung Pulau Duyong and Kampung Losong. A total of 400 respondents participated in the survey. Most respondents from Kampung Pulau Duyong (N = 200) were male (61.5%), while in Kampung Losong, most residents were female (51%). A majority of the respondents were between 17 - 70 years old with almost fair distribution among the gender. The results indicated that both settlements have a greater number of adult-youth respondents between 26 - 45 years old. A large proportion of respondents work in the private sector (KPD, 37% and KL, 32.5%) and self-employed (KPD, 35.5% and KL, 25.5%), as seen from both respondents in the survey groups. Less than 20% are students, housewives, retirees, and unemployed. The majority of respondents are from the middle-income group, earning RM1000-RM2000 a month. However, there is a significant difference, whereby the Kampung Losong population has more income percentage of RM2001-3001 as compared to the Kampung Pulau Duyong population. There are more than 65% of respondents that have been residing in both villages for 11 years and above.

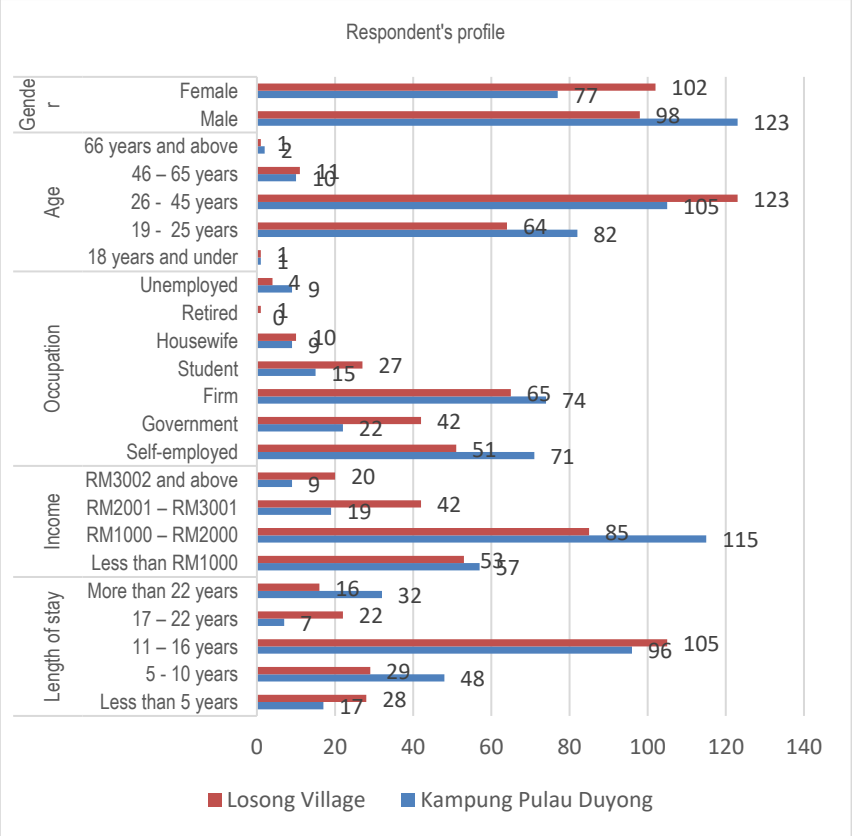

Figure 2: Respondent's profile
(Source: Authors, 2019)

TYPOLOGIES OF OPEN SPACES

The open space available at Kampung Pulau Duyong is a field located strategically near the jetty known as a tourist attraction. The field has an area of 0.2 hectares with a capacity of 300 to 1000 people. There is also a playground for children under 12 years old. The inclusion of passive activities combined with active activities has contributed to the success of the open space in Kampung Pulau Duyong. Among the passive activities identified through observation are observing people, sightseeing, basking in nature, walking, running, kite flying, fishing, and exploring the historic site of Kota Lama Duyong located nearby the field area. Active activities consist of playing football and futsal. Apart from this, various events such as festivals, poetry recitals, forums, and cultural shows are held using the available field area. Furthermore, the recreational facilities offered in the field and other support facilities such as ample seating and shade in the surrounding area often meet the needs of every resident. The location of open

space in front of the river has made Kampung Pulau Duyong unmatched by other recreational areas that usually have an uninteresting view.

While in Kampung Losong, open spaces are grounds and fields located next to the road at the end of the settlement. The Civic Hall and Community Hall facilities located in one place make it easy to accommodate large-scale activities. The open space is dominated by youths and children with active activities in the evening. While public spaces such as platforms or 'pangkin' are dominated by adults and the elderly with a variety of passive activities. With this result, the study found that both settlements have a similar pattern of activities and groups utilising the open space. With adequate facilities, more activities can take place and more people have the opportunity to participate (Omar et al., 2018).

The survey result suggests that social interaction at public infrastructures seems to be influenced by the respondent's background including gender and employment status. Respondents from different groups use public infrastructure for different reasons. Adults and the elderly prefer passive activities such as sitting, reading, eating, and sightseeing. They mostly talk to their friends, share experiences with their peers, and observe people's behavior. This group feels more comfortable in their group without the presence of outsiders. While youths and children are more inclined to explore public space due to their curiosity and enthusiasm in exploring the environment to strengthen their social support, whereas parents use this space to improve their quality of life and life expectancy.

Table 1: Types and nature of activities performed in the public spaces

Activities	Example
	Walking, exercising, relaxing, observing, playing
Recreation	Gathering with family and friends, children playing together,
In Groups	hawker groups
Seasonal Programs	Merdeka celebration, Maulidur Rasul celebration,
Daily Activity	competitions, Cultural Day festival
Entertainment	Tourists, hawkers, children playing, relaxing, resting
Economy	Playing musical instruments, poetry, concerts
	Selling daily or during seasonal events

(Source: Authors, 2020)

DISCUSSION

Thus, based on the data, this study determined that there are three values or aspects that contribute to the population's social sustainability through the continuity of everyday activities conducted in various types of public places that enable each activity to be conducted constantly. Table 2 summarises the three primary values.

Table. 2: Values of public spaces in accomodating social sustainability

Social sustainability indicator	Factor loading	% of variance explained	Cumulative % of the variance
Recreation space		**2.579**	63.901
Have sufficient facilities and space to accommodate sports and recreational activities	0.806		
Communal space		**2.910**	61.322
Covers different activities at different times	0.747		
Provides facilities to the public to enjoy comfort and tranquility	0.614		

(Source: Authors, 2020)

AVAILABILITY OF FACILITIES AND SPACE TO ACCOMMODATE SOCIAL AND RECREATIONAL ACTIVITIES

All in all, the facilities and area of the public space in Kampung Pulau Duyong and Kampung Losong are sufficient with a good balance to accommodate the capacity of the community among the genders. In addition, it can be used by all groups of people including the elderly, adults and children. The public space in Kampung Pulau Duyong and Kampung Losong can be used by individuals and groups to enjoy outdoor activities, hence improve the quality of social activities among the residents. This coincides with the statement of Sakip, Akhir, and Omar (2015) where they indicated that public space should meet the needs of all its users. The location of public infrastructure by the riverfront too has made Kampung Pulau Duyong a settlement with a relaxed public space. The findings are in line with the study by Abdul Rahman, Shamsuddin, and Ghani (2015) suggesting that public infrastructure should serve as a ceremonial space, node, and landmark.

Apart from a complete infrastructure available such as the field, the children's playgrounds and playfields, the historic sites with open space near Rumah Dato Biji Sura in Kampung Pulau Duyong and Rumah Haji Su in Kampung Losong prove that the cultural and historical heritage aspects of the area have high and unique values. It is an identity that has the capacity to be introduced to the world. Culture and heritage reflect and shape values, beliefs, and aspirations that affirm our identity as citizens. Prominent special features including architecture, physical structure, and culture make the areas of Kampung Pulau Duyong and Kampung Losong unique and worthy of continuous preservation. Moreover, the existence of active space encourages the involvement and integration of the community, which will indirectly foster pride and unity, as well as promote social capital for a longer period (Rad & Ngah, 2014). This can also be done through efforts to emphasise the unique characteristics and identity, strengthens elements and the importance of heritage and culture of the areas.

ACCOMMODATING DIFFERENT ACTIVITIES AT DIFFERENT TIMES

Studies show that successful public infrastructure is influenced by physical, activity, design, history, and culture that is still practiced. The most vital factor is that public space can accommodate various activities at different times, is to enjoy tranquility comfortably, and have adequate facilities. These factors can create daily interactions that encompass all groups of people, but at the same time maintain privacy among different groups. This study discovers a social perspective on public infrastructure, as revealed by Karimnia & Haas (2020), and Askari (2014) that the way people use various spaces is important based on different cultures, gender and interests, which then shape social interactions and societal relationships. The results of the study are also in line with Gehl's (2002) statement wherein facilities and equipment are significant factors that play a role in providing satisfaction to users of public infrastructure. Another important factor influencing the success of social sustainability is design (Carmona et al., 2003). This study emphasises that the interior space and public infrastructure environment in traditional settlements should have formal or informal seating amenities to create opportunities for social interaction. As highlighted by Carmona et al. (2003), responsive public infrastructure is a flexible space for various events and as a space that provides a wide selection of activities.

PROVIDES FACILITIES TO THE PUBLIC TO ENJOY COMFORT AND TRANQUILITY

Based on the observations, the study shows that physical, activity, social, and design factors influence the social interaction of public infrastructure in both settlements of Kampung Pulau Duyong and Kampung Losong. Factors that are seen as fundamental, which create comfort and tranquility are physical, visual appeal, location, security, and accessibility influence social interaction at public infrastructure. The results of this study are in line with Rad & Ngah (2013) and Widiyastuti & Ermawati (2020), in which the accessibility of public infrastructure is an influential factor in improving the quality of social interaction. The strategic location of public infrastructure selected by the residents is near the main road and the settlement area. The results of this study also conform with the statements of Pasaogullari and Doratli (2004), and Sugiyama and Thompson (2007) who stated that good public infrastructure is located in neighborhoods and workplaces, easily accessible, and can be monitored from the road.

CONCLUSION

In conclusion, the provision of complete facilities such as a sufficient supply of seating, dining, trading, activities, and sports are the fundamental factors that attract people to use public infrastructure in traditional Malay settlements. Social

interaction with each other, sharing ideas, viewing scenery, practicing religious beliefs, and enjoying leisure time can improve the quality of life as well as emotional stability formed from attitudes and successful public space designs. A successful public infrastructure is also a space that is easily accessible, establishes social connections, provides a variety of events and activities, with an attractive design, and creates a sense of belonging. Lastly, social relationships are crucial for communities in a settlement because strong community relationships will encourage individuals to cooperate in achieving prosperity. This study suggests that conservation efforts focused on the physical landscape is intended to give ideas and efforts regarding the importance of preserving social sustainability in a traditional Malay settlement. Preservation and conservation efforts of the physical landscape are important because it reflects the sustainability of a society with an identity. This can be achieved by revealing the community activities that are still practiced in traditional settlements. This study is a branch of cultural landscape knowledge whereby traditional settlement is a platform that connects two main elements, namely human activities and the physical landscape. The physical landscape is difficult to replace or restore if it diminishes. Its loss will indicate the non-existence of a settlement's identity. Hence, this study focuses on providing insights and recommendations to maintain the quality of the physical landscape with an emphasis on public spaces available in traditional Malay settlements. It is suggested that further research be carried out within the field of social sustainability, Malay cultural landscape, and its related areas. Several research topics that can be investigated related to the study are as follows: (i) the study on the determinant factors to enhance other sustainable values such as economy and environment, (ii) the behavioural response in experiencing the life in traditional Malay settlements, (iii) the non-physical characteristics of the Malay cultural landscape contributing to the enhancement of social sustainability.

ACKNOWLEDGEMENTS

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RECYCLING INTENTION AND BEHAVIOUR AMONG THE HIGHER EDUCATION INSTITUTIONS' (HEIS) COMMUNITY IN MALAYSIA

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Abstract

The Higher Education Institutions (HEIs) are among the largest waste producers in the municipality, and they have a huge responsibility towards the waste they produced. In order to divert waste as much as possible from the landfill, many HEIs have implemented reduce, reuse and recycle (3Rs) strategies and programs on their campuses. However, not all the communities are aware of the programs initiated, and as such, the recycling rate in most universities is still low. Therefore, this research seeks to identify the factors that influence the HEIs community to practise recycling on the campus. This study has extended the Theory of Planned Behaviour (TPB) with the inclusion of situational factors, recycling information and personal norm in the model. A total of 1068 duly completed questionnaire surveys were collected from six selected universities. The data collected were analysed using both descriptive and inferential analyses. The findings show that all the constructs investigated significantly influence recycling intention with exception of the subjective norm, whereas the situational factors have a significant direct influence on recycling behaviour. These findings have led to several suggestions and recommendations for a better sustainable waste management on the campuses in Malaysia.

Keywords: TPB, sustainable SWM, 3R, recycling behaviour, Higher Education Institutions (HEIs)

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INTRODUCTION

Higher Education Institutions (HEIs) consist of a large area that can be assumed as a small city that has contributed a lot to solid waste generation in the municipalities (Gallardo et al., 2016). Consequently, HEIs have responsibilities towards supporting various government's initiatives on minimizing waste to the landfill.

Although there are many 3Rs initiatives and programmes implemented, the issue of gaining participation and engagement from HEIs' community has become a great challenge. The community's engagement is important for successful recycling practices in the university. However, many of the HEIs community failed to practice 3Rs and waste minimization as promoted and campaigned. Therefore, this study seeks to identify the significant factors determining recycling intention and behaviour among the HEIs community by adopting modified Theory of Planned Behaviour Theory (TPB).

This study is expected to identify the main cause of the HEIs' community to practice 3R on the campus. This will help the responsible department or solid waste administrator in the campus to improve their SWM besides to increase the recycling rates through optimum recycling practices in the university. The identification of factors and the relationship of each factor will contribute to the development of appropriate SWM scheme in the campus. The outcome of the generalization of new attitude and behaviour theories will lead to recommendation for better HEIs' solid waste management in the future.

LITERATURE REVIEW

Waste produced from HEIs is considered as institutional solid waste. According to Izan et al. (2017), waste compositions in Malaysian HEIs consisted of food or organic waste, papers, plastics, tin/ aluminium, polystyrene, and glass. Whereas Wen (2017) found that most waste generated at HEIs is recyclables, whereby this diversified waste needs to be handled prioritize their impacts (Osmond et al. 2013).

Since waste produced in HEIs are mostly recyclables, there are many opportunities for 3R implementation and practices in the campuses in which a proper system for sustainable SWM especially 3R initiatives need to be designed appropriately and should integrate and recognize WHP concept to achieve sustainability goals in the campus (Osmond et al., 2013; Ghazvinei et al., 2017).

However, the strategies adopted and implemented in HEIs usually depend on the university itself, several universities focus on energy conversion rather than SWM and some focus on composting rather than other methods of waste reduction. However, many researchers agreed that the strategies should be appropriately developed according to the university's waste composition analysis (Gallardo et al., 2016; Shankar Y & Khandelwal, 2017; Ghazvinei et al., 2017; Izan et al., 2017; SWCorp, 2019).

Almost all universities in Malaysia have adopted several strategies for sustainable SWM in the campus. Universiti Kebangsaan Malaysia (UKM) for example has launched the Zero Waste Campus Programme (ZWCP) in 2010 (Norfadillah et al., 2012). Universiti Teknologi Malaysia (UTM) and Universiti Tun Hussein Onn (UTHM) have established several green living laboratories and green or sustainable campus office to promote sustainability in their campuses (Muhamad Nur Fadhli et al., 2018; SCOUTHM, n.d.). University of Malaya (UM) has established UM Zero Waste Campaign (UMZWC) while Universiti Putra Malaysia (UPM) has established a waste bank in the campus (UMZWC, 2019; Fatma et al., 2019).

The establishment of living laboratories, green offices, and waste banks indicate that these universities are giving their full commitment in achieving sustainable SWM on their campuses. In fact, these initiatives also require commitment from the community to uphold the similar aspiration and goals. However, there are many challenges in shaping attitude and behaviour of the university's community to practise 3R. Despite many initiatives implemented to encourage recycling and sustainable behaviour in the campus, the community is still lack of awareness and rarely practicing 3R on the campus (Mazaitul Shima, Shahirah Umamah, & Choy, 2015).

CONCEPTUAL FRAMEWORK

TPB is an established, well-known theory and the most applied behavioural theory in social psychology (Morris et al., 2012; Liu, et al., 2017; Anita, 2019). It was developed by Ajzen (1987) and refined by the Theory of Reason Action which indicates that human behaviours are guided by three kinds of considerations, namely attitude, perceived behaviour control (PBC), and subjective norm (SN).

TPB is commonly employed in studies related to recycling in which past findings show that TPB's constructs are well-suited to study recycling behaviour (Largo-Wight et al., 2012). However, instead of adopting the original TPB, recently the extended or modified TPB to accommodate environmental studies has been commonly used. Gadiraju (2016) opined that additional variable should be integrated into TPB to maximize the assumption of recycling behaviour intentions besides to increase the variance of the theoretical model. Among the variables that mostly extended TPB for the previous studies are such as situational factors (SF), knowledge, and personal norm (PN).

According to Whitmarsh et al. (2018) SF is one of the strongest reasons for people to recycle. For instance, if recycling facilities are upgraded, it will become more normative and easier to practise. Furthermore, Flanagan (2017) found that adequate facilities have improved recycling habits of the secondary school's students, which indicates convenience has made the students become motivated to recycle more. Many studies resulted significant influence of SF on

recycling intention and behaviour (Philippsen, 2015; Zhang et al., 2015; Sharifah et al., 2015; Gadiraju, 2016; Heidari et al., 2018; Arli et al., 2020).

Knowledge has been included into TPB by several researchers (Sharifah et al., 2015; Zhang et al., 2015; Aria, 2016; Noralfishah et al., 2019). However, the inclusion of knowledge into TPB only limited to the subjective questions of how and what to recycle. Most of the studies reported significant for influence of knowledge on recycling intention and behaviour except Philippsen (2015). This can be assumed that there was inadequacy of information provided on the campus which leads to lack of knowledge about recycling among the community.

Another variable that was usually extended the TPB is PN. Many studies have extended TPB with the inclusion of PN (Philippsen, 2015; Zhang et al., 2015; Botetzagias et al., 2015; Poskus, 2015; Gadiraju, 2016; Xu et al., 2017; Heidari et al., 2018; Noralfishah et al., 2019; Arli et al., 2020; Nik Hazimah et al., 2020). According to Gadiraju (2016), including personal moral norm or PN in TPB seems to be appropriate and significant at least in the context of recycling behaviour because it shows elements of personal morality and social responsibility. Moreover, all the studies that included PN into TPB found it to be significant towards recycling intention. According to Gadiraju (2016) although the inclusion of PN in TPB was found to be positively influencing recycling intention, it has reduced the significance level of the SN in the model. This indicates that even though the students were influenced by their friends and family's perception of what they were supposed to do, they were more motivated by their norms and moral responsibility.

Based on the above discussion, instead of adopting original TPB, this study has extended TPB with the inclusion of three other factors namely information availability (IA), personal norm (PN), and situational factor (SF). Initially, six constructs were predicted to influence recycling intention and behaviour among the HEI's community. However, during the Exploratory Factor Analysis (EFA) and cross-validation process for the pilot and actual data. PBC was insignificant as it has high correlation with attitude. Therefore, PBC was excluded from the model.

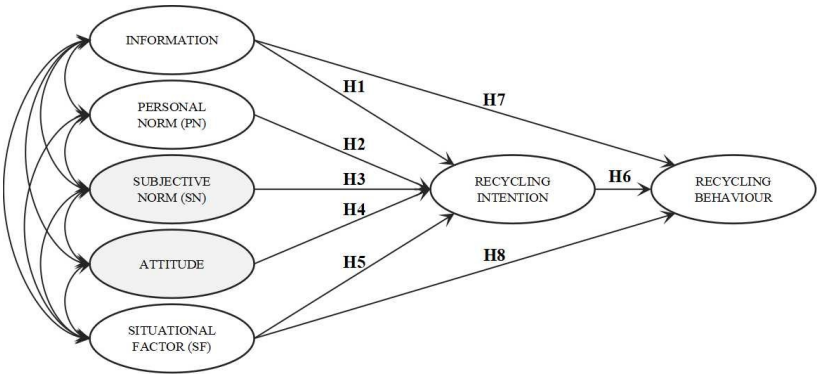

Figure 1: Developed conceptual model for the study

The final developed conceptual model for this study can be seen in Figure 1 in which five constructs (IA, PN, SN, Att., SF) were predicted to have a significant effect on recycling intention.

INSTRUMENTS AND METHODS

This study adopts quantitative research approach hence, data were collected from six selected universities: Universiti Teknologi Malaysia (UTM), Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Malaya (UM), Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), and International Islamic University Malaysia (IIUM). These universities were selected based on their involvement in UI Greenmetric 2019 considering these universities were committed to their sustainable campus agenda.

Specifically, data were collected from the students, administrative staffs, academic staffs, and others who are familiar with the university's surrounding areas. An adequate sample size for this study was arrived based to the formula by Hair et al. (2010) in which the minimum sample size for the developed model is 500 samples. However, to meet the adequacy and avoid bias, the sample size was calculated using an online sample size calculator from Creative Research System for 95% confidence level with 5.0% margin error (Creative Research Systems, n.d.) and the data collection was using simple random and cluster sampling.

The selected respondents were given a set of questionnaire survey with the items using a 10-point interval scale measure. A total of 1094 responses were collected during the field survey. However, only 1068 completed questionnaires were valid after the screening.

The data was analysed through descriptive statistics for the respondents' background and inferential statistics to examine the relationship between variables in the developed conceptual model through Structural Equation Modelling (SEM). Prior to SEM, Exploratory Factor Analysis (EFA)

and Confirmatory Factor Analysis (CFA) were conducted to reduce the items in the questionnaire into manageable sizes as well as to test the validity and reliability of the variables in the model. Meanwhile, EFA, CFA and SEM were analysed using Statistical Package for the Social Sciences (SPSS Version 24) and Analysis of Moment Structure (AMOS Graphic).

To achieve the model fit during the CFA, several items were removed from the model due to low factor loading and following the modification suggestions. For this study, the model fit was examined based on the Root Mean Square Error of Approximation (RMSEA) for the absolute fit, Comparative Fit Index (CFI) for the incremental fit, and Chi-square distribution (Chisq/df) for the parsimonious fit criteria as depicted in Table 1.

Table 1: Chosen criteria for fitness indexes

Name of Category	Name of Index	Level of Acceptance	Literature
Absolute Fit	**RMSEA**	RMSEA < 0.08	Browne and Cudeck (1993)
Incremental Fit	**CFI**	CFI > 0.95 (great) CFI>0.90 (traditional) CFI>0.80 (sometimes permissible)	Bentler (1990)
Parsimonious Fit	**Chisq/df**	Chisq/df < 3.0 (great) Chisq/df<5.0 (permissible)	Marsh and Hocevar (1985) Hu and Bentler (1999)

RESULTS

Respondents' Background

For this study, most of the respondents were females with a total of 671 (62.83%) and 393 (36.80%) were males, while others did not indicate their gender. Regarding the age, 625 (66.96%) respondents are between 16 to 25 years old, indicating that the majority of the respondents are from the students with a total of 721 (67.51%). A total of 440 (41.2%) are between 26 years and above, suggesting that the majority from the group of workers and staffs. There were 746 (69.84%) of the total respondents who experienced less than 1-5 years in the university assumed as the common period for the students and workers in the university followed by 212 (19.85%) who experienced more than 9 years in the university assumed to be lecturers, workers, or postgraduate students. With this data, generally, it has met the requirement of the targeted respondents for this study in which the distributions seem relevant for further analysis.

Confirmatory Factor Analysis (CFA)

Before conducting SEM, CFA was applied for this study to achieve parsimony. The final model of the factor loading matrix from the EFA was measured for its model fit through Attempt 1. However, it showed a very poor result. The model

indices for this measurement showed relative Chi-Square 9.274, CFI 0.837, TLI 0.818, RMSEA 0.088. Hence, the Attempt 1 measurement model fit was failed to meet the criteria of model fit suggested in Table 1.

Due to a very poor model fit in the Attempt 1, another attempt for the measurement model was employed with some modification. The measurement model Attempt 2 deleted items with very low factor loading and assessed it modification indices (MI). It was found that the measurement model had too many redundant items which were indicated through MI>15. Hence, each highly correlated item was constrained as a free parameter to fix the fitness indexes starting from the highest value (MI) until the required fitness indexes achieved. The summary of achieved fitness indexes for the model can be seen in Table 2.

Table 2: Summary of Fitness Indexes for Measurement Model (Attempt 2)

Name of Category	Name of Index	Index Value	Interpretation
Parsimonious Fit	**CMIN**	1845.554	--
	DF	375	--
	CMIN/DF	**4.921**	The permissible level is achieved
Incremental Fit	**CFI**	**0.931**	The required level is achieved
Absolute Fit	**RMSEA**	**0.061**	The required level is achieved
	SRMR	**0.067**	The required level is achieved

This also indicates that the measurement model (Attempt 2) had met the minimum required model fit. Table 4 indicates the summary of CFA report for measurement model Attempt 2.

According to table 3, although a few factor loadings were too low, it was valid according to some literature that accepts factor loading between 0.4 to 0.7 if the CR and AVE are satisfactory (Hair et al., 2014). It is opined that if AVE is above 0.4, but composite reliability (CR) is higher than 0.6, the convergent validity of the construct is still adequate (Fornell & Larcker, 1981). Based on the Table 4, the CR of all constructs was above 0.6, and AVE above 0.5, therefore the convergent validity of the constructs was considered satisfactory.

Table 3: The summary of CFA Report for measurement model 2

Construct	Item	Factor Loading	CR (Min 0.6)	AVE (Min 0.5)
Intention	Int1	0.66	**0.829**	**0.556**
	Int2	0.56		
	Int3	0.90		
	Int4	0.81		
Personal Norm	PN1	*Deleted*	**0.856**	**0.549**
	PN2	0.75		
	PN3	0.82		
	PN4	0.81		

Construct	Item	Factor Loading	CR (Min 0.6)	AVE (Min 0.5)
	PN5	0.74		
	PN6	0.54		
Behaviour	Beh1	0.90	**0.881**	**0.653**
	Beh2	0.71		
	Beh3	0.91		
	Beh4	0.69		
Situational Factor	SF1	*Deleted*	**0.880**	**0.561**
	SF2	0.74		
	SF3	0.84		
	SF4	0.87		
	SF5	0.83		
	SF6	0.40		
	SF7	0.72		
Information	Info1	0.89	**0.935**	**0.827**
	Info2	0.95		
	Info3	0.88		
Attitude	Att1	0.61	**0.820**	**0.501**
	Att2	*Deleted*		
	Att3	0.77		
	Att4	0.84		
	Att5	0.69		
	Att6	0.50		
Subjective Norm	SN1	*Deleted*	**0.732**	**0.509**
	SN2	0.83		
	SN3	0.83		
	SN4	0.35		
	SN5	*Deleted*		

Discriminant Validity Summary

Next, the measurement model was also assessed for its validity, and reliability before modelling the structural model. Table 4 indicates the Discriminant Validity Index Summary to show and prove the constructs in the model were discriminant between each other.

Table 4: The Discriminant Validity of Construct

	CR	AVE	MSV	MaxR(H)	Int.	PN	Beh.	SF	IA	Att.	SN
Int.	0.829	0.556	0.412	0.882	**0.746**						
Per.Norm	0.856	0.549	0.387	0.875	0.622	**0.741**					
Beh.	0.881	0.653	0.416	0.916	0.642	0.493	**0.808**				
Sit.Fac.	0.880	0.561	0.501	0.910	0.533	0.480	0.645	**0.749**			
Info.	0.935	0.827	0.501	0.944	0.439	0.281	0.525	0.708	**0.910**		
Att.	0.820	0.501	0.251	0.854	0.393	0.501	0.121	0.177	0.063	**0.695**	
Sub.Norm	0.732	0.509	0.287	0.823	0.392	0.454	0.448	0.536	0.454	0.229	**0.709**

Referring to Table 4 above, the diagonal values **(in bold)** are a square root of AVE of the construct while other values show the correlation between the respective constructs. The diagonal values have shown higher values than the values in its row and column, thus, it can be concluded that the discriminant validity for all seven constructs was achieved.

Structural Equation Modelling

As the model fitness indexes and all the criteria were satisfied, this model was proceeded with Structural Equation Modelling (SEM). SEM was employed and the structural model was obtained as in Figure 2.

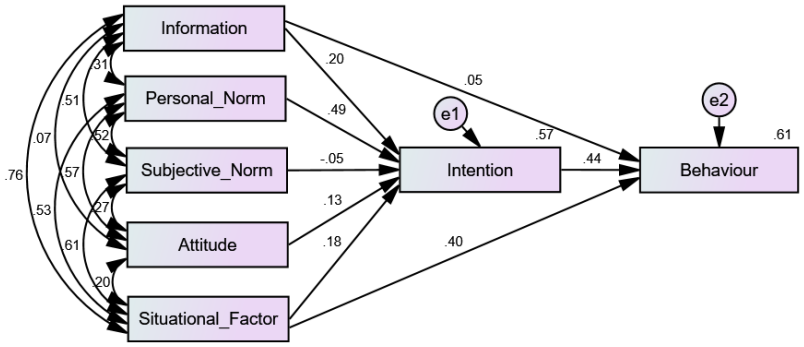

Figure 2: The standardized coefficient regression weights or factor loading for every path in the complete model

Figure 2 shows the standardized estimate for the structural model for this research. The highest measure of correlation was resulted between IA and SF with the measure 0.76. This can be interpreted that the discriminant validity between exogenous constructs was achieved as all the measures were below 0.85. If any of two exogenous constructs were highly correlated (measure >0.85), the discriminant validity had failed, in other words, the constructs cannot be treated separately as they are redundant.

The most important output in the Standardized Regression Weight is the value of R^2 in the model (Zainudin, 2016). From the Figure 2 the value of coefficient of determination R^2 for the model was 0.61. This figure indicates the contribution of exogenous constructs (IA, PN, SN, Att., SF, and Int.) in estimating the endogenous constructs of behaviour to recycle was 61%. At the same time, R^2 for the intention to recycle was 0.57, which indicates 57% of the intention to recycle could be measured by using 5 latent constructs including IA, PN, SN, Att., SF.

Table 5: The regression path coefficients and its significance based on P-value <0.05 for the complete model

Path of the Constructs			Estimate	S.E.	C.R.	P	Label
Intention	<---	Information	.180	.028	6.513	***	
Intention	<---	Personal_Norm	.665	.041	16.406	***	
Intention	<---	Subjective_Norm	-.110	.064	-1.717	.086	
Intention	<---	Attitude	.272	.052	5.191	***	
Intention	<---	Situational_Factor	.175	.036	4.911	***	
Behaviour	<---	Intention	.400	.022	18.476	***	
Behaviour	<---	Situational_Factor	.368	.029	12.732	***	
Behaviour	<---	Information	.037	.024	1.546	.122	

Table 5 shows the regression path coefficient and its significance based on P-value<0.05 for the complete model. The result showed that all paths of the constructs were significant except for the SN → intention and IA → behaviour. Thus, the interpretation of these results for the hypotheses developed is depicted in Table 6 below.

Table 6: The result of hypotheses testing for the respective path

Hypotheses	Path	CR	P	Decision
H1. Information availability has positive influence towards recycling intention	IA→Int	6.513	***	Supported
H2. Personal norm has positive influence towards recycling intention	PN→Int	16.406	***	Supported
H3. Subjective norm has positive influence towards recycling intention	SN→Int	-1.717	.086	Not Supported
H4. Attitude has positive influence towards recycling intention	Att→Int	5.191	***	Supported
H5. Situational factor has positive influence towards recycling intention	SF→Int.	4.911	***	Supported
H6. Recycling intention has positive influence towards recycling behaviour	Int→Beh	18.476	***	Supported
H7. Information availability has positive direct influence towards recycling behaviour	IA→Beh.	1.546	.122	Not Supported
H8. Situational factor has positive direct influence towards recycling behaviour	SF→Beh.	12.732	***	Supported

DISCUSSION OF FINDINGS

From the hypotheses in the previous section, this study found four significant factors influencing recycling intention and behaviour of the HEIs' community in Malaysia which were IA, PN, attitude and SF, while SN was not significantly

contributed towards recycling intention and behaviour of the community. The sequence of the most influential factors to the least influential factor is first the PN, followed by IA, SF ad attitude while SF has a direct influence on recycling behaviour.

The result shows that most of the HEIs' communities felt guilty and wrong if they do not practice recycling. It also indicates that the person with high motivation and positive moral norms has a great attitude and effort towards recycling compared to those who have lower self-motivation towards recycling.

From this study, as PN is the most influential factor towards recycling intention, there is a need to nurture recycling personal norm or the sense of guilt and responsibility among the community to encourage more recycling behaviour on the campus.

However, to nurture great PN among the community is also a huge challenge. As IA is the second most influential factor towards recycling intention, it can be suggested that the availability of effective information channel is very important to give knowledge and awareness on recycling in the campus. An effective information delivery will help to nurture the sense of responsibility among the community.

In fact, SF with the provision of good and adequate facilities alone does not guarantee the community will recycle more although based on the result it can be understood that the community will recycle unintendedly if there are facilities provided near them. But they also tend to recycle incorrectly.

CONCLUSION

This study found four significant factors influencing recycling intention and behaviour of the HEIs' community in Malaysia in which PN resulted in the highest influence on recycling intention followed by IA, SF and attitude. SF had a direct effect towards recycling behaviour while IA had no direct positive effect towards recycling behaviour. This study suggests that enhancing PN among HEIs' community will increase recycling behaviour on the campuses, in which PN can be improved by the availability of adequate and effective recycling information and facilities on the campuses. The future research was recommended extending the theory by including spiritual aspects or religious ethics as well as policy and enforcement in influencing recycling intention and behaviour in HEIs.

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HOUSING CRISIS IN ALGERIA: CHALLENGES AND PERSPECTIVES

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Abstract

The provision of good quality housing remains a major problem facing policymakers in developing countries, with Algeria being no exception. The Algerian policy focuses on ensuring the provision of housing to low-income households who cannot house themselves adequately. This article presents an overview of the Algerian housing policies focusing on the issues encountered by governments since independence in 1962. This entails presenting the history of Algerian housing policy, including colonial, after independence and new Algeria. This will not be completed without reviewing the different national housing plans and policies introduced by the Algerian government, focusing on the housing achievements and deficits. Using qualitative analysis of secondary data through narrative and inductive approaches, this research argues that a significant change in how these programmes are currently structured is urgent. Thus, there is a need to find a new approach to finance the construction of public and private housing units and reduce dependence on the Public Treasury.

***Keywords**:* Housing; Algeria; Housing Crisis; Housing History; Housing Supply; Housing Performance

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INTRODUCTION

Housing has become one of the main concerns in Algeria despite Algeria's housing policy having evolved since independence (1962) by implementing various housing policies and plans in order to tackle the housing issues (Algerian National Report on Housing, 2014; Merzag, 2015; Tarache, 2009). The Worldometer statistics illustrated the rapid growth of Algeria's urban population representing 72.6% of the global population (Worldometer, 2020). Demographic factors make the problem more acute as the Algerian population is growing around 1.85% per year. In addition, the Algerian National Report on Housing (2014) reported that urban areas were crowded, and the development of new suburban areas had become critical in Algerian cities. The rapid urban development was not accompanied by appropriate urban infrastructure thus failed to accommodate population growth within the cities.

Many studies (Madani, 2012; Merzag, 2015; Mohdeb, 1988; Tarache, 2009) have emphasised that Algeria is suffering from a housing crisis. The uncontrolled growth of population is a phenomenon that affects all countries of the third world including Algeria. In 2011-2015, the construction of residential buildings increased and was the largest, representing 41% of the total construction sector. (Oxford Business Group, 2017). According to the Algerian National Office of Statistics ONS (2017), the construction of housing has increased in recent decades to reach 1,531,518 units. Over the past decades, many studies (Behloul, 1991; Bellal, 2009; Madani, 2012; Merzag, 2015) considered that the issue of the housing shortage in Algeria is crucial. Nowadays, despite the considerable delivered number of housing units in Algeria, the problem of housing provision is still a major concern.

The Algerian authorities have implemented various programmes to upgrade the housing condition and offer more quality and decent housing (Djiar, Gharbi, Messaoudene, & Chareb, 2015). Lalonde (2010) reported that the policies of urban planning during the colonial period were not suitable to the social and cultural characteristics of the local people at that time, which has worsened the housing situation. This has led to the creation of shantytowns. The French culture and politics influenced Algerian housing design during the colonisation period, where the objective during this period was to integrate the Algerian citizens into the culture of French society. In addition, the Algerian government after independence considered that the housing design inherited from the coloniser were suitable for the Algerian society at that time.

Many factors influence the production of housing units, the most important of which is the insufficient housing budget to fulfil the demand increasing after uncontrolled exodus and the maladjusted French housing to the Algerian society, with the augmentation of the family rate with almost seven persons on average (Benamrane, 1980; Ministry of Housing, 1986). According to Bendib & Naceur (2018), collective housing in Algeria is characterised by

outdoor spaces which are poorly maintained, suggesting no form of appropriation. This situation led to dysfunctions that stigmatised these areas as violence and unsecured neighbourhood areas. Therefore, urban interventions have been planned and carried out in the form of operations intended to improve the image of these residential areas. Unfortunately, they proved ineffective and were unable to achieve the expected objectives. This spatial fluidity was not adapted to the needs of users and given the State's inability to offer outdoor spaces that can be appropriated by inhabitants. Accordingly, there is a need to search for strategies of appropriation to provide solutions to their problems. This concerns all Algerian cities. Djafri, Mohamed Osman, Rabe, & Shuid (2019) concluded that effective and innovative policy and programmes need to be planned with government agencies, public institutions and ministries together with other stakeholders in ensuring the provision of good quality housing for all can be achieved.

Despite the considerable effort and investment made by the Algerian government, Algeria is facing a pressing housing problem, in which the housing crisis worsens progressively (Abdelkarim, 2012; Bellal, 2009; Djafri et al., 2019; Guendouz, Gasmi, & Belhimer, 2017; Hadjri, 1992; Madani, 2012; Mouaziz-Bouchentouf, 2018; Saada, 1999). The next section will discuss the Algerian housing policies from the colonial period till the new era

Algerian Housing Policies From 1945 to 1999

Colonial Period 1945-1962

In 1945, the situation in Algerian cities was critical, as the total housing was estimated at 850 100 housing units and the average household size for the indigenous population was eight persons per housing unit. From 1945 to 1954, several houses were built, and the housing stock (informal housing excluded) has grown to 1 220 221 housing units, and the average household size has improved to 7.76 (Benmatti, 1982).

During the Algerian war (1954-1962), the French colonial authority excluded the Algerian society from the war by implementing a housing programme called the Constantine Plan (Plan de Constantine). It is an economic programme designed by the French government in 1958. It was developed to achieve the construction of 200 000 urban housing units and 110 000 rural housing units, allowing the accommodation of one million people. It was an attempt to improve the quality of life of Algerians living in rural areas (Djiar, 2014). Furthermore, the main objectives set by this plan were also the redistribution of 250 000 hectares of agricultural land, the development of irrigation, the creation of 400 000 industrial jobs for Algerians, raising national revenue by 7.5%, and increase wages (Mouaziz-Bouchentouf, 2018). Nevertheless, the initiative did not achieve its objectives since it was used originally to eliminate the Algerian revolution. However, throughout the war

(Algerian revolution), the rate of housing units fell in addition to the damages caused by this war increased the need for housing. As shown in Figure 1, the number of housing shortage increased significantly by more than 350 000 units during this period.

After independence in 1962, Algeria listed nearly 1 876 000 housing units, which corresponded to an average household size of 6.1 persons (Djiar, 2014). As a result, new housing construction was not considered a priority at that time despite the housing shortage.

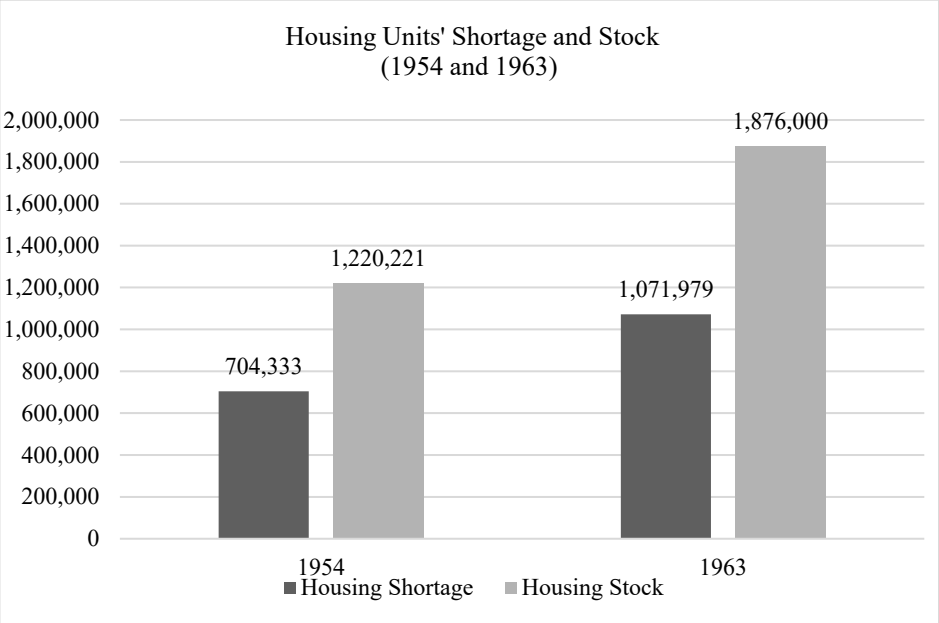

Figure 1: Housing Units' Shortage and Stock in 1954 and 1963
Source: Adapted by the author from Benmatti, 1982; Djiar, 2014

After Independence 1963-1999

In 1963, there was a deficit of 1 071 979 housing units for a population of 10 288 000 inhabitants. This situation was caused by a disruption of administrative and executive structures, and a decline in the pace of construction (Benmatti, 1982). The causes of the housing crisis in Algeria are divided into three dimensions, namely historical with the colonial heritage and taking charge of housing after independence, socio-economic issue whereby migration has caused an increased demand for housing. In contrast, the economic condition remained insufficient to accommodate the increased demand (Tarache, 2009).

After independence, the Algerian government aimed to set up a vast industrialisation programme to create jobs and ease the housing crisis. Thus, housing planning was implemented through one three-year plan (1967-1969), two

four-year plans (1970-1973 and 1974-1977), and two five-year plans (1980-1984 and 1985-1989). First, the 1967-1969 housing plan aimed mainly at reconstructing villages damaged by the war and completing abandoned construction sites. Second, 4000 housing units were built in urban areas in the 1970-1973 housing plan. Third, the housing sector received 13.25% of the national investment in the 1974-1977 housing plan. Fourth, the percentage of investment rose to 16.5% during the 1980-1984 housing plan (Mouaziz-Bouchentouf, 2018).

Since 1975, the Algerian government executed the ZHUN (New Urban Housing Zones) housing programme, which is an international housing model based on the concepts of prefabrication and standardisation. It was an attempt to solve the housing crisis and reduce the housing deficit in Algeria. The purpose of this policy was to construct a considerable number of new housing projects in order to solve the issues of social and physical environments. The objective, therefore, was to set and create new guidelines for designing new urban areas which meet the needs of occupants to increase their level of satisfaction (Oussadou, 1988). However, Naceur (2013) claimed that ZHUN housing programmes were incomplete or poorly finished and deprived of their required facilities. Thus, it failed to solve the housing crisis. In addition, the ZHUN was not the solution for the housing crisis at that time, as the average household size was increased in 1977 to 7.7 persons per housing unit and the housing deficit reached 1,268,585 units in 1977 with a stock of 2,208,712 housing units (Merzag, 2015).

From 1979, changes were introduced in the modes of financing since the housing issue captured the attention of public authorities after the creation of the Ministry of Housing in 1977. Moreover, starting from 1987, the average household size rose due to the augmentation of urban population. Accordingly, the percentage of urban population was increased from 49.7% to 58.3% in 1987 and 1998 respectively (Figure 2).

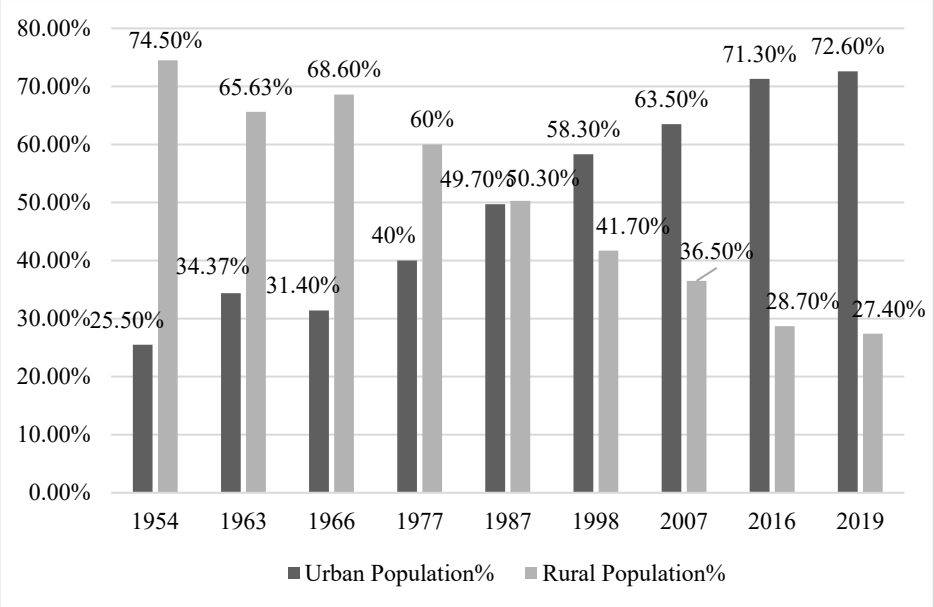

Figure 2: Evolution of the Urban and Rural Population 1954-2019
Source: ONS, 2000; The World Bank Group, 2017; Worldometer, 2020

In the early 90s, the housing crisis remained an obstacle for hundreds of thousands of Algerians despite the huge financial allocation dedicated to this sector. In terms of housing deficits and according to the statistics of the Ministry of Housing, Algeria's deficit in housing at the beginning of 1999 stood at approximately three million housing units (MHUV, 2018).

Since 1999, Algeria has recovered political and institutional stability. The financial situation improved as a result of rising oil prices, and a new era for the housing sector started. According to official figures, 810 000 housing units were built during the period from 1999-2004 (Ministère de l'Habitat et de l'Urbanisme, 2011).

Algerian Housing Policies From 2001 to 2019

The housing sector in this period had considerable priority and huge funds were dedicated to eliminating the housing crisis (Figure 3). This sought to improve the living conditions of Algerian society. In fact, since 2000, oil has played a significant role in launching major projects. Thus, the beginning of the third millennium was a new era where the public authorities in Algeria have gambled on economic development whereby national development plans were implemented aiming to improve the standard of living of individuals, develop education and generalise care health, building basic facilities and developing the infrastructure. Four national development plans have been launched since 2001

as part of a series of investments in the public sector through the economic recovery support program for the period from 2001-2004. It was followed by the supplementary program to support economic growth for the period from 2005-2009 and the 2010-2014 five-year plan as well as the 2015-2019 five-year plan. Accordingly, these national development plans have a prominent and important role in achieving the objectives of financial policy represented in economic development and various sectors, including housing and improving the standard of living.

Therefore, the new era in Algeria has seen a sort of evolution in launching new national development plans to upgrade the living conditions and surpass the housing crisis. Concerning the housing sector, 3 585 572 units were completed between 2010 and 2017 (Services du Premier Ministre, 2017). Table 1 illustrates a summary of housing target and Achievement (1999-2019).

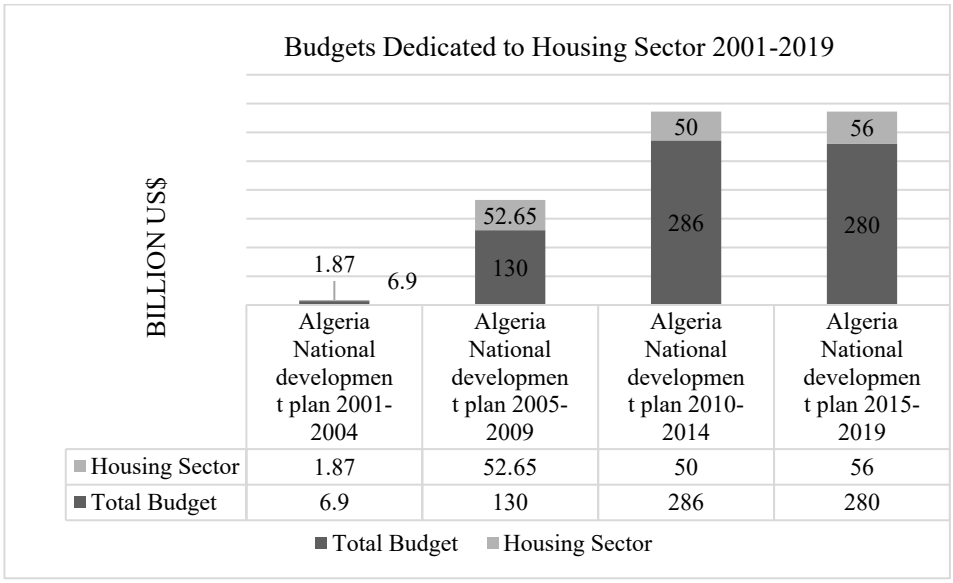

Figure 3: Budgets Dedicated to Housing Sector 2001-2019
Source: MHUV, 2019

Table1: Summary of Housing Target-Achievement in Algeria 1999-2019

	Target (Units)	Achievement (Units)
1999-2004	-	810 000
2005-2009	1 000 000	1 000 000
2010-2014	2 000 000	1 200 000
2015-2019	1 600 000	-

Source: Adapted by the author from MHUV, 2019

In fact, the government is not able to respond to demand, in which the Algerian population is growing at an exponential rate with the rising urbanisation rate as the urban population has increased significantly from 1998 to 2019, reaching 72.60% (Worldometer, 2020). The Ministry of Housing established five subsidised types of housing programmes for high-, middle- and low-income to ease the crisis. The demand for these programmes is far exceeding supply, especially for low-income groups. In addition to the public sector housing, the private sector in Algeria is also working along to ease the housing issues by providing different types of housing throughout Algeria. Nevertheless, there has been a slight improvement in the average household size from 4.89 persons at the end of 2009 to 4.55 at the end of 2014. According to the National Algerian Office of Statistics, by 2030, the average household size would be 4.14 persons per housing unit. Figure 4 illustrates the average household size (1998-2030).

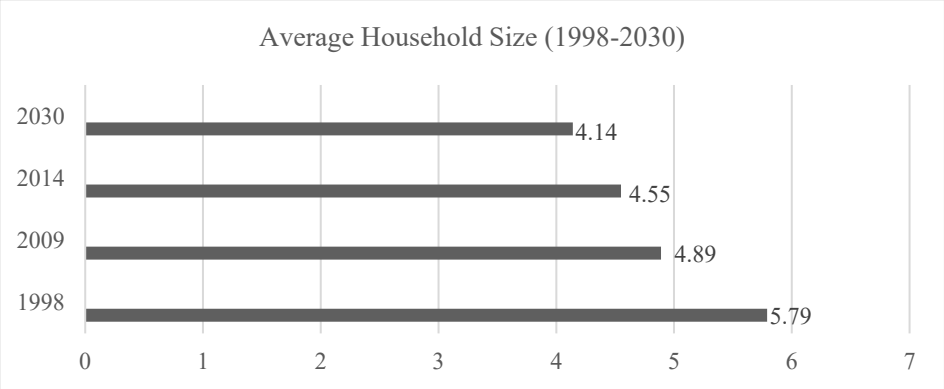

Figure 4: Average Household Size (1998-2030)
Source: Ministère de l'Habitat et de l'Urbanisme, 2011; ONS, 2019

Based on the figure, it can be inferred that the Algerian national housing policies are still far from reality to resolve the housing crisis. In purview of the housing policies' objectives, that aims to accommodate the low- and medium-income groups towards eliminating precarious housing, slum and shantytown. Thus, it appears that the current policies seem to be ineffective, despite the variety programmes, subsidies as well as encouragements from the private sectors.

Housing Demand, Supply and Property Markets in Algeria

According to Ismail, Jalil, & Muzafar (2015) affordability of housing is based on a function of price and income. The income drives the demand, while the price depends on the interaction of both demand and supply. Further, numerous factors influence the demand and supply of housing. Demand factor includes:

i) Demographic factors, which consists of the analysis of the population growth, the number and the type of households.

ii) The evaluation of households' income
iii) Policies implemented by the governments, which includes taxation and property rights.
iv) Occupants' preferences

Supply factor is affected by:

i) Land costs
ii) Government policy, which comprises land use and planning policy
iii) Cost of financing
iv) Construction costs including the costs of materials, equipment, and labour

In comparison to Malaysia, the government introduced various 5 years economic plans namely Malaysia Plan where in 2015-2020, the 11th Malaysia Plan recommends establishing an integrated database on housing supply and housing conditions. The purpose is to offer adequate, comfortable, good quality, and affordable houses to improve the well-being of the people (Economic Planning Unit, 2015).

In Algeria, the policy of housing concentrates on building a large amount of very low-cost rental and subsidised housing units. The Ministère de l'Habitat de l'Urbanisme et de la Ville (2015) reported a national housing shortage of 720,000 units (Figure 5) and around 20% of the national housing stock was estimated to be vacant. Meanwhile, 2,500,000 units are in dangerous and poor conditions dated from independence in 1962. The demand continues to outstrip the supply with the growth of cities. This creates a need for affordable high-quality residential buildings. For the annual housing supply, it is estimated at 80,000 dwellings, while the annual demand is at 300,000 units.

Subsidised provision for low and medium groups constitutes the majority of the government's aid taking into account the variable incomes and the most disadvantaged families living in precarious or unhealthy conditions through providing a variety of housing programmes such as Social Housing, Rural Housing, Lease to Own Programme, and Assisted Housing Programme.

Most North African countries have a poor classification in terms of property registration according to the World Bank Group (2016), where Algeria ranked 109th with Morocco 87th, Tunisia 92nd, Egypt 162nd and Libya 187th performing worst. Several reasons behind informality in north African countries including poorly imposed regulations, shortages in housing supply, the lack of affordability, rapid urbanisation, low-income and focusing on high luxury units. In Algeria, limited land availability in some regions has severely restricted the growth of the formal real estate market. Most households depend on public housing programmes. Other strategies of the urban poor include self-building on informally-squatted government land and buying units in the informal market (Centre for affordable housing finance in Africa, 2017).

Figure 5 shows the housing stock and deficit in Algeria from 1966 until 2019. The statistics illustrate that the housing stock increased slowly while the demand is still increasing over the past decades. Besides, the housing shortage registered at the highest level in 1999 with 3 million units. After that, the shortage decreased to 1.2 million and more than 720 000 in 2010 and 2015 respectively. In 2018, the shortage registered 1.5 million units with a total of the housing stock of 9,634,967 units in 2019.

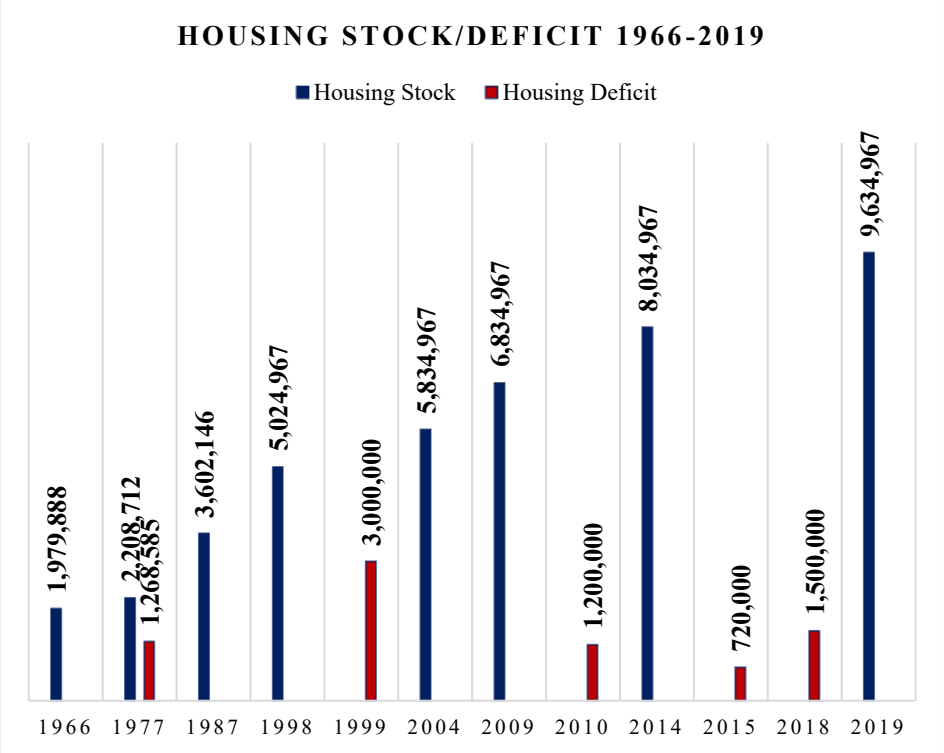

Figure 5: Housing Stock and Deficit in Algeria (1966-2019)
Source: Adapted by the author from MHUV, 2019

CONCLUSION

Housing is an ongoing challenge that has faced Algeria since independence. The Algerian government is facing pressure to provide low- and medium-income housing to the fast-growing population. Further, Algeria has made considerable efforts to end the housing crisis by implementing various strategies and plans to tackle housing problems.

Algerian housing policies are currently poorly structured, thereby failing to meet the housing crisis. Therefore, a significant change in how these programmes is currently structured is urgent. In addition, it is necessary to assign

monitors to tighten control over contractors in order to respect building standards while supporting housing complexes with various facilities. Besides, there is a need to find new forms to finance the construction of housing units in order to reduce dependence on the Public Treasury. Thus, the Algerian market should be open for investors.

To ensure improved performance of housing in addressing the encountered issues and solving the housing crisis, the following recommendations are made. First, refining the current housing policies implemented on national, regional, and local levels to enhance consistency of vision and encourage public participation. Second, developing quality and adequate housing to upgrade the overall housing quality in Algeria. Third, the control process during the construction and delivery of housing units is an important factor to ensure the construction completes on time and the distribution is equitable. Fourth, providing well-prepared specifications and guidelines defining the full process from the study to delivery. Fifth, the financial factor followed by professional management determines the quantity and quality as improving the current housing financing schemes will contribute to offering effective solutions for easy access to different housing programmes. Sixth, there is a mismatch in demand and supply for affordable housing according to the statistics. Hence, for efficient planning of housing supply and demand, there is a need to establish an integrated housing database for all relevant stakeholders and provide the needed information. Finally, there is a need to explore and examine the interrelationships between factors affecting housing problems in Algeria.

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