

Sustainable Architecture in the Urban Studies on Walkability in Public Housing

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This research aims to observe the existing streetscapes feature related to walkability in the area of The People's Housing Program in Kerinchi which serves as part of the Government Program for the resettlement of squatters and to fulfill the shelter needs of the low-income group (bottom 40%) in Malaysia. The stakeholder's perception of the effectiveness of the existing streetscape feature will be collected and analyzed. The study employs a quantitative approach, data collection is done via on-site study and survey questionnaires. Streetscape features were analyzed from four criteria – enjoyment, safety, comfort, and accessibility. This study identified most of the respondents will spend less time walking due to lacking enjoyment (55.33%), exposed physical safety (42.30%), poor sanitation and street maintenance (54.36%), and poor walkability design for special-needs people (53.60%). The outcome of the research findings suggests several methods in improving walkability by enhancing the walking environment and facilities, implementation of the pedestrian-only zone, congestion pricing, and more active participation by governing bodies.

Keywords: Architecture, Sustainable Urban Studies, Walkability, Streetscape Design, Accessibility

1. INTRODUCTION

Abley and Stephen (2008) define walkability as the extent to which the built environment is welcoming to the existence of people living, shopping, visiting, enjoying, or spending time in an area. Some dialogue focus on environmental features or ways to make a walkable neighborhood, for instance, areas being reachable, compact, physical-enticing, and secure. (A. Forsyth, 2015). The promotion of walkability in the city is fundamental to create a liveable community and improve the urban condition for better living quality. This is because walking can deal with many social and economic issues through social interaction. (Fernando Fonseca, et al., 2020). Moreover, developing walkable cities is a strategy of generating affordable and equitable transportation modes for the whole urban community. (Abdel Wahed Ahmed and Abd El Monem, N., 2020).

Research in Auckland, New Zealand, a predominantly vehicle-oriented city has shown that pedestrians are the most economical mode of movement in the city. The researchers predicted that government policies and regulation which isolate pedestrians from Queen Street, one of the largest commercial streets, will cost NZ\$11.7 million (RM32.2 millions) a year. Among the ten key dimensions suggested by Jeffrey R.K (2006) into a liveable and sustainable city, people-oriented city planning and planning for non-motorized transportation modes are being pointed out. Similarly, to achieve a more people-oriented city, the local authorities of Malaysia have paid a lot of effort in planning to make Kuala Lumpur a first-class liveable city. These efforts include the Kuala Lumpur 2020 City Plan (SD6) and actions taken by the local authorities in pedestrianizing several streets such as Dataran DBKL every 1st and 3rd Sunday monthly. (Ghahramanpouri, A., et al., 2012). Moreover, New Urban Agenda (NUA) and Safe City Programme were launched aligning with Development Goal (DG) 11 in Malaysia in 2004 that targeting creating a safer, resilient and liveable city environment for the residents. Aminuddin A. (2018) has also expressed the

Sustainable Urban Studies and its relationship and has related safety among users.

Allan Jacobs in his publication called *Great Streets* has mentioned that when streets become unsafe, it is almost always when the pedestrian realm does not exist. Other than the safety concern, in *Great Streets*, Jacobs also analyses the quality of streets around the world: buildings of similar height, building facades, landscape or trees, openings that allow great view, intersections, beginnings and endings, interesting stopping spot, and spot for relaxing purpose. All of these are characteristics of good walkability, according to Jacobs. Besides that, in the publication of Shamsuddin. S., et al. (2014) called *What Makes People Use the Street*, enjoyment is critical in influencing walkability as user activities that happened on the road do influence the vibrancy of the street environment. The space to walk without exceeding obstruction for a comfortable walk with sufficient distance and speed is very important to the pedestrians from various age groups, especially the disable groups, old folks and children (Jan Gehl, 2011; Sahabuddin, M. F. M., Aminuddin, A., Muhammad-Sukki, F., & Shukri, S. M., 2022). Next, according to the conceptual steps by Park, et al. (2009), the decision-making to walk is determined by four key components such as pleasantness, vitality, unsafety, and complexity. In 2013, the general theory of walkability was further developed by City Planner Jeff Speck in his publication called *4 ways to make a city more walkable* which includes enjoyment, safety, comfort, and accessibility.

Many research that has been conducted within the Malaysia context employed road networks instead of pedestrian networks for the walkability assessment, with the assumption that most footpaths are sidewalks along the road. (Sun, G., et al., 2019; Hashim, M. Z., Awaluddin, Z. L., Aminuddin, A. M. R., Sarkum, S. A., Sholiha, A. B., & Aziz, A. A., 2021; Shukri, S. M., Wahab, M. H., & Jamala, N., 2021). However, several recent studies have compared the results of employing road networks versus pedestrian networks on the

walking assessment and indicated that pedestrian network is more viable in anticipating pedestrian behavior (Ellis et al., 2016). Apart from that, numerous relevant pieces of works of literature that related to walkability in Malaysia often examine the commercial and public space of the City Centre such as Jalan Tuanku Rahman (Nasrudin, N., et al., 2018; Shukri, S. M., Wahab, M. H., & Amat, R. C., 2020), Bukit Bintang (Loh, K.S, 2017; Shukri, S. M., & Wahab, M. H., 2019), Chinatown (Ibrahim, M. A., Wahab, M. H., & Shukri, S. M., 2018; Tan 'G'-Ling, A., and Aminuddin, A., 2019), Meldrum Walk and Segget Walk-in Johor Bahru (Ghahramanpouri, A., et al., 2012; Shukri, S. M., Wahab, M. H., Amat, R. C., Taib, I., & Ismail, S., 2018) by investigating the tourists' perception on the quality of the pedestrian environment. However, studies that focus on the walkability in the residential zone of Kuala Lumpur City Center are rare with readily obtainable sources. There is limited information regarding the residents' perception on the level of satisfaction of the existing streetscape in their housing area, their worries and concerns on the decision to walk, desire, and future expectation for a better walkable environment as in Adeeb, Aminuddin, A (2020) and Shukri, S. M., Wahab, M. H., Awaluddin, Z. L., Aminuddin, A. M. R., & Hasan, M. I. (2022). To cover the research gap, this research aims to observe the existing streetscapes feature related to walkability in the area of The People's Housing Program in Kerinchi (PPR Kerinchi) which serve as part of the Government Program for the resettlement of squatters and to fulfill the shelter needs of the low-income group (bottom 40%) in Malaysia. The research was narrowed down to PPR Kerinchi Blk. D, E, and F while the stakeholders' perception of the effectiveness of the existing streetscape features in the five correspond pedestrian pathways will be examined closely. This is

because the success of all streetscape designs was determined by its users. (Shamsuddin, et al., 2012). The outcome of the research findings aims to suggest possible implementation gaps to enhance the streetscapes for walkability in PPR Kerinchi Block D, E, and F in terms of design and planning respecting the point of view of the end-user.

2. METHODOLOGY

In this research, quantitative research methodology will be adopted to fulfilling the overall aims of the study. The research was conducted in two consecutive phases: Phase 1 site study and photography analysis while Phase 2 questionnaire survey. The study will be conducted locally in Malaysia context, the chosen area is PPR Kerinchi Block D, E, and F, which serve as part of the Government Program for the resettlement of squatters and to fulfill the shelter needs of the low-income group (bottom 40%) in Malaysia. The location of PPR Kerinchi is at the heart of Kerinchi, Kuala Lumpur, Malaysia (refer to Figure 1). PPR Kerinchi has opened for the tenants back in March 2008 where most of the earlier tenants were from nearby Rumah Panjang Pantai Dalam, Kuala Lumpur. The housing comprises of 6 blocks (Block A to F) with each at 17 stories high built on 20 acres of land. The development has a total of 1896 units which is estimated that about 7218 people live within the compound. The majority of tenants consist of Malay by 65%, Indian by %, and Chinese and others by 10%. The scope of the study has narrowed down into the area of PPR Kerinchi Block D, E, and F to examine closely the walkability of its corresponding pedestrian streets. Table 1 has summarized the details of PPR Kerinchi Block D, E, and F.



Figure 1: Location Map of Kerinchi in Kuala Lumpur, Malaysia.

Table 1: Information of PPR Kerinchi Block D, E, and F

	Case Study (PPR Kerinchi)
Blocks	3 (Block E, D and F)
Area (acres)	9.05
Storey	17
Units per block	316
Total Units for Block D, E, F	948
Nearby LRT & Commuter Station & Walking distance	LRT University (1.7km, 22 minutes); LRT Kerinchi (1.8km, 26 minutes); Commuter Station Angkasapuri (1.7km, 22 minutes)

A study in Perth, Australia, found that when using a pedestrian network compared to a road network that designed main for motorized vehicles, the scale of connectivity for some neighborhoods is boosted by up to 120% (Sun, G., et al., 2019). Five pedestrian streets surrounding PPR Kerinchi Block D, E, and F such as Jalan Pantai Permai 2 (i), Jalan Pantai Permai 2 (ii), Jalan PPR Kerinchi Block D, Jalan PPR Kerinchi Block E, and Jalan

PPR Kerinchi Block F will be focused in this research. These streets are illustrated in Figures 2, 3, and 4. Furthermore, Table 2 elaborate the point of interest of each above-mentioned pedestrian street which has shown that the importance of the streets to the end-users as these streets are their daily-passing streets to carry their regular activities.

Table 2: Five studied pedestrian streets and their point of interest

Street Name	Length	Point of interest
Jalan Pantai Permai 2 (i)	127.20m	PPR Kerinchi A-C, Community Library, Food Court, Religious Places, Restaurant, Retails, etc.
Jalan Pantai Permai 2 (ii)	152.47m	PPR Kerinchi A-C, Community Library, Food Court, Religious Places, Restaurant, Retails, etc.
Jalan PPR Kerinchi Block D	101.60m	Football Field, Food Court, Jalan Pantai Permai 2
Jalan PPR Kerinchi Block E	101.60m	Football Field, Food Court, Jalan Pantai Permai 2
Jalan PPR Kerinchi Block F	122.40m	Jalan Pantai Permai 2, PPR Kerinchi A-C, Community Library, Food Court, Religious Places, Restaurant, Retails, etc.

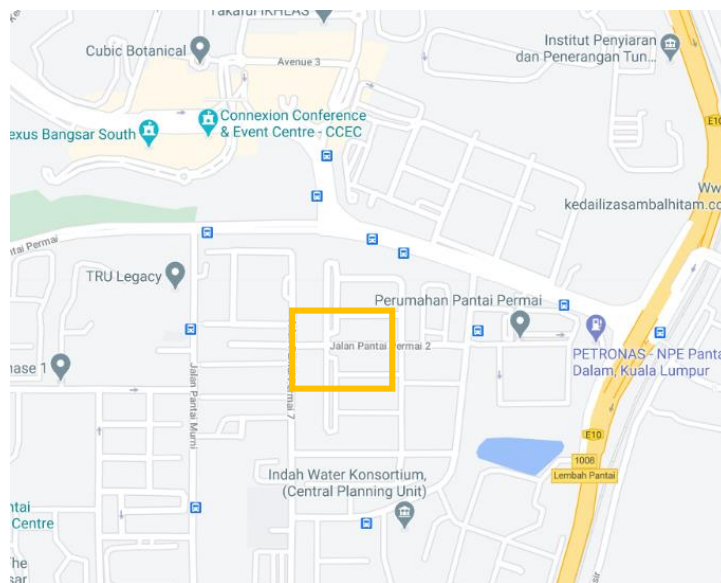


Figure 2: Map showing location of studied street (orange) in relation to the Kerinchi, Kuala Lumpur.

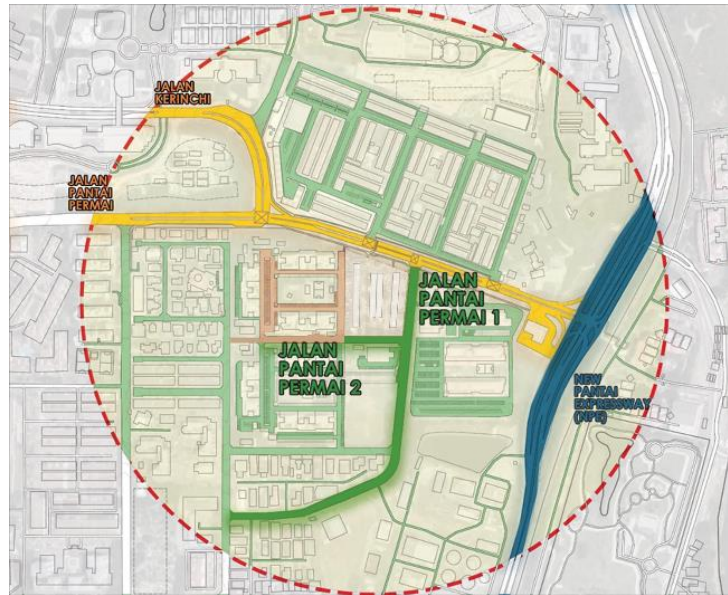


Figure 3: Map showing location of studied street (orange) in relation to highway, main, secondary streets.

■ Highway
 ■ Main Road
 ■ Secondary Road



Figure 4: Map showing location of studied street (orange) in micro.

2.1 Phase 1: Site Study and Photography Analysis

Although the limitation due to the Movement Control Order (MCO) brought by the Covid-19 pandemic in Malaysia, site study and photography analysis is carried to study the current condition of the streets of the case study area. This information provides a general overview of the physical hardscape and road facilities that would eventually affect the quality of the street walkability. The condition of the streets was

studied and assessed based on the four main categories which are enjoyment, safety, comfort, and accessibility.

2.2 Phase 2: Survey Questionnaire

The survey questionnaire was used to allow this research to understand the perception from the stakeholders' perspective of PPR Kerinci Block D, E, and F. This method is to utilize the survey questionnaire to gather information about their

perception of the streetscape features of PPR Kerinchi Block D, E, and F. Among the population in PPR Kerinchi Block D, E, and F that is up to 948 household units (316 units per block), a total of 152 responses were collected through an electronic medium (16%). Users who are living within the area of PPR Kerinchi Block D, E, and F are chosen as respondents for the survey. To ensure a fair distribution and more accurate survey results, the questionnaire is distributed and answered by one representative per household in PPR Kerinchi Block D, E, and F with the assistance of PPR Kerinchi's chief and the community members. The questionnaire consists of 24 questions that are divided into three parts as below: -

Respondent Information– Participants' demographics

User's perception – Consist of Likert scale of the tabulated data from the literature review turned into questions which the participants are to fill in their level of agreement towards the topics. The user perception of the walkability of the research area is gathered from main categories which are enjoyment, safety, comfort, and accessibility. Respondent Opinion & Recommendation – An open-ended question for the respondents to include their recommendation or suggestion on what they would like to see changes towards the current situation of the streetscape that improving walkability in the area. Once the data were collected, the data were further analyzed by basic descriptive statistics and reported in frequencies and percentages by using Microsoft Excel software. The procedure that was used to construct the quantitative data analysis is as follows: (1) creating an Excel database, (2) data coding, (3) data entry, (4) data checking, and (5) data analysis. Data coding is where the transformation of the collected raw data which can be analyzed by the software. Data entry is

where the collected data are entered into the software for further processing. Data checking is where the integrity of the data is verified, it also acts as a secondary check towards any false, missing, or invalid data that can affect the result. Finally, data analysis is where the data are analyzed and discussions can be carried out that are related to the perception of the stakeholders towards the streetscape features of PPR Kerinchi Block D, E, and F.

3. RESULT

The findings of this research are primarily from the questionnaire survey to gather the perception of stakeholders on the streetscape features for walkability in the PPR Kerinchi Block D, E, and F area. The findings were then reinforced with site study to understand the physical hardscape and road facilities that would eventually affect the stakeholders' perspectives and the quality of the street walkability.

3.1 Data Findings from Questionnaire Survey

There are four categories under this questionnaire survey such as section I-Respondent Information; section II- User perception; and section III- Respondent Recommendation. From 152 respondents that make up the sample size of the research, the perspective on walkability was studied and assessed based on the four main categories which are enjoyment, safety, comfort, and accessibility. Figure 5 have shown that the respondents are quite balanced among males (46%) and females (54%). Furthermore, most respondents are in the age group of 40 to 50 which is about 34% as shown in Figure 6. From that, as shown in Figure 7, most of the respondents are made up of housing occupants or stakeholders, most residents (49.3%) and secondly the tenants. (32.2%).

Respondent Gender

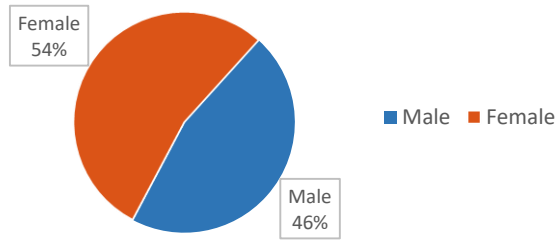


Figure 5: Respondents Gender

Respondent Age Group

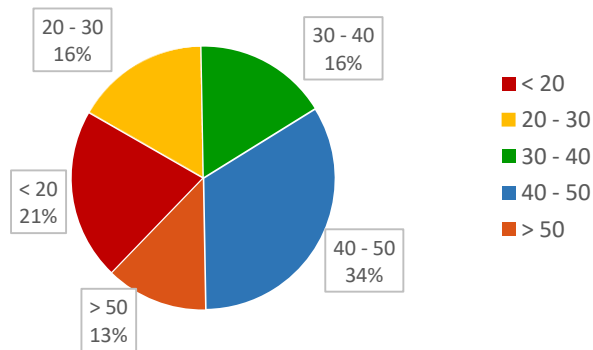


Figure 6: Respondents Age Group

Role of Respondents in PPR Kerinchi

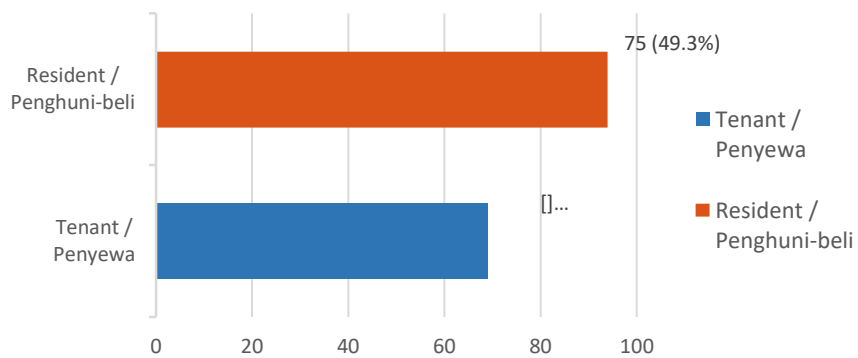


Figure 7: Role of Respondents in PPR Kerinchi Block D, E & F

The stakeholders' perception of the walkability of PPR Kerinchi Block D, E, and F was measured using a multi-choice question and numbers of 5-point Likert Scale in the survey questionnaire that ranges from "Strongly Disagree" to "Strongly Agree".

3.1.1 Assessment on Enjoyment at PPR Kerinchi Block D, E & F

According to Jeff Speck's Walkable City (2012), enjoyment in the term of walkability is related to the sense of enjoyment and satisfaction transmitted by the urban design qualities people experience while walking. In other words, enjoyment is also referring to the sense of place and "vibrant atmosphere" infused by urban space which encourages pedestrians to spend time in (Mohidin, H. H. B., Aminuddin, A., Rosni, A., Sediadi, E., & Razif, F. M., 2019). The indicator of Enjoyment includes site atmosphere, aesthetic of places, architectural and landscape design, scenery, cleanliness, pedestrian activity, noise

level, transparency, and permeability of built environment and urban texture. A multi-choice question that asking what implement is essential in such a way that could activate the PPR Kerinchi area is placed to understand what occupants think is essential to make a vibration to the PPR Kerinchi area. The responses from the stakeholders are important to achieve the research objective as the preference of the users can be recorded and so people-orientated recommendations can be suggested later. Among the options of (a) Places for Recreational; (b) Places for Eatery; (c) Sufficient Road Facilities; and (d) Landscaping (Greenery) as shown in Figure 8, there are 43% of the respondents (65 respondents) agree that by having sufficient road facilities, it would activate the area of the topics. Whereas, the latter option preferred by 24% of the respondents (36 respondents) is having places for recreational. The least preferred option picked by the respondents is placed for eatery which only consists of 15 % of the respondents (22 respondents).

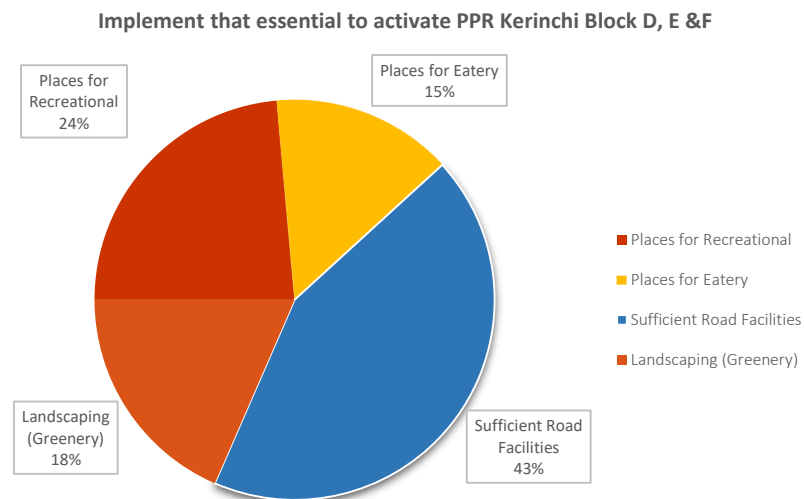


Figure 8: Implement that essential to activate PPR Kerinchi Block D, E and F.

In terms of enjoyment, most responses collected from the respondents have shown that the current streets in the PPR Kerinchi area are not enjoyable to walk about (55.33%) as shown in Table 3.

Breaking down the criteria, more than half of the respondents (50.6%) are not satisfied with the current amount of landscaping along the streets such as trees and shrubs. While 34.2% of the

respondents tend to be neutral towards the amount of existing landscaping in the area of the topics. This data is very significant which has strongly shown that the stakeholders in the research area would like to have more greenery as part of their walking enjoyment. Besides that, most of the

respondents (67.7%) are agree that the streets are dirty and unhygienic. Whereas, only 16.5% of the respondents find the streets have good and adequate facilities for the walking experience. There are a big number of respondents (47.4%) do not satisfy with the current road facilities.

Table 3: Enjoyment-Related Survey Criteria.

ENJOYMENT						
	CRITERIA	Level of Agreement				
		(1 – Strongly Disagree; 5 – Strongly Agree)				
		1	2	3	4	5
1.	The streets have adequate landscaping (trees, shrubs).	11.8%	38.8%	34.2%	13.2%	2.0%
2.	The streets are dirty and unhygienic.	7.2%	12.5%	12.5%	43.4%	24.3%
3.	The streets have good and adequate facilities.	15.8%	31.6%	35.5%	9.9%	6.6%

3.1.2 Assessment on Safety at PPR Kerinchi Block D, E & F

According to Jeff Speck’s Walkable City (2012), safety refers to perceptible and physically measurable attributes of the walked environment that affect people’s perception of being protected from traffic and crime and of being walking in the right direction. Its indicators include car traffic, on-street parking, the geometry of crossings and facilities for pedestrians at crossings, coexistence or conflicts with other modes (separation features, traffic calming measures, surface texture, and signalization), transparency and permeability of built environment, street lighting, crime/police presence, natural surveillance, etc. In terms of safety, most responses collected from the respondents have shown that the streets are not safe for walking (42.30%) as shown in Table 4. Breaking down the criteria, there are 48.7% of

respondents (74 respondents) agree that the current street condition is not good and unsecured. Also, 47.4% of respondents (72 respondents) find walking along and across the streets are unsecured and not safe. Furthermore, for the street lighting, up to 47.3% of respondents (72 respondents) are not satisfied with the lighting of the streets during night time whereas 25% of the respondents (38 respondents) have a neutral point of view towards this.

Among the respondents, only 21.1% of respondents (32 respondents) have faced bad experiences or accidents while walking along the streets. Fortunately, among the respondents, up to 46% of the respondents (70 respondents) have claimed that they have yet to experience accidents or any unfortunate occurrence during the walking journey at the research area. Next, based on the statistics, 38.1% of the respondents (58

respondents) agree that the streets are prone to car accidents. These findings were synchronized with the site observation which over a hundred cars are found either parking or access the roads at all-time

in the research area. Moreover, there are 51.3% of the respondents (78 respondents) have issues of how the streets are unsafe for crossing due to lacking zebra crossing.

Table 4: Safety-Related Survey Criteria.

CRITERIA		Level of Agreement				
		(1 – Strongly Disagree; 5 – Strongly Agree)				
		1	2	3	4	5
1.	The street condition is good and secured.	13.2%	35.5%	26.9%	17.8%	6.6%
2.	Walking along and across the streets are secured and safe.	13.2%	34.2%	30.9%	17.8%	5.9%
3.	The streets are well lit during nighttime.	10.5%	36.8%	25.0%	21.7%	2.6%
4.	Bad experiences or accidents have happened while walking along the streets.	21.0%	25.0%	32.9%	15.8%	5.3%
5.	The streets are prone to car accidents.	12.5%	22.4%	27.0%	28.9%	9.2%
6.	The streets are safe for crossing (zebra crossing)	13.8%	37.5%	27.6%	19.1%	2.0%

3.1.3 Assessment on Comfort at PPR Kerinchi Block D, E & F

According to Jeff Speck’s Walkable City (2012), comfort refers to the convenience and ease of walking and freedom from hardship and constraints. The indicators of comfort include sidewalk width, street lighting, pavement maintenance, availability of parking facilities, etc.

In terms of comfort, most responses collected from the respondents are most of them agree that the streets in the topics are not comfortable for working (54.36%) as shown in Table 5. The statistics have shown that there are 45.9% of the respondents (70 respondents) find walking along and across the streets is not comfortable. Among them, 28.3% of the respondents (43 respondents)

have a neutral view of points. Next, more than half of the respondents which up to 58.5% of the respondents (89 respondents) are unsatisfied with the street protection from weather such as sun and rain. Plus, 56% of the respondents (85 respondents) suggest that the surface of the streets is in bad condition that inhibits ease to maneuver. For the maintenance of streets, up to 57.8% of the respondents (88 respondents) agree that the streets are not well-maintained whereas 27.0% of the respondents are keeping neutral towards this. On the other hand, a huge amount of the respondents (61.2% or 93 respondents) finds there is inadequate street furniture for resting along the streets. Plus, in terms of the street width, about 46.8% of the respondents (71 respondents) are not satisfied with the width of the streets that were designed for walking purposes whereas 23.7% of the respondents are keeping neutral towards this.

Table 5: Comfort-Related Survey Criteria.

COMFORT						
	CRITERIA	Level of Agreement				
		(1 – Strongly Disagree; 5 – Strongly Agree)				
		1	2	3	4	5
1.	Walking along and across the streets are comfortable.	15.7%	30.2%	28.3%	22.4%	3.3%
2.	The streets are well protected from the weather (sun/rain)	17.1%	41.4%	23.0%	16.4%	2.0%
3.	The surface of the streets is in good condition that easy to maneuver (no holes/objects blocking)	13.2%	42.8%	25.0%	17.8%	1.3%
4.	The streets are well-maintained.	10.5%	47.3%	27.0%	10.5%	4.0%
5.	There is adequate street furniture for resting along the streets.	18.4%	42.8%	17.8%	17.1%	3.9%
6.	The streets are wide enough for walking along.	13.2%	33.6%	23.7%	23.0%	6.6%

3.1.4 Assessment on Accessibility at PPR Kerinchi Block D, E & F

According to Jeff Speck’s Walkable City (2012), accessibility encompasses topological characteristics of the road network and spatial qualities that contribute to physical ease. Its indicators include cost expressed in the distance, time, directness and continuity of route, accessibility by different transport modes, connection to point of interests, etc. In terms of accessibility, most responses collected from the respondents are most of them agree that the streets in the topics have issues of accessibility for smooth walking experience (53.60%) as shown in Table 6. Only 23.1% of the respondents (35 respondents) agree that the streets are easily accessible by walking while 48% of the

respondents (73 respondents) suggest that the streets are not easy to access by walking. Next, in terms of easy accessibility to public transportation, 46.7% of the respondents (71 respondents) have shown their dissatisfaction while about 34.2% of them stood a neutral point of view towards this. Apart from that, there is an overwhelming number of respondents (75% of the respondents) suggest that the OKU access lane is not suitable and hard to be accessed by special needs people such as disable group with a wheelchair, stroller, toddlers, etc. Only 5.9% of them (9 respondents) are satisfied with the existing OKU access lane. Lastly, in terms of the connection to point of interest, 44.7% of the respondents (68 respondents) find the streets are not well-connected to the point of interest. However, 35.5 % of the respondents (54 respondents) are neutral towards this.

Table 6: Accessibility-Related Survey Criteria.

ACCESSIBILITY		Level of Agreement				
CRITERIA		(1 – Strongly Disagree; 5 – Strongly Agree)				
		1	2	3	4	5
1.	The streets are easily accessible by walking	13.8%	34.2%	28.9%	17.8%	5.3%
2.	The streets are easily accessible to public transportation	9.9%	36.8%	34.2%	12.5%	6.6%
3.	The OKU access lane is suitable and easy to be accessed by special needs people (Disable group with wheelchair, stroller, toddlers)	35.5%	39.5%	19.1%	4.6%	1.3%
4.	The streets connect well to point of interest	13.8%	30.9%	35.5%	15.8%	3.9%

3.1.5 Respondents Opinion & Recommendations

The last part of the questionnaire consists of a recommendation section that asks the participants what they think could be improved or added to the streets, an open-ended question that allow the participants to suggest or proposed anything that could be done that are lacking in the area of PPR Kerinchi Block D, E, and F. This allows the actual users of the streets to propose needs and wants to help improve the streets to meet their perception of successful walkable streets. Table 7 summarized all the opinions or recommendations by the respondents. Most of them are concerned about the safety of the pedestrians due to the presence of plenty of cars and improvement needed on the pedestrian pathways or sidewalks. A few of them specifically stated the need of repairing and upgrading their recreational park for better enjoyment and events. One of them felt that the current recreational park or playground shall be upgraded and segregated by design for different age groups especially the senior citizens. In his/her opinion, this is because of the presence of children who are having heavy sports like

basketball that might hit or cause injury to the nearby senior citizens that used the recreational park at the same time. There is only one recreational park at the moment for the people of PPR Kerinchi Block D, E, and F which are located at the center of these three blocks.

Moreover, a few respondents requested have more landscaping and greenery be planted around the areas. One respondent has specifically requested to have more street lights on the roads and he wished all the bushes around the pedestrian walkways to be cleared. Besides, some respondents have complained about the cleanliness of the pedestrian walkways which there are plenty of litters around and causes walking not enjoyable. Another specific recommendation suggested by a respondent is to have CCTV equipment along the pedestrian walkways to ensure their safety while walking. Apart from that, the respondent has pointed out that the current pedestrian walkways design is not suitable for the disabled group and those with wheelchairs. Lastly, an improvement is needed to make the pedestrian walkways more user-friendly is also suggested by some of the respondents.

Table 7: Respondents Opinion & Recommendations.

	OPINION & RECOMMENDATION	CRITERIA
1.	Very bad sidewalk. Not user-friendly due to greedy people that open stalls have stop footage for other users. Dirty and disgusting.	Enjoyment/ Comfort/ Accessibility
2.	Absence of pedestrian walkways.	Safety/ Accessibility
3.	The presence of plenty of cars might cause safety issues.	Safety
4.	Enhancement is needed (to improve walkability).	-
5.	Please upgrade the recreation park around blocks D, E, and F for exercise activities for senior citizens. The available area is not suitable for this group because the children play ball by every night which possible accidents might happen for instance their football might hit the nearby senior citizens that use the park at the same time.	Enjoyment/ Safety
6.	Pedestrian Walkways need to be repaired	Safety/ Comfort
7.	Landscaping needs to be added	Enjoyment
8.	More Street lights are needed and the bushes around the pedestrian walkways need to be cleaned.	Enjoyment/ Safety
9.	Absence of comfortable pedestrian walkways. We need a green landscape. And too many stray cats and litters. Dirty	Comfort/ Enjoyment
10.	CCTV is needed along the pedestrian walkways	Safety
11.	(Pedestrian walkways) is not suitable for the OKU group's visual and those with wheelchairs.	Comfort
12.	Improve the playground.	Enjoyment
13.	Repair the pedestrian pathway.	Comfort Safety Enjoyment
14.	The road condition is very congested.	Comfort Enjoyment
15.	To build a wider pedestrian walkway.	Comfort/ Enjoyment
16.	Pedestrian walkways are not user-friendly and unsafe	Comfort/ Safety/Accessibility/ Enjoyment
17.	Repair the park and pathways need to be repaired and rectified.	Comfort/ Safety/ Enjoyment
18.	In my opinion, pedestrian walkways need to be upgraded with higher safety design.	Safety
19.	(The Pedestrian walkways) need to upgrade for safety & cleaning.	Comfort/ Safety/ Enjoyment

3.2 Data Findings from Site Study

Considering the inadequacy in explaining the condition of walkability in the PPR Kerinchi area via survey questionnaire solely, Maxwell (2012) suggests that the data findings from the quantitative survey shall simultaneously synchronize with the site observation for the validity of research findings. Site study or

photography analysis have carried on the five pedestrian streets based on four criteria which are enjoyment, safety, comfort, and accessibility. Table 8 illustrates the view of the five pedestrian streets (labeled as A, B, C, D, and E) in PPR Kerinchi Block D, E, and F. Furthermore, Table 8 is the summary of the site survey that demonstrates the physical characteristic of the pedestrian streets.

Table 8: Street View.






















Street Name	Street View
A - Jalan Pantai Permai 2 (i)	
B - Jalan Pantai Permai 2 (ii)	
C - Jalan PPR Kerinchi Block D	
D - Jalan PPR Kerinchi Block E	
E - Jalan PPR Kerinchi Block F	

Table 9. The Summary of Site Study

CRITERIA	SUBJECTS STUDIED	PHOTO				
Enjoyment	Greenery and Landscape Street Cleanliness Road Facilities Resting Points Activities					
	Findings	<p>Somewhat satisfactory for the street cleanliness and trees are planted along the street for shaded-walking. However, road facilities to promote walking like sitting points, cycling lane, ramp and etc are lacking.</p> <p>Heavy shrubs and big trees were found at the road end, however the road-end area was used as parking. There are some hawker stalls along the street which contribute to lively environment.</p> <p>Somewhat satisfactory for the street cleanliness and trees are planted along the street next to the central playground. However, Less enjoyment due to the walking scenery might be taken over by the cars and motorcycles. Plus, absence of enough sitting points, cycling lane, ramp, rubbish bin and etc. for enjoyable walking. The central recreational area being the liveliest place in the research area.</p> <p>Satisfactory street cleanliness except absence of landscape at the lobby of PPR Kerinchi Blk. D. Less enjoyment due to the walking scenery might be taken over by the cars and motorcycles.</p>				
Safety	On-street Parking Crossing Facilities Street Lighting Crime presence Natural Surveillance					
	Findings	<p>Somewhat satisfactory for the natural surveillance due the presence of hawker stalls and central recreational area however, the level of natural surveillance is reduced due to the view that blocked by cars. Overwhelming cars were found at all the streets in the topics where the cars was double or triple parked at both side of the roads, causing the width of the walkable road is getting reduced and absence of zebra-crossing that might pose danger to the pedestrians. Fortunately, the streets are well-lit during the night time because of sufficient street lamps and crime rate is less as reported by the residents.</p>				
Comfort	Protected walkways Surface texture Object Blocking Street Maintenance Street Furniture					
	Findings	<p>Not satisfactory for the street maintenance due to uneven and broken surface of the pedestrian</p> <p>Not satisfactory for the street furniture along the streets however several seating</p> <p>Not satisfactory for the smoothness of</p>				
		<p>walkways. In contrary, the roads for car access is generally flat and smooth which form the contrast phenomenon. The pedestrian walkways are not covered from weather. Due to the presence of hawker stalls, many rubbish were spotted along the streets hence resulted bad smell.</p> <p>were found in the central recreation area. Absence of covered walkways that link the PPR Kerinchi Blk. D, E and F to the central recreational area.</p> <p>walking due to the presence of hawker stalls that allocated in the middle of the pedestrian walkways. Many rubbish were spotted along the streets due to the hawker stalls and caused bad smell.</p>				
Accessibility	Access to Point of Interest OKU Accessibility Connectivity					
	Findings	<p>Satisfactory to the accessibility which the street allow easy access to the point of interest and public transportation.</p> <p>Not satisfactory for the OKU accessibility due to the only OKU access to the central recreational area were found only located in front of the PPR Kerinchi Blk. F. This cause the OKU group from Blk. D and E have issues of crossing directly from their block and resulted longer time or special assistance is needed for them.</p>				

4. RESULT AND DISCUSSION

Traditional urban planning was designed by traffic engineers, before traffic modes, infrastructure, and transportation models (F. Wefering, et al., 2014). Today, urban planning has started to engage with interdisciplinary teams including the stakeholders (Pereira, P., et al., 2020). This is because the soul of the city is the people who live inside (Hashim, H. S., et al., 2017; Shukri, S. M., Manteghi, G., Wahab, M. H., Amat, R. C., & Ming, W. H., 2018). While a good walkable neighborhood can enhance the life quality of the city people by improving their health, encouraging social capital, and removing undesirable commuting which separates people from the environment (Dale, A., 2012). After analyzing the feedback of respondents through the survey questionnaire as well as the detailed site study on the current walking condition of PPR Kerinchi Block D, E, and F, the discussion of the research aims to highlight four issues as implementation gaps to enhance the walkability in this area based on four criteria of enjoyment, safety, comfort, and accessibility. The highlighted issues are (i) greenery, (ii) congested car-orientated areas, (iii) maintenance of pedestrian walkways, and (iv) walkability design for special needs people.

Even though there are already some greeneries in the PPR Kerinchi Block D, E, and F area, many respondents still suggested that the greenery is not sufficient. This is due to the urban space tends to be sliced up, degraded, and eventually destroyed by the proliferation of fast roads and of places to park and garage cars, and their corollary, a reduction of tree-lined streets, green spaces, and parks and gardens (Sheller, M., et al., 2000). According to Charlotte (2017), trees have been proven to make streets safer and more walkable for pedestrians. This is due to the role of trees that can be used to slow down the traffic and hence assure the safety of the walking people. According to the US Department of Transportation 2015, the tree canopy planted along the road has contributed a narrowing speed control measure by giving the drivers a psycho-

perceptive sense of closure that could reduce the chance of speeding. Apart from that, the buffer zone between car roads and pedestrian pathways resulted from tree canopy also generates a sense of self-assurance or feeling safe to the pedestrians. Moreover, the publication of Green Cities: Good Health by the University of Washington on the influence of urban trees on city's health, safety, and quality of life have declared that people walk and jog more under the shaded areas, will inspire more communication with their neighbors and thus result from a stronger bond of community. As a subsequent, the natural surveillance could be enhanced in the area of PPR Kerinchi Block D, E and F.

Walking becomes very difficult and overlooked when there is an increasing number of cars in the city setting. As per Dale, A., et al. (2012), car culture and pedestrian culture do not happen at the same time without difficulty. According to the research by Freeman, C., et al. (2009), safety fears have developed in parents which subsequently withdrawing their kids from what is thought as a dangerous environment, called outdoor due to the dangers posed by cars. As an impact, lack of active access to the outdoor environment might become an inhibitor of children's prospering mental mapping exercises and skills to negotiate their environment productively (Halseth and Doddridge 2000). In the ten steps of walkability suggested by Jeff Speck, congested car-orientated issues can be reduced by stopping the induced demand for cars. According to Jeff Speck, the keys to solving car congestion are two, strong political leadership and re-educating traffic engineers or city planners. The Government and the Kuala Lumpur City Hall play an important role in this topic which is to stand up to DOT and request the traffic engineers, Architects, or city planners to incorporate policies into the design standards so that the streets can accommodate all users. Next, the strategies of pedestrian-only zones can be applied. In Malaysia, pedestrianization has been applied in some areas to separate the cars and pedestrians for non-traffic activities due to the upgrade of streetscape and promotion of better urban spaces

(Ghahramanpouri, A., et al., 2012). The practicability of this pedestrian-only--zone can be run as an experiment by using temporary low-cost materials such as blocks and cones that prevent traffic from entering a certain area of PPR Kerinchi at a certain day and time. According to Jeff Speck "try it on weekend and, if it works, expand the days..." By doing this way, less car congestion can be achieved in the research area.

Another strategy introduced by Speck is congestion pricing which has been operated successfully by many countries in the world. It is an idea of charging a fare to drivers and motorists for entering a zone, that are affected most of the traffic congestion. The same idea can be applied to reduce car congestion in the PPR Kerinchi area. By constraining the drivers to pay something closer to the real price of driving, it will make people choose to use another form of transportation in the PPR Kerinchi areas which will then reduce car congestion significantly. As a bonus bringing by the congestion pricing, another form of transportation and infrastructure can be then developed by the Government. Apart from that, according to Papa, R., et al. (2018), traffic calming measures, upgrade of public transportation and facilities for cycling and walking, mixed land-use policies, and adoption of transportation tax policies such as parking pricing and road pricing have been listed in his ideas of smart planning to promote non-motorized city centers.

The level of comfort while walking in PPR Kerinchi Block D, E, and F area that has responded by the respondents is remarkably low due to the poor condition of pedestrian walkways. To solve the issues, the Kuala Lumpur City Hall should make a site visit and initiate immediate action on repairing and adjusting the pedestrian streets that would allow a smooth walking experience for different user groups including the special needs people. According to Alfonzo (2005), the environmental qualities that facilitate walking and support walking activities are capable to influence the level of comfort of a street user. Hence, the hygienic condition of the

walkways is critical in enhancing the comfort of walking. A walkway that full of rubbishes and stinky due to the stagnant water at the uneven surface would chase away the pedestrians within a second. Moreover, unlicensed traders and hawkers that utilize the pedestrian walkways for their business purposes might cause deficits in the walkway facilities (Nasrudin, N., et al., 2018). The Kuala Lumpur City Hall should take action on those unlicensed businesses especially those that have blocked the pedestrian sidewalks to ensure the smoothness of walking and so to assure the pedestrian's safety while walking.

The research found that more than half of the respondents have issues concerning the OKU lanes. The research found there are missing ramps with suitable gradients for these groups of people to access many points of interest such as the central recreational park, bazaria, night market, and so on. Few criteria need to be concerned by the city planners or Architects to improve the design of pedestrian pathways in the PPR Kerinchi area. This is because the street design shall play the role that catered for the different groups of people such as the toddlers, the elderly, disabled people with a wheelchair, etc. to have a comfortable and continuous walk. The design criteria including walking speed, topography, width, and the presence of a continuous footpath. According to Dumbaugh (2008), older adults often walk at speeds much less than the average speed that is used to calculate thresholds. Also, the disabled group might walk much slower than the normal people and might need some rest points along the walkways. These differences in walking speed and special needs by the elders and disabled people should notify the street planners and department of transportation of Lembah Pantai for adjusting and adding the timing of traffic, pedestrian lights at suitable luminance especially during night time, rest place, crossing facilities, and wider pedestrian walkway for those people with wheelchairs. By doing this improvement, these groups of special needs people in the PPR Kerinchi area can have smooth and continuous access to their point of interest.

5. CONCLUSION

An overall, the research suggests that the walkability in the area of PPR Kerinchi Block D, E, and F still has room for improvement. Issues such as firstly lacking enjoyment due to poor sanitation and well-designed landscape, secondly overwhelming cars that lead to limited walking space and exposed physical safety, thirdly poor-maintained streets, and final is non-user-friendly street design have significantly affected the users' satisfaction while walking in the research area. Knowing that the importance of pedestrian streets as a public meeting space might leads to a lively neighborhood and unified development of urban communities. The researchers have come out several possible implementation gaps after analyzing the respondents' perception and streetscape feature of the site. The implementation gap such as having more greenery along the pedestrian walkways to provide psychological safety and buffer between the main road and pedestrian walkways. Next, to reduce the car congestion by stopping the induced demand of cars through the strategies of the pedestrian-only zone and congestion pricing to the drivers and motorists for entering the area of PPR Kerinchi. Apart from that, the Kuala Lumpur City Hall is recommended to make a constant checking and initiate action on repairing and adjusting the size of the pedestrian streets to cater to different usage of user groups. Moreover, the hygienic condition of the walkways that have been affected by the rubbish and stagnant water shall be cleaned for the comfort of walking. Besides that, the design of pedestrian walkways shall be capable to cater to different groups of people such as toddlers, the elderly, disabled people with a wheelchair so that to have a comfortable and continuous walk. Lastly, these major findings of the research allow several implications in policy and design reference for the city planners, urban designers, landscapers, Architects, etc. to enhance the walkability at PPR Kerinchi Area.

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7. REFERENCES

1. Abdel Wahed Ahmed, M. M., and Abd El Monem, N. (2020). Sustainable and green transportation for better quality of life case study greater Cairo – Egypt. *HBRC Journal*, 16(1), 17–37. <https://doi.org/10.1080/16874048.2020.1719340>
2. Abdul Rahman, N., Shamsuddin, S., and Ghani, I. (2014, August). What Makes People Use the Street? Towards a liveable urban environment in Kuala Lumpur city centre. *Asian Conference on Environment-Behaviour Studies “Environmental Settings in the Era of Urban Regeneration”*, Chung-Ang University, Seoul, S. Korea.
3. Abdul Rashid, S., Wahab, M. H., Wan Rani and W. N. M. (2020). An Analysis of Safety Perception in the Street of Kuala Lumpur. *Journal of Critical Reviews*, 7(5), 52–55. <https://doi.org/10.31838/jcr.07.05.09>
4. Adeeb Zulkifli, Aminuddin, Asrul (2020), Outdoor space as integral component in home making at low-cost housing in bangsar. <https://majournal.my/2020.v2i3/10.pdf>
5. Allan Jacobs. (2008, December 31). Project for Public Spaces. <https://www.pps.org/article/ajacobs>
6. Aminuddin Asrul (2018). Towards sustainable low-cost high rise urban housing in Kuala Lumpur, Malaysia. (Doctoral Dissertation), University of Nottingham, UK.
7. Aminuddin, Asrul.M.R., Yong, G.K., Study on lowcost high rise urban

- housing in Kuala Lumpur - Impact on communities and social spaces. *International Journal for Housing Science and Its Applications*, 2009, 33(2), pp. 117–126
9. Banister, D. (2005). *Unsustainable Transport*. New York: Taylor & Francis Group.
 10. Bhattacharya, T., Dasgupta, S., & Sen, J. (2019). An Attempt to Assess the Need and Potential of Aesthetic Regeneration to Improve Walkability and Ergonomic Experience of Urban Space. *Advances in Intelligent Systems and Computing*, 358–370. https://doi.org/10.1007/978-3-030-20151-7_34
 11. Canopy. (2018, May 17). The Benefits of Trees. <https://canopy.org/tree-info/benefits-of-trees/>
 12. Charlotte Tree Plan. (2017). Safe, More Walkable Streets. <http://charlottetreeplan.weebly.com/safe-walkable-streets.html>
 13. Dale, A., Dushenko, W., & Robinson, P. J. (2012). *Urban Sustainability: Reconnecting Space and Place* (1st ed.). University of Toronto Press, Scholarly Publishing Division.
 14. DBKL (2008b). *Kuala Lumpur Structure Plan 2020*. Kuala Lumpur. Dewan Bandaraya Kuala Lumpur.
 15. Dunn, S. (2015). *Reimagining Streets: A Guide for Walkability in Downtown Los Angeles*. <https://www.oxy.edu/>
 16. Fazzini, E. (2013, June). “Walkable City” by Jeff Speck. Eric Fazzini. https://www.ci.durham.nh.us/sites/default/files/fileattachments/planning_board/page/15701/walkable_city.pdf
 17. Fonseca, F. P., Conticelli, E., Jabbari, M., Ribeiro, P., Tondelli, S., Papageorgiou, G., and Ramos, R. A. R. (2020). Smart Pedestrian Net: A Smart Approach to Evaluate Built Environment Attributes and their Influence on Walkability; Fundamentals, Assessment and Application. University of Minho
 18. Forsyth, Ann. (2015). What is a walkable place? The walkability debate in urban design. *Urban Design International* 20, no.4: 274-292. Retrieved from https://dash.harvard.edu/bitstream/handle/1/29663388/Forsyth_walkability_082415_final.pdf?sequence=1
 19. Freeman, C., & Quigg, R. (2009). Commuting lives: children’s mobility and energy use. *Journal of Environmental Planning and Management*, 52(3), 393–412. <https://doi.org/10.1080/09640560802703280>
 20. Gehl, J. (2011, June 16). Danish Architect Jan Gehl on Good Cities for Walking. *Streetsblog San Francisco*. <https://sf.streetsblog.org/2011/06/14/danish-architect-jan-gehl-on-good-cities-for-walking/>
 21. Ghahramanpouri, A., Lamit, H., & Sedaghatnia, S. (2012). Behavioural Observation of Human Stationary and Sustained Activities in Pedestrian Priority Streets of Johor Bahru. *Journal of Construction in Developing Countries*, 17(2), 105–116. http://web.usm.my/jcdc/vol17_2_2012/Art%206_jcdc17-2.pdf
 22. Gillham, B. (2000). *Case study research methods*: Bloomsbury Publishing.
 23. Hashim, H. S., Aziz, S., & Razy, N. M. R. (2017). Urban Revitalisation for a City’s Soul: The Case of Kampong Bharu. *Kajian Malaysia*, 35(Supp.1), 119–140. <https://doi.org/10.21315/km2017.35.supp.1.7>
 24. Hashim, M. Z., Awaluddin, Z. L., Aminuddin, A. M. R., Sarkum, S. A., Sholiha, A. B., & Aziz, A. A. (2021). Co-Housing: Rethinking the Future of Housing for Malaysia. *Journal of Design and Built Environment*, 21(3), 83-94.
 25. Ibrahim, M. A., Wahab, M. H., & Shukri, S. M. (2018). Revealing Urban Marketplace Identity: Pudu. *Planning Malaysia*, 16.
 26. Jacobs, A. B. (1995). *Great streets*. Cambridge, Mass.: MIT Press.

27. Jacobs, A. B. (2008, December 31). Project for Public Spaces. <https://www.pps.org/article/ajacobs>
28. Johar Razali, H. R., Tobi, S. U., Ilani Bilyamin, S. F., & Hussaini Wahab, M. (2017, October). SD 24 - The Influence of Walkability towards Urban Street Design in Kuala Lumpur. SUDLIC 17 : 2nd International Conference on Sustainable Urban Design for Liveable Cities (SUDLiC) 2017, Renaissance Hotel, Kuala Lumpur.
29. Jorge Andres, D.-R. (2020, August). Supporting the creation of walkable complete communities. <https://Sustain.Ubc.Ca/>. https://sustain.ubc.ca/sites/default/files/2020-45a_Supporting%20walkable%20complete%20communities_Delgado-Ron.pdf
30. Kenworthy, J. R. (2006). The eco-city: ten key transport and planning dimensions for sustainable city development. *Environment and Urbanization*, 18(1), 67–85. <https://doi.org/10.1177/0956247806063947>
31. Kim, E. J., Kim, J., & Kim, H. (2020). Does Environmental Walkability Matter? The Role of Walkable Environment in Active Commuting. *International Journal of Environmental Research and Public Health*, 17(4), 1261. <https://doi.org/10.3390/ijerph17041261>
32. MD Mustiafiz, A. M., Anjuman, A. B., & Qazi Azizul, M. (2018, June). Walkability for Urban Sustainability: Study of Pedestrian Traffic in Chittagong. Qazi Azizul Mowla. <https://doi.org/10.13140/RG.2.2.35300.63367>
33. Mohidin, H. H. B., Aminuddin, A., Rosni, A., Sediadi, E., & Razif, F. M. (2019). Architectural Profession and its Role Towards the Design of Administrative Architecture in Malaysia. *Journal of Design and Built Environment*, 19(3), 53-61.
34. Nancy, S. C. (2017, May). Walkability and Accessibility: Users' Perspectives of a Planned Neighborhood. Nancy S. Chu. <https://dc.uwm.edu/cgi/viewcontent.cgi?article=2460&context=etd>
35. Nasrudin, N., Sarimin, M., and Ibrahim, N. (2018). Assessing a Walkable Environment in Jalan Tuanku Abdul Rahman, Kuala Lumpur, Malaysia. *PLANNING MALAYSIA JOURNAL*, 16(7), 261–273. <https://doi.org/10.21837/pmjjournal.v16.i7.516>
36. Papa, R., Fistola, R., & Gargiulo, C. (2018). Smart Planning: Sustainability and Mobility in the Age of Change (Green Energy and Technology) (1st ed. 2018 ed.). Springer.
37. Park, S. H., Kim, J. H., Choi, Y. M., and Seo, H. L. (2013). Design elements to improve pleasantness, vitality, safety, and complexity of the pedestrian environment: evidence from a Korean neighbourhood walkability case study. *International Journal of Urban Sciences*, 17(1), 142–160. <https://doi.org/10.1080/12265934.2013.776283>
38. Pereira, P., Ribeiro, R., Oliveira, I., & Novais, P. (2020). Society with Future: Smart and Liveable Cities: First EAI International Conference, SC4Life 2019, Braga, Portugal, December 4-6, 2019, Proceedings (Lecture ... Telecommunications Engineering Book 318) (1st ed.). Springer.
39. Sahabuddin, M. F. M., Aminuddin, A., Muhammad-Sukki, F., & Shukri, S. M. (2022). Indoor and Outdoor Air Quality in Densely Populated Areas: Case Studies of High-Rise Social Housing in Kuala Lumpur. *Pertanika Journal of Science & Technology*, 30(2).
40. Shukri, S. M., Wahab, M. H., Awaluddin, Z. L., Aminuddin, A. M. R., & Hasan, M. I. (2022). The Role of Attachment in Creating Sustainable Sense of Place for Traditional Streets in Alor Setar,

- Malaysia. *Journal of Design and Built Environment*, 22(1), 55-71.
41. Shukri, S. M., Wahab, M. H., & Jamala, N. (2021). The Architectural Concept of Malay Royal Town. *Journal of Design and Built Environment*, 21(3), 52-62.
 42. Shukri, S. M., Wahab, M. H., & Amat, R. C. (2020). Revealing Malay Royal Town Identity: Seri Menanti, Negeri Sembilan. In *IOP Conference Series: Earth and Environmental Science* (Vol. 409, No. 1, p. 012034). IOP Publishing.
 43. Shukri, S. M., & Wahab, M. H. (2019). The Origin of Malay Royal Town Concept of Urban Form.
 44. Shukri, S. M., Wahab, M. H., Amat, R. C., Taib, I., & Ismail, S. (2018). The Morphology of Early Towns in Malay Peninsula. *International Journal of Engineering & Technology*, 7(3.9), 77-80.
 45. Shukri, S. M., Manteghi, G., Wahab, M. H., Amat, R. C., & Ming, W. H. (2018). Preserving and Conserving Malay Royal Towns Identity in Malaysia. *The Journal of Social Sciences Research*, 852-860.
 46. Sheller, M., & Urry, J. (2000). The city and the Car. *International Journal of Urban and Regional Research*, 24(4), 737-757. <https://doi.org/10.1111/1468-2427.00276>
 47. Silva, O. H. da, Pitilin, T. R., Gobbo, C. A. R., Caxambu, M. G., Sanches, S. da P., & De Angelis Neto, G. (2019). Accessibility index for urban walkable spaces. *Acta Scientiarum. Technology*, 42, e45181. <https://doi.org/10.4025/actascitechnol.v42i1.45181>
 48. Soni, N., & Soni, N. (2016). Benefits of pedestrianization and warrants to pedestrianize an area. *Benefits of Pedestrianization and Warrants to Pedestrianize an Area*, 139-150. <https://doi.org/10.1016/j.landusepol.2016.05.009>
 49. Speck, J. Walkable city. The design of the pedestrian network. (2009) (1st ed.). Torbay streetscape guidelines. (2004) (1st ed., pp. 11 - 13). Retrieved from <http://www.torbay.gov.uk/streetscape-guidelines.pdf>
 50. Speck, J. (2018). *Walkable City Rules: 101 Steps to Making Better Places*. Island Press/Center for Resource Economics.
 51. Sun, G., Webster, C., and Zhang, X. (2019). Connecting the city: A three-dimensional pedestrian network of Hong Kong. *Environment and Planning B: Urban Analytics and City Science*, 48(1), 60-75. <https://doi.org/10.1177/2399808319847204>
 52. Tan 'G'-Ling, A., and Aminuddin, A. (2019). How does street trading activities keep Chinatown in Kuala Lumpur a living cultural enclave? *Journal of Design and Built Environment*, 9(3), 42-52. <https://doi.org/10.22452/jdbe.vol19no3.5>