THE IMPORTANCE OF DESIGN CHARACTERISTICS IN WALKING FROM STUDENT'S PERSPECTIVE: A CASE STUDY IN UNIVERSITI KEBANGSAAN MALAYSIA

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Abstract

Walking is a common form of physical activity, which has a lot of both social and recreational impacts. It is studied as a way of achieving sustainability. Many researchers recommend that walking can increase mental and physical health. Spectators of new urbanism recommend that the good design will encourage walking. There are several characteristics for designing walkable communities, which were frequently described in researches by many authors. In this paper, the four criteria noticed for making walkable university campus include connectivity, accessibility, safety/security and comfort. These criteria have been assessed by gathering survey in the Universiti Kebangsaan Malaysia to find out if these criteria can cause or affect walkability in university campus and it has been supported by previous studies. The result of the survey shows that these criteria are important from students' perspective as high numbers of the students consider these characters as important for walking activity. The conclusion is to achieve walkable university campus as it will be necessary to evaluate present walking conditions, research walking behavior in different settings and consider these four criteria in designing campus for improving walking condition.

Keywords: Campus University, Physical activity, Pedestrian, Sustainability, Walkability.

Introduction

Walkability is considered as a foundation for designing sustainable campus (Southworth, 2005). Campus sustainability is global issue for campus designer and planner as a result of understanding the effects of the activities and operations on the environment. Green campus promotes construction of green buildings and transportation facilities such as footpaths, cycle-ways, greenways, etc. on the campus (Alshuwaikhat & Abu-Bakr, 2008). This study has focused on either walking condition or walkability. It has been considered as green transportation part in green campus. There is no standard for walkability which has been adopted by federal or state except some guidelines and characteristics. The current guidelines may not be feasible in some situations due to terrain, environmental or other limitations. So, the purpose of this study is to find the suitable approach for designing or improving the present condition in university campus.

Recent research on public transportation in Universiti Kebangsaan Malaysia (UKM) campus showed that about 18% of the campus community are involved in walking, 31% of them are involved in riding buses within the campus while the rest of the 50% use private transportation to travel within the campus. Most of the campus community preferred walking within the distance of 100 meters and below for on-campus trip, but the travel modes vary when the trip distance exceeds 100 meters (Norzalwi and Ismail, 2011). So, few numbers of people in campus choose to walk to their destinations.

Since walking is the oldest and most basic form of transportation, many people walk on a daily basis as some part of health trips (MRAC, 1998). Traditionally, the subject of walking is discussed under traffic studies, mainly because it is seen as a solution to overcoming traffic woes. The argument is that if more people walk, there will be fewer cars on the road and less congestion which also means better ease of movement for both motor traffic and pedestrians. However, it is more than just about resolving traffic issues as it has an effect on the environment and health of people as well as the social and recreational value. In its totality, walkability can help towards reaching sustainability and greenery (Sepe 2006).

If the walkable campuses should be designed, it is essential to know about the meaning of walkability. The *Wisconsin Pedestrian Policy Plan 2020* gave a detailed description of a walkable community. Ultimately, the goal of any effort to facilitate pedestrian travel is walkable communities. A walkable community is thoughtfully planned, designed or retrofitted to integrate pedestrian travel into the community's fabric. In a walkable community, walking is considered a normal transportation choice and is not a distraction or obstacle to motor vehicle traffic (Wisconsin Department of Transportation 2002).

Due to the large scope of different aspects of walkability, the main focus of this study is to investigate the existing issues concerning the pedestrian experience in the UKM campus, which is a University that was built as part of a city and perfectly functions as a small town by itself. This happens because it faced a substantial growth in the numbers of students, staff and faculties. Over the last few years, making use of automobile significantly increased to the extent that the University faced serious problems such as traffic jams and congestions during peak hours, parking shortages and lack of land for parking lots and many other problems in the quality of the pedestrian line (Muhamad Nazri Borhan et al. 2011). Problems relating to pedestrians include conditions where walkways are not properly connected leaving pedestrian with difficulties when traveling between zones within the campus and existing walkways do not have sufficient utilities.

Previous studies

Walkability has been defined as "the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort and offering visual interest in journeys throughout the network" (Southworth, 2005). There have been explanations about four design characteristics, which were frequently used by the other authors for discussing walkable communities.

Theory development

There are several factors that affect whether or not people decide to walk instead of using a vehicle. Firstly, environmental factors are functionality of the pedestrian networks such as connectivity, accessibility, safety, weather, terrain, etc. Secondly, personal factors such as age, health, etc. Finally, visual interest along the path network such as landscaping. There are many elements that may increase walkability. However, there is general agreement that the provision of sidewalks will improve walkability, a host of sidewalk variables that may be important to walkability include connection to surrounding destinations, crosswalks, safety features, width, surface quality, lighting and others (Flora, 2009).

Funahashi (1985) also identified a list of requirements in developing an environment conducive for walking. These requirements include safety for protection of vehicular traffic accidents and crime, health for pedestrian accessibility and rest accessibility, convenience for improvement of the physical environment by integrating provisions for way finding, proximity and comfort for increased opportunities for walking, improved quality of walking environment, enjoyment and restfulness. The six important attributes for designing successful pedestrian network to include connectivity of path network, linkage with other modes, fine grained and varied land-use patterns, safety to both traffic and social crime, quality of path, and finally, the path context meant for street design, visual interest of the built environment, transparency, spatial definition, landscape and overall explorations. However, several criteria have been well-developed and are increasingly used by transportation planners and cities in planning for pedestrian access (Southworth, 2005).

Conclusively, previous reviews and newer studies frequently note that several characteristics of built environment have significant relationship with walking activity. Many ways have been used to classify these with all attempts being used to describe the same characteristics. Some of these characteristics included density, land use pattern,

distance to intended destination, accessibility, connectivity, proximity of destinations, link to transit, parks and open spaces, safety, quality of path and aesthetics. Since some characteristics are related to each other such as accessibility related to land use pattern and proximity of destinations, they are grouped into four criteria, which include connectivity, accessibility, comfort and safety. These above-mentioned criteria were referred to as design characteristics or criteria of built environment in walkable communities.

Connectivity

Connectivity is fundamentally required by people who need to stay connected. In many developing cities, it is a genuine problem because as motorization increases, pedestrians are often neglected in the infrastructure provision. Lane's connectivity comprehensively means more direct routes and thus shorter distances from one place to intended destinations. Street connectivity might also influence walking by spreading out the choice of routes thereby facilitating some diversity in routes within the area or to destinations (Saelens, 2008). Connectivity can also be described in terms of continuity, which arises by proximity and linkage with the other modes of transportation (Funihashi, 1985).

Safety and security

The pedestrian network necessitates being safe for individuals of varied ages and degrees of mobility from both traffic danger and crime. Pedestrian safety maybe the best implied and most fully matured aspect of walkability (Southworth, 2005). Safer places enhance walking trips (Alfonzo, 2005). Safety and security are derived from the fact that most of the key improvement initiatives in developing cities as pedestrians can also be victims to crime and bad driving habits.

On the other hand, people who are aware of safe and convenient places to walk are much probable to walk up to 41.5% more than the people who are not aware of such places that walk up to 27.4% (Powell et al. 2003).

Accessibility

Accessibility demand is established from the fact that many developed countries are involved in this after they have progressed beyond connectivity and safety considerations. The pedestrians need to get to their destinations or transit nodes through quicker and easier ways. And people demand to make use of better quality walkways too. Compact land use, tactile strips, rub-cut ramps, on-slip tiles, wider paths are some of the features at this level of walking. Developed cities cannot expect that the pedestrians will be happy by connecting them to a certain node (connectivity). They desired that this connection should be accessible and usable by all as well as being short and direct with making the least physical and mental effort to use. Majorities of the studies on accessibility were related from the issues of proximity to potential destinations. Five reviews possess adequate evidence to deduce that accessibility based on distance to destinations is related with more walking (Handy et al. 2002). Some study point to the mixed land use which is also corresponding with more walking. Due to the fact that mixed land use means the destinations are within closer distance, it was indicated in some researchers that density is an important associate of walking. This invariably means that in areas with higher density, destinations can be closely linked (Handy et al., 2006).

Comfort

Walking should be enjoyable where the comfort, aesthetics of the environment and other factors come into play to derive the best walking experience. The characteristics that many developed countries are actively pursuing include beautifying the streetscapes, landscaping, etc. (Leow, 2008). For promoting walking, it is necessary to consider more factors other than connectivity, accessibility and safety. A safe and continuous path network in boring physical surroundings will not attract pedestrians. The path network

must absorb the interest of the user. Many characteristics of the path surroundings can cause a favorable walking experience such as visual interest of the built environment, design of the street as a whole, clarity of facing structures, visible activity, street trees and other landscape elements, which include lighting and views (Southworth, 2005).

Methodology

To improve the walking experience on the university campus, it is necessary to consider multiple strategies since different people have different expectations of a good walking environment which depends broadly on their walking purpose and context. People walk as a means of travel value directness, speed and comfort as there is a need to keep the exposure of the pedestrians to walking as little as possible. For making university campus walkable, there is a need to consider some characteristic in designing it. Recent researches to have mentioned some of the characteristic of walkable communities. Based on the previous research, this present study is therefore suggesting that walkable campus has four characteristics such as connectivity, accessibility, safety and security/comfort.

A survey was conducted on the participants in the Universiti Kebangsaan Malaysia campus which serves as the case study of this research to assess the importance of the selected criteria based on the perception of its users. The surveys were collected gradually in the allocated area which is the second zone of UKM campus. Since all the designs and constructions were done for the people, a survey was conducted to understand how important these criteria are for users and how relevant these criteria are to the needs of the users within the university campus thereby supporting the selected factors.

The survey has been distributed to groups of students during the month of January, 2011. A total of 90 surveys was completed. As earlier explained, the aim of this survey is to support the criteria which mentioned them in previous sections. The following sections outlined the results of the survey. Since the number of students (18552) is more than staff (4408), and the students tend to walk more than the staff, the students were chosen as the respondents of this study. Survey was conducted in second cluster of UKM campus, which has more problems in this case and walking activity is less. Second clusters of UKM campus are incorporated in five faculties and one residential hall. Students were grouped in two categories, postgraduate and undergraduate. The population of the undergraduates is more than the postgraduates. 15 students who formed the respondents were chosen from each of the faculties (10 undergraduate students and five postgraduate students). Total number of the respondents was 90, which gave 100% response to the questionnaire. Then, data from the questionnaire was aggregated and evaluated by using the Microsoft Excel and SPSS 18.0 software. When using Likert-type scales, it is essential to calculate and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales. From the data analysis by SPSS, the overall Cronbach's alpha reliability coefficient is 0.803, which is the supportable value for this study.

The questionnaire consists of three sections. The first section includes respondents' personal information data such as gender, age, faculty and degree (undergraduate or postgraduate). The second section was designed to find out the importance of the four design characteristics which include connectivity, accessibility, safety and comfort. Each of the factors comes in detail in one or two questions. Third section was used to identify the criteria which influence the decision in university campus. As shown in table below, each of them has been detailed and the details were used as a question in the survey (Table 1)

Results and Discussions

As shown in the survey, large number of the students (47.5%) use private vehicle for traveling around the campus while 43.8% use bus and taxi. However, most of the

students preferred using vehicle to move from one place to the other in the university campus (Table 2).

Second section finds out the importance of these criteria in the university campus. The ranking of criteria starts from “not at all important” to “extremely important." Respondents were asked to give rating for each criterion. All criteria show the high percentage in very important and extremely important scales. This means that all criteria were considered by most respondents as being important in influencing walking in university campus. The ratings of the criteria from most important to be least from respondents’ perspectives were as follows:

Rate 1 Safety from crime and accident
Rate 2 Short time distance
Rate 3 Availability of shelter walkway
Rate 4 Linkage to the other mode and facilities
Rate 5 Availability of interesting place
Rate 6 Path quality
Rate 7 Availability of short cut
Rate 8 Close walking distance

More detail of findings is shown in Table 3 and Figure 1.

Third section was to identify the criteria which have influence on the decision in the university campus. The rating of the criteria in order of respondents’ preference is as follows:

1. Close walking distance
2. Safety from crime and accident
3. Short time distance
4. Availability of shelter walkway
5. Linkage to the other mode of transportation
6. Availability of short cut
7. Availability of interesting place
8. Path quality

The ranking from second priority to fifth priority is almost same with the ranking for importance of criteria discussed in second section, which comes from first to forth. The different is in ranking of close walking distance, which has been lowest ranking for importance of criteria but is in highest priority when students took the decision to walk. As It was shown in the result, the most important criteria which students consider during the decision are close walking distance and safety from crime and accident. Figure 2 shows more details of the findings. In summary, the most important design characteristic which students consider most during walking is safety. However, the other design characteristics were also considered during walking while most of the respondents select the important factors for walking in campus.

Conclusion

Walkability is the first step to be urban sustainability as this mode of transportation is often neglected. The standards for measuring and designing a walkable environment are not available except some characteristics and features. This study found that the important characteristics such as connectivity, accessibility, safety and comfort are for designing walkability in the campuses and have relevance in the enhancement of walking activities in the university campuses. So, the criteria which were proposed in this study are prominent element to consider when designing university campuses in order to make them walkable. Connectivity is important because it allows users to move from one space to another. Comfort is the key factor that can influence walking behavior with the reasonable level of accessibility being needed to be met. Using the same direct path with hot sun in equatorial climate as an example, there is a need to create a visual interest

which should be irresistible in such a way that everybody has to see it thereby displacing all walking considerations regardless of the hot sun.

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Appendix

Table1 : Design characteristics in details

Characteristics	**Detail(Question)**
Connectivity	Existing shortcuts Linkage with the other mode
Accessibility	Proximity and short-distance short time distance for walking
Safety and security	Safety from crime especially in dark time Safety from accident
Comfort	Existing Shelter rout, path quality, attractive place

Table2: Transportation modes for comminuting in campus

		Frequency	Percent	Valid Percent
Valid	private car	37	35.2	35.2
	bus/taxi	46	43.8	43.8
	motorcycle	11	10.5	10.5
	Walk	6	5.7	5.7
	private car&bus/taxi	1	1.0	1.0
	Bus,taxi&walk	4	3.8	3.8

Figure1 : Importance of the characteristics in influencing walking in UKM Campus University; frequency range

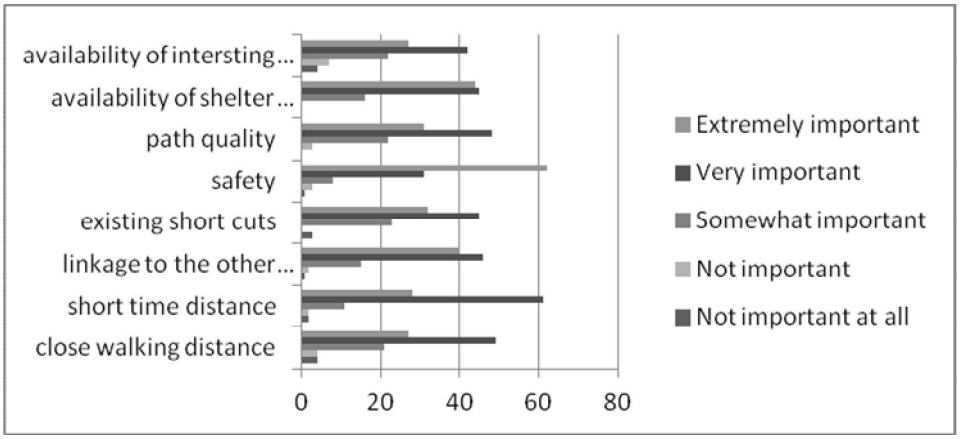

Table3. Importance of charecteristic in UKM Campus University. Percentage of responses

		Close walking distance	Short time distance	easy access	Availability of short cut	Safety from crime	Path quality	Availability of shelter walkway	
Valid	Not important at all	3.8	1.9	1.0	2.9	1.0	0	0	
	Not important	3.8	1.9	1.9	0	2.9	2.9	0	
	Somewhat important	20.0	10.5	14.3	21.9	7.6	21.0	15.2	
	Very important	**46.7**	**58.1**	**43.8**	**42.9**	**29.5**	**45.7**	**42.9**	

	Extremely important	**25.7**	**26.7**	**38.1**	**30.5**	**59.0**	**29.5**	**41.9**
		72.4	**84.8**	**81.9**	**73.4**	**88.5**	**75.2**	**84.8**
	Total	100	99.0	99.0	98.1	100.0	99.0	100.0
Missing	No Response		1.0	1.0	1.9		1.0	
Total		100	100.0	100.0	100.0	100.0	100.0	100.0

Figure2: Criteria influence on walking in Campus University; number of respondents