This thesis is dedicated to all those who believe in the richness of learning
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ABSTRACT

Planning pedestrian environments requires assumptions about how pedestrians will respond to characteristics of the environment as they formulate and enact their walking itineraries. As a consequence, most research interest in public environments focuses on behaviour in relation to those characteristics. This research is an examination of the relationship between aspects of urban form and pedestrian perceptions toward walking. The concept of Walkability is a popular concept that is widely used in urban centres of developed countries. It is obvious that the concept has contributed a great deal to the urban environment, more importantly; it has returned the urban areas to the pedestrian to use, enjoy, shop apart from the fact that walking contributes to reduce the negative impact of vehicular traffic. To the tourists, walking is the main mode of communication for them to know the life style, culture, architecture of the locals apart from doing some shopping. In relation to this, a study is conducted in a selected study site around historical core of Melaka town, between A’famosa and Dutch Square as the main tourist centers. The characteristics of “Walkable environments” as identified in the literature review formed the basis to evaluate whether the study area meets the characteristics of walkable street. This research also employed observation survey that identified the characteristics of urban forms. Another important component is to study and identify the pedestrian perception of walkable environments by questionnaires were conducted in several selected locations in and around the study area. Based on the findings; issues, problems and suggestions were compiled, analyzed and finally schematic and conceptual solutions were formulated. Because pedestrians value the shortest, safest, least-crowded, and easiest to navigate routes, this study found that confusing routes, unsafe or indirect connections, and a lack of amenities detract from the walkability in Melaka historic centre.
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CHAPTER 1

1. INTRODUCTION

1.1. Introduction to pedestrian perception of walkable environment

This research attempts to investigate how urban form affects pedestrian perception of the walking environment and its contribution towards making an urban area more “walkable”. It intends to uncover some of the relationships between morphological and syntactical qualities of the urban environment and the perceptions of those walking through it and also to focus on the relationship between Urban Form and the pedestrian environment, in order to find ways of improving Urban Design so as to encourage residents to walk.

Planning pedestrian environments requires assumptions about how pedestrians will respond to characteristics of the environment as they formulate and enact their walking itineraries. As a consequence, most research interest in public environments focuses on behavior in relation to those characteristics. For example, there is a substantial body of descriptive and typological studies of pedestrian environments. Metric, geometric, and topological models have proved useful in characterizing density and direction of movement. The need to understand the mechanism travel behaviour has prompted micro scale and laboratory-based research on exploratory spatial behaviour within walking districts. Studies of behavior in relation to comfort,
the way in which images of places interrupt on choices, and how dynamic and serial experience of the city affects individual itineraries have all developed as specialized fields of understanding. In general, studies of pedestrian environment dynamics have both diversified and multiplied as its systems and methodologies are adapted for planning other environments.

1.2. Background of study

Empirical literature dealing with how urban form can influence on pedestrian perception of walking environment has been framed around three attributes of built environment: density, land use and design of street network. By determining the link between urban form and distances walked to/from the station, this research aims to determine the primary factors that can aid in extending acceptable walking distances. The findings of this analysis can provide researchers and planners with specific tools to design urban environments that would induce riders to walk more often and for greater distances.

1.3. Importance of walking as a choice to travel

Walking is different than other modes of transportation because it is so easy to stop, to sit down and take a break – without having to park any vehicle so walking is closely connected to staying.

The data on what people were doing when they stopped walking and were engaged in the many different activities that take place on pedestrian areas clearly showed that
spaces that are of high quality in relation to locality, climate, furnishing and design were used more those spaces of low quality. Walking is not necessarily a sign of quality in itself. But when people are stopping up, sitting down and staying that is a sign of quality.

Although beyond the scope of this study, it is worth noting that transit and walking are inextricably intertwined. It is not possible to have large-scale transit service in a non-walking city, because people want to arrive at and depart from transit as pedestrians. If the urban environment surrounding transit stops do not encourage walking, most potential transit users will end up driving.

1.3.1. Walking and sense

Walking differs from other modes of transport by direct interaction between the pedestrian and their environment (Gehl, 1999). Researchers have used the ideas of sense walking, capturing what people feel and sense during a walk (Adams, 2008; Clark, 2008). Nold (2008) used GPS units to record walking routes, and measured galvanic skin response along the route to indicate “arousal” (good and bad).
1.4. Impact of density on travel behavior

There is substantial amount of literature that has acknowledged density as a significant predictor of travel choice (Pushkarev and Zupan 1977; Smith 1984; Marshall and Grady 2005). A plethora of recent studies have suggested that compact developments with higher densities degenerate vehicle trips and encourage non-motorized travel by reducing the distance between origins and destinations; offering a wider variety of choices for commuting and a better quality of transit services; and by triggering changes in the overall travel pattern of households (Cervero and Kockelman 1997; Krizek 2003; Holtzclaw 1994; Ewing et al. 1994). Recent policy initiatives have focused on developing urban-form strategies with attempts to reduce auto-dependence rates by encouraging densification of development infrastructure (Washington State Growth Management Act 1990; Central Puget Sound Vision 2020).
1.5. Impact of land use on travel behavior

Explanations regarding the measurable impact of land-use characteristics on pedestrian travel and how dense land-use patterns play a significant role in encouraging walks follow similar logics. Those high density levels of mix-use and presence of retail activities near residences increase non-work trips and induce non-auto commuting (Cervero 1996; Holtzclaw 1994; Krizek 2003), and that increased levels of land-use mix at the trip origins and destinations yield in increase in walking (Frank and Pivo 1994; Cervero 1988).

1.6. Impact of design of street network on travel behavior

Transportation and urban planners have focused on the design of street networks, discussing its strength as a determinant of walking. Various quantitative measures have been suggested by the urban-design literature to evaluate pedestrian accessibility and measure street connectivity. The distance between origins and destinations for walking and the total length of streets covering an area have been employed by some authors (Handy 1996; Aultman-Hall et al 1997) to describe how the character of streets differs at neighborhood and regional levels. Pedestrian Route Directness, which measures the ratio between a chosen pedestrian route distance and the ‘crow-fly’ distance to a particular destination, has been studied (Hess 1997; Randall and Baetz 2001) as an indicator of how accessible a neighborhood is to the pedestrians.

Some researchers have chosen to calculate the density and pattern of intersections, average block areas and block face lengths per unit area to capture the degree of network connectivity (Southworth and Owens 1993; Cervero and Kockelman 1997; Siksna 1997). Pertinent analysis has computed higher NA (neighborhood
accessibility) levels for communities with higher street intersection densities or lower average block areas (Krizek 2000; Krizek 2003).

It has been argued that large blocks, having fewer intersections, provide a scale consistent with the automobile (Jacobs 1985), and empirical research has demonstrated an inverse relationship between the size of blocks and the levels of pedestrian traffic (Hess et al 1999). A common theme of this body of research is that inordinate size of street blocks or the lack of a fine-grained urban network of densely interconnected streets fails to promote walking (Ewing et al 2003; Hess et al 1999).

However, most studies report no significant relationships between travel and network design. A California Air Resources Board study (Kitamura et al. 1994), which involved the examination of travel behaviour in 5 selected neighbourhoods in the San Francisco Bay Area, concluded that specific individual street design characteristics (i.e. sidewalk width, intersection characteristics) and neighborhood characteristics may not be significant at every site and location in influencing transit use. Thus, the effect of street network design on overall travel remains unclear.

Another limitation of these studies is the difficulty to develop well-specified statistical models that allow researchers to accurately evaluate the individual effect of street network. Part of the reason is due to collinearity between density, land use mix and urban form. For instance; fairly compact neighborhoods in US cities generally have more varied land-uses, on average shorter block lengths with more grid-like street patterns. One facet underlying the weak explanatory power of built environment is the absence of rich land-use and urban design data. National censuses generally include travel data for large scale models at the tract level or block group level. This is a significant barrier to carrying out small scale studies at the neighbourhood level on how design of street network shapes non-motorized travel. Parcel-level or block-level land use compositions might help elucidate the different attributes of the urban network in explaining the distribution of pedestrian movement, and hence transit patronage.
1.7. **Aim**

To identify how different aspects of urban form encourage walkability.

1.8. **Objectives**

- To identify aspects of urban form that encourage walkability.
- To evaluate aspects of urban form that encourage walkability
- To evaluate pedestrian perception of urban form’s aspects

1.9. **Research questions**

1. What are people’s sense and feelings about built forms?
2. What elements of urban form have impact on people perception?
3. What elements of urban form enhance people perception of walking?
1.10. **Significant of study**

The aim of many recent planning investments is to reduce automobile dependence and induce non-auto commuting by implementing various urban design principles along with the ideals of New Urbanism and smart growth in re-shaping the urban form. How can urban form support pedestrian and transit-friendly development? What are the determinants of the link between urban form and non-motorized travel, namely walking and transit usage? Specifically, which urban form characteristics have a more explanatory power in revealing this relationship? These motivating questions have given rise to numerous studies on how design of built environment can change travel behaviour by shaping urban form.

To sum up, perception is a major factor in modelling walkable environments. Eventually we come across number of theories discussing factors affecting improvement of pedestrian perception. This research will analyse aspects of urban form and its influence on perception of pedestrian, which can lead to increase people’s walkability sense and ultimately increase walking trips.

1.11. **Problem statement**

There has been substantial research on the subject of “walkability” and “pedestrianization” in the last decade. However, it has been consistently established that these thoughts and knowledge, to an extent have been restricted to theoretical concepts and have not been executed to an expected level in practice.

A distinct gap exists between the literature and implementation practices. Many communities brand themselves as “walkable community” by merely creating extensive walking trails while neglecting density, urban form, land use, building design, open spaces, streetscapes, safety and such other factors identified in the
literature as crucial for a walkable community. This research attempts to identify how the affect of different aspects of urban form can encourage people to walk.

1.12. Organization of dissertation

This dissertation is organized into six chapters. Chapters One and Two present an overview of the dissertation topic, and a review of prior research in the field. Chapter Three presents the research methodology used, including how data was compiled, and how case study was selected. Chapter Four provides a detailed description and analysis of the case study, including their demographics and urban form. Chapter Five presents the findings from the literature reviews as well as the data collection analysis. Chapter Six presents a final summary of the research findings.
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