UNIVERSITI PUTRA MALAYSIA

CRITICAL ANALYSIS OF STUDENTS' PERCEPTION ON PEDESTRIAN ENVIRONMENT IN A MALAYSIAN PUBLIC UNIVERSITY

BIJAN AFSAR

FRSB 2014 21

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By

BIJAN AFSAR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements of the Degree of Master of Science

December 2014

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master Science

CRITICAL ANALYSIS OF STUDENTS′ PERCEPTION ON PEDESTRIAN ENVIRONMENT IN A MALAYSIAN PUBLIC UNIVERSITY

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BIJAN AFSAR

December 2014

Chairman: Mohd Yazid Mohd Yunos, PhD

Faculty: Design and Architecture

During the last decade transportation in Malaysia has been changed and stepped forward into motorized-transportation. However, Malaysian government started to move toward sustainable society, which sustainable transportation is one of the parts. University Putra Malaysia's (UPM) Serdang campus is mainly dependent on the personal cars and shuttle buses. Furthermore, routes in the campus mainly planned for the vehicles rather than pedestrians and cyclists. This study was trying to achieve two objectives: A) to document pedestrian environment physical determinants for a university campus. B) To examine physical environment factors that encourages UPM's students to do pedestrian activities in the campus. Reviewing the literature found that four main factors (functionality, safety, aesthetics, facility) are commonly used to understand walkability of a pedestrian environment. Twenty nine attributes were also identified to be relevant and were utilized as an indicator for each of the four factors. In this study quantitative method through questionnaire survey has selected to assess the variables on a sample of subject and express the relationship between variables by using statistical calculations, such as correlations, relative frequencies, description and cross tabulation or the focus is to a large extent on the answering the research questions. Analysis indicated that students were more concern about the safety and particularly majority of the respondents reported lighting as the most important safety item of the pedestrian environment. This awareness was more significant for females in comparison to the results obtained for males. Additionally, canopy was on the top of the list as an extremely important facility that should be developed and improved. This research can be helpful for the UPM's policy makers and master planners to facilitate in documenting pedestrian environment literature, as well as help urban designers and city planners to have a deeper perspective of pedestrian perceptions and opinions in tropical climate and particularly Malaysia.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Sarjana Sains

ANALISIS KRITIKAL PERSEPSI PELAJAR TERHADAP PERSEKITARAN PEJALAN KAKI DALAM UNIVERSITI AWAM MALAYSIA

Oleh

BIJAN AFSAR

Disember 2014

Pengerusi: Mohd Yazid Mohd Yunos, PhD

Fakulti: Rekabentuk dan Senibina

Sedekad yang lalu, pengangkutan di Malaysia telah berubah dan melangkah ke hadapan kepada pengangkutan bermotor. Walau bagaimanapun, kerajaan Malaysia mula bergerak ke arah masyarakat lestari, di mana ke arah mencapai pengangkutan lestari adalah sebahagiannya. Kampus Universiti Putra Malaysia Serdang adalah bergantung kepada kereta peribadi dan pengangkutan bas ulang-alik. Tambahan pula, laluan di dalam kampus terutamanya dirancang untuk kenderaan bermotor dan bukannya kenderaan pejalan kaki dan penunggang basikal. Kajian penyelidikan ini untuk mencapai dua objektif iaitu, untuk mendokumentasikan penentu persekitaran fizikal pejalan kaki bagi kampus universiti. Keduanya untuk mengkaji faktor-faktor persekitaran fizikal yang menggalakkan pelajar UPM untuk melakukan aktiviti berjalan kaki di kampus. Kajian literatur mendapati empat faktor utama (fungsi, keselamatan, estetika dan kemudahan) biasanya digunakan untuk memahami kemudahjalan bagi persekitaran pejalan kaki. Dua puluh sembilan sifat juga dikenal yang relevan dan telah digunakan sebagai petunjuk untuk setiap satu daripada empat faktor. Kaedah kajian kuantitatif digunakan melalui soal selidik telah dipilih untuk menilai pembolehubah kepada sampel subjek dan menyatakan hubungan antara pemboleh ubah dengan menggunakan pengiraan statistik seperti korelasi, kekerapan relatif, penerangan dan penjadualan silang atau tumpuan adalah sebahagian besarnya pada yang menjawab soalan-soalan kajian. Analisis menunjukkan bahawa pelajar lebih tinggi kebimbangan mengenai keselamatan. Kesedaran ini adalah lebih penting bagi wanita berbanding dengan keputusan yang diperolehi bagi lelaki. Selain itu, kanopi berada di atas senarai sebagai kemudahan yang amat penting yang perlu dibangunkan dan diperbaiki. Kajian ini dapat membantu untuk pembuat dasar oleh UPM dan perancang induk bagi memudahkan untuk merakamkan suasan dan persekitaran pejalan kaki, dan juga membantu pereka bandar dan perancang bandar untuk mempunyai perspektif yang lebih mendalam terhadap persepsi pejalan kaki yang beriklim tropika terutamanya Malaysia.

ACKNOWLEDGEMENTS

This thesis is the end of my journey in Master thesis to obtain my degree in Urban Planning and Design. Here I would like to acknowledge the help of my people during this journey.

First of all I would like to state my great appreciate to my advisor Dr. Mohd Yazid Mohd Yunos for his supervision and guidance during my master journey. Dr. Mohd Yazid Mohd Yunos has always been helpful and supportive and advise me with his helpful comments. In addition, I would like to thank Dr. Mohd Johari Mohd Yusof for his willingness to be the committee member, further his support and helpful suggestion in the all stages of m thesis process.

I am very grateful to my colleague Ms. Sara Rajaei for her helpful comments and contribution during the writing process. Last but not least, I wish to express my sincere gratitude to all those who are not mentioned here that have helped me to ensure the completion of my study.

I certify that a Thesis Examination Committee has met on 2 December 2014 to conduct the final examination of Bijan Afsar on his thesis entitled "Critical Analysis of Students' Perception on Pedestrian Environment in a Malaysian Public University" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

Noorizan bt Mohamed, PhD
Associate Professor, Lar
Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

Nangkula Utaberta, PhD
Associate Professor, Ir
Faculty of Design and Architecture
Universiti Putra Malaysia
(Internal Examiner)

Mohd. Ramzi Mohd Hussain, PhD
Associate Professor
Department of Landscape Architecture
International Islamic University Malaysia (Lium)
(External Examiner)

ZULKARNAIN ZAINAL, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 23 January 2015

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Mohd Yazid Mohd Yunos
Senior Lecturer
Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

Mohd Johari Mohd Yusof
Senior Lecturer
Faculty of Design and Architcture
Universiti Putra Malaysia
(Member)

BUJANG BIN KIM HUAT, Ph.D.
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 23 January 2015

DECLARATION

I hereby confirm that:

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
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Signature: _____	Signature: _____
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CHAPTER 1

INTRODUCTION

In the last decade, transportation in Malaysia has progressed and seen a development in motorized-transportation. During this time, each day a greater number of cars were being added to the traffic system and hence people were less likely to engage in any form of physical activity. Recently, Kuala Lumpur, the capital city of Malaysia, faced air pollution issues due to the fact that the city transportation network has to tolerate heavy traffic every day. Consequently, the Malaysian government started to move towards a sustainable society as a long-term solution and signify the use of sustainable transportation as one of the parts in achieving this goal. Sustainable transportation has been described into different definitions, however the clearest and most relevant description for this study is stated by Steg & Gifford (2005): sustainable transportation implies finding a proper balance between (current and future) environmental, social, and economic qualities.

Pedestrian environment constitutes neighborhood livability, physical activity, safety and quality of the connected area. J. A. Mendoza et al. (2010) stated that pedestrian environment is not just about accessibility and route connections; in fact it should also be attractive in terms of aesthetics and view. Consequently, physical factors of the pedestrian environment are the main crucial factors in encouraging walking and physical activities that reflect inhabitants' lifestyle.

Almost all college campuses are categorized as a small city. Campuses have their own transportation, energy supply, waste system and so on, which supply distinct communities. Furthermore, people of different backgrounds, incomes, lifestyles and attitudes unite together to live, study, work, and recreate. College campuses belong to the public for restoration of all cultural and social relations, hence in a conceptual viewpoint it can be considered as a public space (Movahed, Azad, & Zakeri, 2012). College campuses build societies that are at once transitory and lasting, and have an ideal human scale (Ojeda and Yudell, 1997). The traditional campus adheres to the basic principles of the neo-traditional town, since it concentrates a variety of functions within reach of pedestrians (Dulken, 1992; Turner, 1995). In addition, a college campus is a good example of a 'people's place' since they are privileged places to communicate sustainability and to help reshape society's transportation patterns (Balsas, 2003).

As with any society, fast growing transportation systems need to move towards a more comprehensive and practical solution. Fortunately, sustainable policies are now being applied in almost all Malaysian societies including smaller societies such as university campuses. University Putra Malaysia (UPM), in particular, is the leading university in terms of applying sustainable policies among other existing Malaysian universities. This study is part of the sustainable transportation research of the aggregate green campus research program. In fact, this study is parallel to the UPM sustainable transportation programs and focuses on exploring the encouragement factors for pedestrian activities in the campus. Understanding students' perception of

the pedestrian environment is a crucial factor in encouraging pedestrian activities among the students. In addition to developing sustainable transportation, increasing health and well-being, it can also reduce air pollution and energy consumption indirectly.

It is widely accepted that trends in motorization on college campuses equate those experienced by societies at large (Balsas, 2003). In the last decade, campus planners have struggled to provide access and mobility without destroying campus qualities as distinct communities (Balsas, 2003). A college campus may be located in a suburb or urban area and subsequently their layouts vary according to their locations. A campus that is located in a suburban area tends to present horizontal connectivity, while an urban campus tends toward a vertical connectivity. Suburban campuses are normally more automobile dependent than urban ones. Although most campuses do not totally exclude the automobile, walking is the expected way to get around even though other ways of transportation may also be possible. In the same way, UPM Serdang Campus is located in the suburb of Kuala Lumpur with the huge area of the main campus (1108.103 hectares), which signifies the horizontal connectivity of the campus. Additionally, UPM Serdang Campus is highly dependent on automobile and buses; hence an inadequacy of physical activity and enthusiasm exists.

However, UPM is greatly attempting to achieve a green campus, which evidently placed UPM in the top 10 green metric universities in 2007. Additionally, the university had several publications in the field of sustainable design, such as sustainable design in urban design (Tazilan, Salleh, Komoo, & Ismail, 2009), public participation for sustainable development (Dola, Mijan, Unit, & Planning, 2006), sustainable urban landscape (Roe & Kingdom, 2006) and sustainable architectural education (Shari, Fakri, & Jaafar, 2006). Developing a pedestrian environment is one of UPM future policies; consequently, this research is the initial step of the creating pedestrian planning. In addition, developing and improving the pedestrian sites is highly beneficial to the students in terms of well-being all the while being environmental-friendly.

1.1. Research problem

Awareness of motorized transportation and lack of physical activities is increasing; consequently researchers are highly concentrating on developing spaces where individuals can engage in physical activities such as walking and cycling. Solely depending on motorized-vehicles is causing environmental and social issues. Air pollution and global warming were and still are a result of increasing motorized vehicle and industrialization. Aside from the environmental impacts, social aspects could be notably mentioned such as decreasing of well-being, public health, and social interaction. Meanwhile, side costs of using cars and motorbikes can be added as disadvantages of motorized-transportation, such as high cost of maintenance and providing energy.

In Malaysia, traffic and air pollution is becoming a major problem, and particularly Kuala Lumpur is attempting to cope with these problems. However, most of the

solutions are focused on smoothing traffic by increasing number of highways and streets, which is not a long-term solution. On the other hand, developed countries focus on the implementation of sustainable transportation by concentrating on reducing the number of highways and developing further active transportation as a form of long-term solution.

In a smaller community such as UPM Serdang Campus, transportation is mostly dependent on personal cars and shuttle buses. Furthermore, campus routes are mainly planned for vehicle usage rather than pedestrians and cyclists. Hence, to reach a sustainable transportation which is broadly described as walking and cycling, development of a cycling and walking environment in terms of physical and environmental is necessary. In this study physical factors are limited and hence categorized as functionality, safety, visual, and pedestrian facilities.

From the documented literature, proper pedestrian environment are described as: pedestrians should be provided with ease of reaching their desired destination with barrier-free, enough width, and convenient path surface. Adequate lighting should be provided for pedestrians to have a sense of safety and predictability. Additionally, walkways with built-in views and landscapes play an important role in encouraging pedestrian movements (Morris & Zisman, 1962). Substantially proper network path, safe, convenient and well-designed in terms of aesthetics are essential for the pedestrian mobility (Guo, 2009), as well as well-connected infrastructures are effective in increasing walking activities (J. F. Mendoza, Oliver-solà, Gabarrell, & Rieradevall, 2012). Since most of these studies have been conducted on an urban scale, the ideal specifications of each factor can possibly be different for an academic area.

While some research has been found on reducing traffic in college campus (Aoun, Abou-Zeid, Kaysi, & Myntti, 2013) with the exception of Tolley (1996), who has examined bicycling on college campuses in the UK, there are no publications found on the topic of campus pedestrian environment in a tropical climate and particularly Malaysia. Furthermore, less attention has been paid to active transportation compared to other modes of transportation. Balas (2003) studied on green campuses in the U.S.A. emphasized that college administrators rarely consider bicycle and pedestrian planning. Similarly, inadvertency to the pedestrian planning occurred in UPM Serdang Campus. Despite UPM initiation to improve sustainable transportation by promoting cycling routes, pedestrian facilities are still in the basic level of development compared to other transportation facilities.

Additionally, a majority of the studies done on active commuting have been conducted in western countries. Studies done on walking and cycling is closely related to the physical and environmental characteristics of the analyzed area even though universal design and standards have published. Indeed, essential and influential factors in a country with moderate climate could be different from a country with a tropical climate. Consequently, the missing data in studying pedestrian environment in tropical climate conditions should be covered, since the demand of pedestrians in different climate can possibly be unique.

In one the available Malaysian studies, Yazid, Ismail, & Atiq (2011) proposed strategies to change the choice of transport modes to road users of motor vehicles to non-motorized vehicles by improving pedestrian path and cycling zone to increase non-motorized travel and reduce motor vehicles travel through integration of land use and transportation planning. However, in this study scholars failed to detail the improvement factors or even how to improve the pedestrian paths.

Direct observation of UPM pedestrian environment provided opportunity to identify the problem more accurately. Furthermore, observation statement is essential to witness the problems existence of the study area in the related context. Hence, to achieve a comprehensive observation of the problem, direct observation of the UPM Serdang Campus has accomplished. Several photos have taken around the campus and analyzed to identify the problems (see figures 1, 2, 3 and 4). Mostly photos showed that the main problems of UPM pedestrian environment are accessibility, connectivity, lighting, and being exposed to the weather. Consequently to solve the problem, master physical plan needs to be revised or developed in order to create a pedestrian friendly environment. But, before initiating to design and plan the physical master plan, acknowledgement of the pedestrian preferences is needed for designing and planning based on the users' needs.

To sum it up, the pedestrian environment on UPM Serdang Campus is not in a proper condition; consequently, pedestrian activities are not adequate to achieve a sustainable transportation. Despite encouraging students to engage in walking and other forms of pedestrian activities, pedestrian environment neglected from the policy makers and policy makers allowed for a discouragement. This problem has negatively affected UPM pedestrians; since physical activities and particularly walking is highly influential on increasing public health and further to achieve a green campus, sustainable transportation should be developed. A possible cause of this problem could be improper design and lack of knowledge about the pedestrian perceptions in a tropical weather. Perhaps a study that investigates users' perceptions could allow for collaboration with UPM policy makers to remedy the situation.

Fig1. Sidewalk ends without specific destination (Left), there is no sidewalk exists to the bus stop and FRSB (Right) (Resource: Author).

Fig2. Bus stop without bench and seats (Left), there is no sign has written in English (Middle), there is no facility and accessibility for disabled people to FBMK (Right) (Resource: Author).

Fig3. Physical barriers and obstacles exist along the paths (Left), not maintained canal covers (Right) (Resource: Author).

Fig4. No adequate lighting has provided for FRSB (Left), not adequate lighting around Kolej 12 (Right) (Resource: Author).

1.2. Research questions

This study concentrates on investigating physical environment factors of UPM pedestrian environment that encourage students to walk on the campus. Subsequently, this study is going to answer the following questions:

- **Main RQ:** What are the physical environment factors for encouraging pedestrian activities on UPM Serdang Campus?
- **Sub-RQ1:** What are the physical environment factors for pedestrian paths?
- **Sub-RQ2:** What are the encouragement factors for pedestrian activities on UPM Serdang Campus?

1.3. Research aims & Objectives

This research focuses on the micro scale in order to understand how pedestrians respond to the elements around them and which aspects of UPM pedestrian environment contribute most in terms of either encouraging or discouraging walking. In other words, this study indicates pedestrian perceptions of UPM pedestrian environment in terms of physical environment factors. In order to create more pedestrian friendly campuses, efforts need to be focused on the pedestrian behavior and preferences as an initial step before beginning design and funding. Research benefits could encompass a wide range of people who are engaged with UPM pedestrian environment. Moreover, studying pedestrian behavior in a university campus could be an initial step for studying pedestrian behavior in an urban scale.

Based on the research questions, the research objectives have been sorted into 2 sections:

a) To document the pedestrian environment factors for a pedestrian path.
b) To examine physical environment factors that encourages UPM students to engage in pedestrian activities.

1.4. Significance of the study

Walking is the most common adult physical activity behavior and walking in and around local neighborhoods is an important component of most adults' total physical activity (Humpel, Owen, Leslie, et al., 2004). These days, walkability is becoming a highlighted word in sustainable planning and as a new environmental measure is spreading throughout the profession. Hence, measuring walkability of the smaller communities such as university campuses can extend the knowledge to increase pedestrian activities and walkability.

To achieve a sustainable transportation in the campus, UPM planners are trying to encourage students to cycle by providing bicycle lanes, rent stations and facilities. On the other hand, pedestrians have not received adequate attention and so far there

have been no improvement to develop campus walkability. Therefore, a study needs to indicate pedestrian perceptions of UPM pedestrian environment in terms of physical environment factors. One of the most recommended methods to indicate user perceptions is survey (Creswell, 2002). Consequently, in this study a questionnaire survey has been done to examine the physical environment factors of UPM Serdang campus. Factors were examines based on five point Likert scale which is the appropriate rating system to achieve the objectives.

In turn, findings in this study contribute to UPM Serdang Campus policy makers to consider pedestrian perceptions to its full extent and that more could be done to integrate non-motorized modes in the alternative transportation package. UPM Serdang Campus policy makers could be explained as vice chancellor and university president who take the initial decisions. Hence, in the long run students as well as all others involved in UPM pedestrian environment can benefit from environment improvements. It is essential for Malaysian landscape planners to understand pedestrian needs, encouragement and discouragement factors for walking and their preferences and requirements of a pedestrian environment particularly in a tropical climate.

A pedestrian behavior study could be the initial step of improving pedestrian activities as a sustainable transportation in UPM Serdang Campus. Improved pedestrian environment attract more people to public transit and non-motorized modes of transportation like walking. When the utility of walking increases, the willingness to walk a longer distance also increases, as well as increases the length, frequency, and mode share of walking.

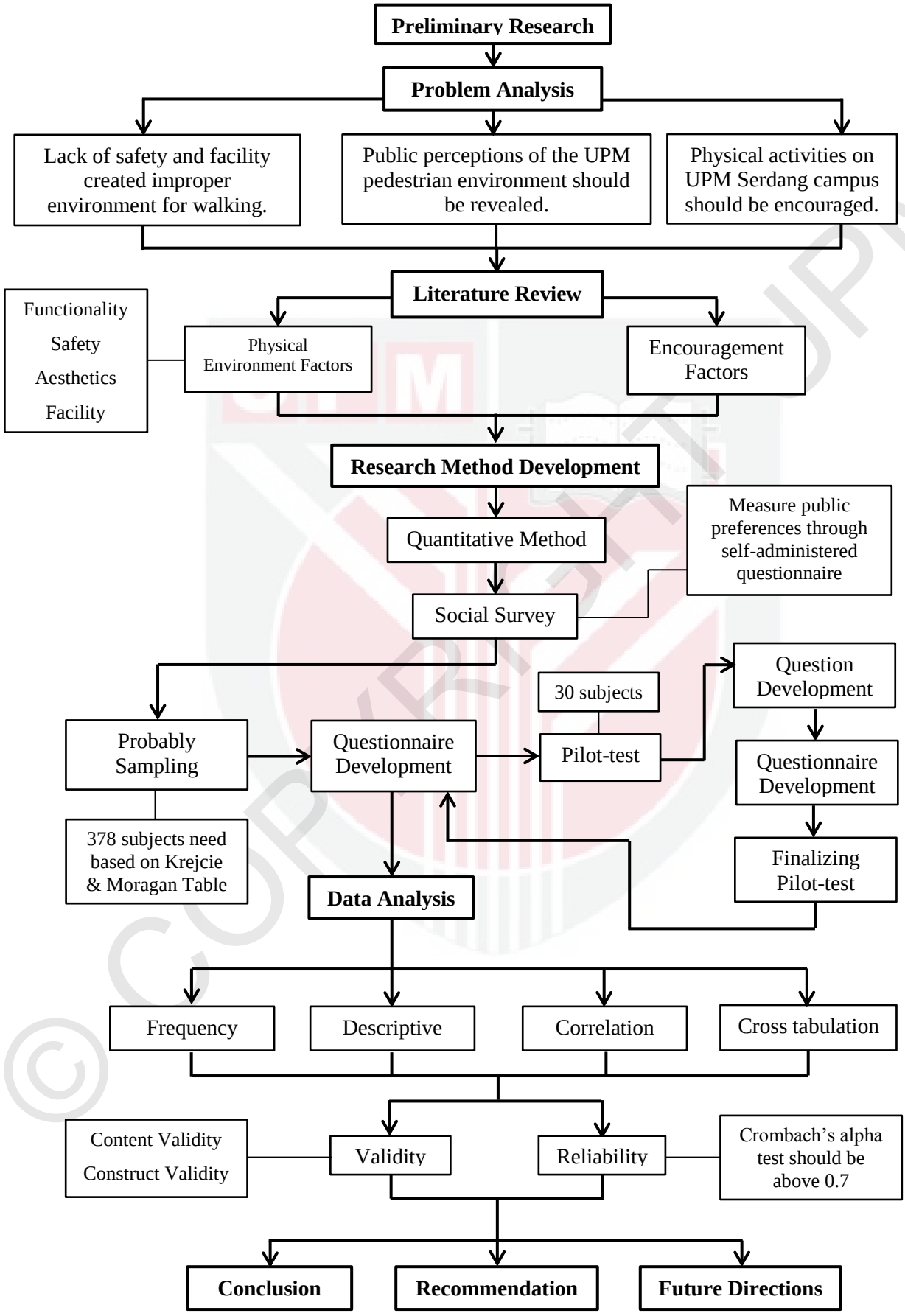
1.5. Research scope

Although a walkability enhancement study needs to be conducted on environmental, physical, social and economic aspects of the neighborhood, the scope of this thesis only covers physical environment factors. Instead, this study intends to provide a broader perspective of the pedestrian perceptions of the physical factors in order to revitalize UPM pedestrian environment. The goal of this thesis is to increase students walking time by improving the encouragement factors and eliminating the discouragement factors and thus promote UPM students health.

1.6. Thesis structure

This thesis contains five chapters. Chapter one gives a brief background of the study along with its problem statement as well as objectives. Chapter two presents an overview of the documented literature and the related knowledge. The following chapter describes the research method and sampling strategy including data collection and analysis plan. Chapter four shows the analysis output and the obtained data explanations. The final chapter discusses the implications of the study, conclusion, recommendations, and direction for the future studies.

1.7. Research framework



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