Original Article

Determinants of livable streets in Malaysia: A study of physical attributes of two streets in Kuala Lumpur

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Abstract   Urban Planners have stressed the important role of street physical attributes for enhancing livability and activity in the area. The purpose of this study is to identify physical attributes of streetscapes that influence street livability. Previous studies focused mainly on traffic management as a major determinant of street livability. Studies that address people's perception of street physical attributes as influencing street livability tend to separate. This study is an empirical examination of people's perception of the physical attributes of Kuala Lumpur streetscapes. Structured observations and a questionnaire survey were used to identify determinants of street livability in two multi-functional streets located in the inner part of Kuala Lumpur. On the basis of literature review and observation of the studied areas, 14 physical attributes of street were identified and evaluated. Findings show that provision of facilities like paving, maintenance, parking space and traffic calming techniques contribute to street livability in Kuala Lumpur streetscapes. Indeed, the result of this study is recommended to Malaysian practitioners and policymakers. This result indicates the most significant factors that need to pay attention to meet human needs in designing livable spaces in Kuala Lumpur City Center.
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Introduction

Urban designers and planners have always pointed to the role of physical attributes of streetscape on creating livable environment and enhancing activities in neighborhoods. Researchers from different disciplines suggest that streets represent an important part of public spaces and are perceived as vital symbols of the public realm (Jacobs, 1961; Appleyard, 1981; Mehta, 2007). The concept of livability was established in the late 60s by Jacobs and Appleyard (1987) and was applied in the late 90s as a result of several researches that were conducted at the last two decades of the twentieth century on different aspects of post-modern cities and criticized various issues of urban spaces, such as unsafe, noisy, polluted, poor quality and not-welcoming environments (Soja, 1989; Davis, 1990; Madanipour *et al*, 1998). In order to address these issues to improve and humanize open spaces of modern cities, Jacobs and Appleyard (1987)

highlighted the notion of livability as an essential goal to achieve a good urban environment.
    They defined livable space as:

> A place where everyone can live in relative comfort … A place where they can bring up children, have privacy, sleep, eat, relax and restore themselves. … a well-managed environment relatively devoid of nuisance, over-crowding, noise, danger, air pollution, dirt, trash and intrusions.

It is noted that much of the social and leisure activities occur in the neighbourhood commercial streets (Mehta, 2007). Streets that address the above mentioned issues and meet the needs of people for social and leisure activities have been positively associated with livability (Francis, 1991, Gehl, 2001).
    The main purpose of this study is to identify determinants of livable streets in Malaysia through examining the physical attributes of streetscapes in two multi-functional streets in Kuala Lumpur,

namely: Bukit Bintang and Tun Perak Street, and their influence on the quality of space. The study uses structured observations and a questionnaire survey used in environmental behavior sciences as methods to investigate people's perception and responses toward the physical attributes of streets and their influence on the street livability. The main focus is to determine physical attributes of streets that contribute to street livability.

Livability: A Look at the Literature

On the basis of the 'livable street' project in 1969, Appleyard and Lintell (1972) identified the detrimental effects of traffic on the deteriorating residents' quality of life. Traffic speed and traffic noise were found as important variables that significantly affect the livability of the environment. The concept of 'livable streets' was further emphasized in Appleyard's (1981) famous book 'livable streets'. In his book, Appleyard adopted the traffic calming approach in different cities around the world in order to humanize the urban environment against the growing traffic volume in cities.

After Appleyard's studies, to enhance the street livability, various researches examined street life and street use from different perspectives, such as livability (Bosselmann et al, 1999), level of safety (Dumbaugh and Gattis, 2005), traffic management and sense of community (Sauter and Huettenmoser, 2008), accessibility (Mackett et al, 2008), signage (Portella, 2007), walkability (Forsyth et al, 2008), sense of place (Shamsuddin and Ujang, 2008) and landscape setting (Layne, 2009).

Bosselmann et al (1999) examined the livability of boulevards in California in comparison with conventional streets. They found that boulevards were generally more livable than conventional streets with heavy traffic. It was noted that the landscaped malls reduced the negative effects of high traffic volume in boulevards.

Dumbaugh and Gattis (2005) examined the association between the streets' level of safety and livable streetscape features. Their findings revealed that livable street elements, such as trees alongside the roadside enhanced the level of safety of urban roadways.

On the other hand, Sauter and Huettenmoser (2008) examined and compared five streets in Basel, Switzerland with regard to the impact of traffic volume in the quantity and quality of street life. They found that a richer community life is achieved by quieter streets. Their findings support Park's (2008)

findings that show the influence of traffic on users' choice for travel mode. It revealed that traffic calming can have great effects on walkability of streets, and encourage people to walk as well.

On the other hand, the urban planning literature suggested that enhancing accessibility in neighbourhood core areas, such as in commercial streets can achieve safer, more viable and sustainable urban lifestyle patterns (Jacobs, 1961; Forsyth et al, 2008). Researchers have also shown that accessibility enhances the quality of street life and hence street livability. For instance, Mackett et al (2008) developed software for the evaluation of accessibility of the environment for disabled people and examined streetscape details such as difficulty in road crossing and building entrances. They found that changes made to such details affect street use, enhanced access to services for disabled and promoted street livability.

In addition to streetscape physical details, commercial signage are found to have a negative effect on the street quality as it contributes to visual damage in historic parts of the city center and consequently negatively influences street livability (Portella, 2007).

It is also noted that enhanced physical attributes of streetscape such as paving, canopies, lighting and esthetics increase walking and physical activity and thus promote neighborhood walkability (Forsyth et al, 2008) and eventually create more sustainable and livable community (Rehan, 2013). Furthermore, the street physical attributes influence the users' perception about the neighborhood identity and sense of place (Shamsuddin and Ujang, 2008). Layne (2009) also illustrated that landscape setting can promote a street as a social space and support intergenerational interaction between old and young people.

However, the valuable reviewed literature evaluated the livability of streetscape and focused only on one or two physical attributes that affect the quality and livability of the street assuming that all other variables are the same. Most noticeable is that the review revealed that few empirical studies addressed the people's perception of these physical attributes as influencing street livability. This study identifies 14 physical attributes and attempts to determine which attributes most influence the street livability.

Research framework

After the nineteenth century, most of the urban space researchers in social, environmental, architectural and city planning fields, have expressed the impact of the physical attributes of the built environment on

people's lives. Furthermore, people's perception, feelings and behavior that compromise their environmental values can be reflected on the physical environment (Rapoport, 1982; Sanoff, 1991).

Therefore, in order to provide a framework for examining the physical attributes that affect the livability of streets, the researchers reviewed prominent literature from 1975 to 2013. Table 1 shows the selected literature among the most well-known and cited urban space design during the past 40 years. Since no special trend for selecting the attributes was detected among the references during past decades and each reference only highlights some attributes the only trend which was applied for designing this table was frequency of referred attributes in the literatures. For instance, some of the physical attributes such as seating, proportion of the space have been examined by the majority of researchers and other attributes such as signs have been highlighted by fewer researchers. Even though there was a lot of other physical attributes like utility poles and tree grates, but they are not included in the table because they have only been referred by one or two unknown researchers. In fact, these attributes selected as the most frequent referred physical attributes among a pool of physical attributes that were mentioned by different references, to provide this framework.

Since this framework will be used for designing a questionnaire to identify determinants of street livability, a pilot study was also proceeded to perceive the people's point of view. A questionnaire was designed by using the identified attributes and distributed among 20 users of the studied areas – passerby who knows the areas very well, during 2 weeks in December 2011. They were asked whether the identified physical attributes affect the livability of the areas. The feedbacks from respondents revealed that some attributes like landmarks and skyline that were related to spatial characteristics of the studied areas, were confusing for users and they mostly could not answer those questions. So, those attributes deleted from the framework.

Finally, 14 physical attributes were identified as the most significant contributors to street livability. These are: paving, seating, shelter and canopy, lighting, signs, planting, sculpture and fountain, proportions of space, harmony between architectural style of different buildings, facilities for disabled people, parking space, accessibility, traffic management, maintenance and cleaning.

Methods

The study aims at identifying physical determinants of street livability in Malaysia via providing empirical evidences. It specifically aims at answering this question: What are the physical attributes that support livability on neighbourhood commercial streets? By focusing on the identified physical attributes, the study attempts to identify determinants of street livability that make streets interesting and comfortable for its users.

To answer the research question, the case study approach was selected as the main strategy of inquiry and structured observations and a questionnaire survey were employed to collect data on the perception of street users of street physical attributes that promote street livability on two commercial streets in Kuala Lumpur city center. Case study approach was selected because of exploratory nature of this research and type of research question (Yin, 2003; Creswell, 2009).The streets were chosen based on the fact that they are the streets with high accessibility, vitality and economic and social significance in Kuala Lumpur. The reasons for choosing two cases were, first, necessity of generalization of results and, second, limitations of this research. First, to generalize the result of this research more than one case study was needed (Yin, 2003) but because of time and budget limitations for conducting this research, it was not feasible for researcher to work on more than two case studies. Therefore, only two case studies were selected.

The study areas

To evaluate the livability of Kuala Lumpur streets, two dominant multifunctional streets with high accessibility and vitality, which are economically and socially significant for the city life, were selected. Also, these streets are located in the Heritage Zones of Kuala Lumpur, which shows the special value of these streets for the city.

Bukit Bintang Street was developed into Kuala Lumpur's 'Golden Triangle' in the early 1980s. The street vibrancy is enhanced by Bintang Walk, approximately a kilometer of pedestrian walkway where hotels stand alongside modern shopping malls. The monorail transport line links the area with other places and provides support as an access point for local shoppers, tourists and visitors.

The second studied area is Tun Perak Street that is located within the old part of Kuala Lumpur city centre. It is significantly identified as a district as it includes the starting point of Kuala Lumpur city (Kum and Ujang, 2012). Masjid Jamek, the

**Table 1:** The identified attributes of urban space derived from literatures

Literatures	The physical attributes													
	Paving	Seating	Shelter & Canopy	Lighting	Signs	Planting	Sculpture & fountain	Proportions of space	Harmony between architectural style of different buildings	Facilities for disabled people	Parking	Accessibility	Traffic management	Maintenance & cleaning
Pushkarev and Zupan (1975)	—	*	—	—	—	—	—	—	—	—	—	*	—	—
Lynch (1981)	—	—	—	—	—	—	—	*	*	*	—	*	—	*
Hedman and Jaszewski (1984)	—	—	—	—	—	*	—	*	*	—	—	*	—	—
Bentley et al (1985)	—	—	—	—	—	—	—	*	—	—	*	*	—	—
Gehl (1987)	—	*	—	—	*	—	—	*	—	—	—	—	—	—
Whyte (1988)	—	*	—	—	—	*	*	—	—	*	—	*	—	—
Francis (1991)	—	*	*	—	—	*	—	—	—	—	—	*	*	*
Carr et al (1992)	—	*	*	*	—	*	*	—	—	*	*	—	—	*
Rubenstein (1992)	*	*	*	*	*	*	*	—	*	*	*	*	*	*
Cherulnik (1993)	—	*	—	—	—	*	*	—	—	—	—	*	—	—
Marcus and Francis (1998)	*	*	—	—	—	*	*	*	—	—	—	*	—	*
Tomalin (1998)	—	*	—	—	—	—	*	—	—	—	—	—	—	—
Duany et al (2000)	—	—	—	—	—	*	—	—	—	—	*	—	*	—
Lo et al (2003)	—	*	—	—	—	*	*	—	—	—	—	*	—	—
Forsyth et al (2008)	—	—	*	*	—	*	—	*	—	—	—	—	*	—
Shaftoe (2008)	—	*	*	*	—	*	—	*	—	*	—	*	*	*
Gjerde (2011)	—	—	—	—	—	—	—	*	—	—	—	—	—	*
Wagner & Caves (2012)	*	—	—	—	—	*	—	—	—	—	—	*	*	—
Rehan (2013)	*	*	*	*	*	*	—	—	—	—	—	—	—	—

Bazaar and LRT station are located in this district, and the Klang River passes through it. Existence of all these significant urban elements makes this area one of the most important crowded spaces of the city for the citizens of Kuala Lumpur as well as tourists.

Tun Perak Street is inside the Secondary Heritage zone and Bukit Bintang Street is part of Tertiary Heritage Zones. While Bukit Bintang Street has been upgraded many times, Tun Perak has not been renovated too much. These streets are the two most visited urban spaces by foreigners as well as local people. Figure 1 shows the location of these studied areas in Kuala Lumpur City Center.
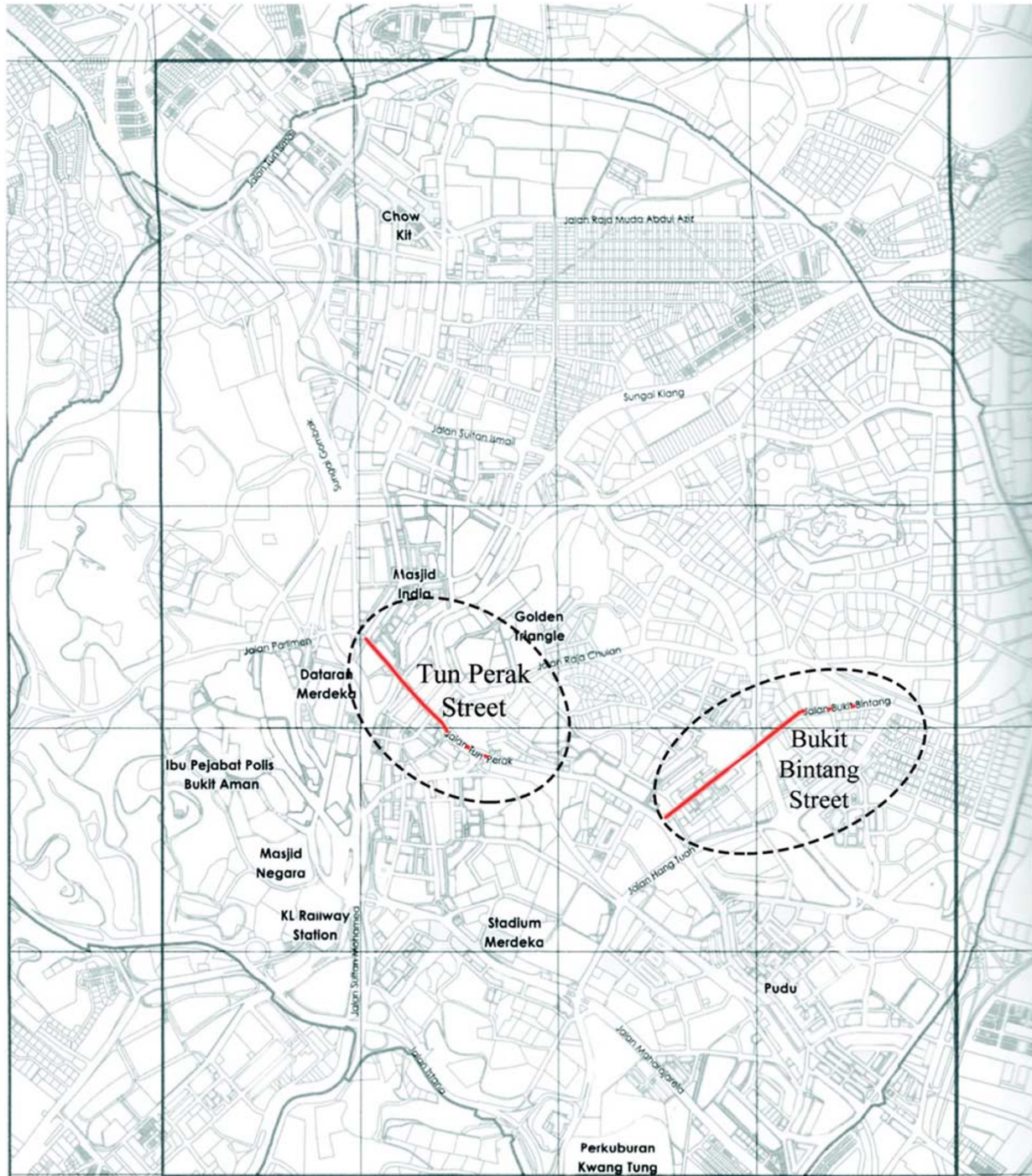
Figure1: Location of the studied streets in the Kuala Lumpur city center.

Research procedures

A mixed method of data collection adopted for this research, which contains two separate phases of qualitative and quantitative approach to answer the research question. In order to explore the physical attributes that promote street livability, the physical attributes of the studied streets were used as variables and examined through structured observation and questionnaire survey. The questionnaire survey discovered users' perspective about quality and livability of the studied areas and effects of those attributes on livability of the streets, to identify the physical attributes that are determinants of street livability. The results of observation were used at discussion part to interpret the result of questionnaire survey.

Structured observation

Observation is one of the most applied methods of post occupancy research that is used in most well-known urban space studies, such as Whyte's (1988) City: Rediscovering the Center, Marcus and Francis (1998), Gehl (2001), Mehta (2007) and Biddulph (2012). The researchers used this method as the first step in examining the streets. The scale for qualitative examination of physical attributes of streetscape included three items; quality, harmony and adequacy. For the visual appraisal, direct observation and an accurate study of physical attributes of the studied streets were followed by making field notes and taking of photographs. To assure that all identified attributes are evaluated systematically, the selected areas were visited over three months from January 2012 to March 2012 at the different times of day, night, weekends and peak hours. Data was collected through observation, field note and photography for each examined attributes were recorded and compiled into a table and provided a data base for examination of each attributes. Then, by interpreting these data, the quality, adequacy and harmony of each attribute were illustrated and findings of this part were used at discussion part to interpret the questionnaire survey results.

The survey questionnaire

Since public are the final referee of urban spaces, it is not possible to evaluate the livability and quality of a street without considering the perception of people who usually experience that space (Nasar, 1998). Therefore, the second phase included a questionnaire designed for each studied street.

The questionnaire survey was designed with an objective to explore the users' perspective on the identified physical attributes and its effect on street livability. In order to achieve this objective, after asking demographic information, people were asked two main questions. First about the livability and quality of study streetscapes and second to evaluate quality, adequacy and harmony of identified physical attributes within studied streets.

In order to measure users' attitude on the mentioned subjects, the Likert scale was used. This format includes five response alternatives from strongly agree to strongly disagree to show the respondents' point of view (De Vaus, 2002). Meanwhile, people who do not have any ideas usually mark the neither agree nor disagree. So this scale provides flexibility for all respondents to answer accurately.

Finally, the newly designed questionnaire was reviewed by three urban planners who are also professors in Malaysia's universities to evaluate its content validity. Also, a pilot study was proceeded to analyze the questionnaire for ambiguity and ease of comprehension during the first 2 weeks of January 2012. After receiving the feedbacks and applying their comments, questionnaire was finalized and prepared to be distributed. The construct validity and reliability of this questionnaire were also tested by using KMO and Bartlett's Test and Cronbach's α value test respectively that are illustrated in data analysis part.

Target population distribution of questionnaires

In this study, the target population is the users of the two multifunctional studied areas – Tun Perak Street and Bukit Bintang Street- who are mostly passersby and who know the area very well. After choosing target population, sample size was determined by considering the two factors. De Vaus (2002, p. 80) stated the first factor of sample size determination is 'the extent to which there is variation in the population in regard to the key characteristics of the study'. Also Dooley (2001) demonstrated the second factor for choosing the sample of a survey. He pointed out the least number for data analysis is 100–150 respondents.

Considering the study areas, the target population of this study is the users of these multifunctional – shopping areas which are mainly passersby and the variation of these passers are generally too much and their socio demographic characteristics of passers are not predicted. In addition, there is no information about the number of passers of these streets and as result the total population size is not

clear. So, the first factor is not applicable for this study and only the second item is considered. Therefore, 160 respondents are chosen to make the analysis possible and meet this requirement.

Finally, to select the respondents, people (regardless of their nationalities) who were older than 18 years were asked about how well they know the study area. Indeed, the scanning question was: 'Do you know the area?' If a person answered 'yes, I know the area very well', then the questionnaire was given to him/her. Since lots of foreigners live or work in these areas and visit and know these areas very well, nationality of the respondents was not an issue and respondents were selected randomly, without differentiating between locals and foreigners.

The finalized questionnaires were prepared and distributed among 160 people who were visiting, living, working or knew the areas randomly. This was done through face – to-face approach during January–February 2012. In overall, the 160 questionnaires were distributed for each studied streets and were given to people who were passing through the spaces or people who worked at those areas and stated they knew the areas very well. These questionnaires distributed in the evening because people usually had enough time (5–10 min) in the evening for filling in the questionnaires.

Data analysis

In analyzing questionnaires' data, the study sought to discover whether the users agree or disagree with livable environment of studied areas, and their level of agreement made no difference to their perception. Accordingly, the five categories of users' responses at the questionnaires were collapsed to three categories. From 'strongly disagree, disagree, neither agree nor disagree, strongly agree, agree' to 'disagree, neither agree nor disagree, agree'. Therefore, in order to have a better understanding about responses, the users' attitudes were described under these three categories. Since, people who do not have any particular idea about livability of studied areas and quality of identified attributes usually mark 'neither agree nor disagree' category, the responses of this category were removed from the analysis and the responses of 'agree' category were compared with 'disagree' category. After organizing the categories, the Statistical Package for Social Science was used for analysis of questionnaires' data. First a reliability test through examination of the Cronbach's α value was carried to measure the internal consistency of the variables. The identified physical attributes were used together

as a complex measure for examining the physical quality and livability of the streetscape. In this test, Cronbach's α values of 0.7 and above are considered acceptable value for a scale. Then, KMO and Bartlett's Test was used for measuring the variables validity. This test included, Kaiser-Meyer-Olkin Measure of Sampling Adequacy and values of 0.6 and above were considered acceptable for a scale (Coakes and Steed, 2007).

The identification of the influence of quality of physical attributes on the livability of streetscape was analyzed by using the descriptive statistics and Spearman coefficient correlation among the variables – livability and quality of streetscape as the dependent variable and identified street physical attributes as independent variables. These quantitative data analysis was used to interpret the total result and reveals the impact of street physical attributes on promoting the quality and livability of the area.

Findings and Discussions

Observation and questionnaire survey during 3 months from January 2012 to March 2012 provided a database for evaluating the livability of the areas and the influential physical attributes that contribute to livability of the streets.

Visual appraisal

Pictures from different parts of Bukit Binatng Street and Tun Perak are illustrated in Figure 2 to Figure 23. During observation of the studied areas,

Figure 2: Different parts of Bukit Bintang street paving.
Note: These broken paving and damaged floor show that quality of paving is improper in Bukit Bintang Street.

in addition to taking pictures some field notes were written that follows the pictures here. These pictures and notes reveal the conditions of physical attributes of the studied areas.

Figure 3: A damaged paving at Tun Perak street.
Note: These broken paving and damaged floor show that quality of paving is improper in Tun Perak street.

Quantitative examination

From 160 distributed questionnaires, 150 (93.75 per cent) questionnaires were correctly completed and received. While 10 (6.25 per cent) received questionnaires were completed incorrectly and hence omitted from final analysis. Table 2 and Table 3 indicate people's perception of the quality and livability of the two streets. The result of this survey shows that to what extent people perceive these areas are livable and quality space. Less than half (44 per cent) of the respondents of Bukit Bintang Street agree that this street is a livable space, and 24 per cent disagree that this area is a livable and quality space. While, in Tun Perak Street, almost half of the respondents disagree with quality and livability of the area, and and only 14 per cent of respondents agree that the street is a livable and quality space. Also, 32and 38 per cent of respondents were neutral and did not have any specific idea about quality and livability of Bukit Bintang Street and Tun Perak Street respectively.

Figure 4: Street furniture in Bukit Bintang street.
Note: In this street, various street cafes alongside the pavements have outdoor seating. Lots of pedestrian are seating, drinking and eating there. So, street furniture and seating seem adequate in this street.

Figure 5: Absence of seating or street furniture at Bazar and the pavements of Tun Perak Street.
Note: People are rushing and consider this area as a passageway. So, street furniture and seating are inadequate in this street.

Figure 6: When it is raining in Bukit Bintang Street, people usually stop walking and wait at building frontage or monorail station. *Note*: It should be noted that rain is usual part of Malaysian life and mean number of rain days in Kuala Lumpur is 158 days in a year (WMO World Weather Forecast, 2012), and because of Bintang Walk in this street, the large number of pedestrian pass this street and various activities take place on the sidewalks. But the sidewalks are not covered and shelters are not provided adequately in this street.

Figure 7: (left to right) (i). Verandah ways at pavement of Tun Perak Street; (ii). People are waiting at LRT station in Tun Perak Street when it is raining.

Figure 8: Commercial signs at Bukit Bintang street.
Note: This picture shows that various signs with different size, type, form and color covered the windows and facades of Bukit Bintang street. Even though this street is located in Tertiary Heritage Zone and has some regulations for installing commercial signs, but no harmony can be found between these irregular signs.

Figure 9: Irregular signs at Tun Perak street.
Note: This picture shows that various signs with different size, type, form and color covered the windows and facades of Tun Perak street. Even though this street is located in Secondary Heritage Zone and has some regulations for installing commercial signs, but no harmony can be found between these irregular signs.

Figure 10: Rows of trees at two sides of Bukit Bintang Street.
Note: Even though in other parts of the street trees and planting may be less than this part, in overall planting seems adequate in this street.
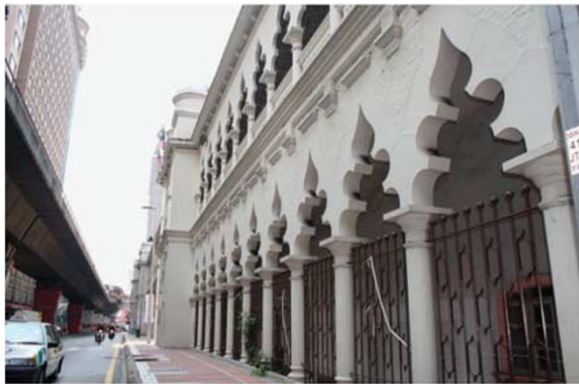
Figure 11: Absence of planting, sculpture and fountain can be seen along the road and sidewalks.
Note: Only few trees exist in some parts of the pavements. So planting, sculpture and fountain are inadequate at Tun Perak Street.

Figure 12: A Fountain located in front of pavilion shopping center in Bukit Bintang Street.
Note: This fountain is kind of art work and considered as a focal point so that people come from other part of the street to this area and take a picture with the fountain. Also, the sound of water is very soothing. So this fountain is considered to have a good quality in context of this street.

These findings show that people do not strongly believe that none of the studied street have livable environment, even though Bukit Bintang Street seems to have more livable environment with higher quality.

Validity test
Table 4 shows the result of KMO and Bartlett's test of Bukit Bintang Street and Tun Perak Street survey. The result of the validity test showed that the Bartelett's test of sphericity is significant at these areas. Also, the value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy for Bukit Bintang Street survey is 0.645 and for Tun Perak Street is 0.617, which are greater than 0.6 and are acceptable for the scale.

Reliability test
Table 5 indicates the result of reliability test of Bukit Bintang Street and Tun Perak Street. The result of the reliability test showed that the value of Cronbach's α for Bukit Bintang Street survey is 0.813 and for Tun perak is 0.757. Both values are greater than the minimum α value (0.7) and are acceptable for the scale.

Evaluation of physical attributes
Table 6 shows the result of evaluation of quality, harmony and adequacy of identified physical attributes from users' perspective. Since there was no sculpture or fountain in the Tun Perak Street, people were not asked about quality of this item.

Correlation test
The result of correlation test revealed that seven identified street physical attributes have positive correlation with the livability of studied streets which are shown in Table 7. Among these attributes, four attributes – paving, parking space, traffic management, maintenance and cleaning – were similar in both areas. Therefore, these attributes are identified as determinants of street livability in the studied street.

It is noticeable that proportions of space and planting have only strong effect on livability in Tun Perak Street. The no correlation of this variable in Bukit Bintang Street may be explained by the fact that Tun Perak Street is a narrow two way road but Bukit Bintang Street is one way road. So proportion of Bukit Bintang Street does not affect livability of the area from user's perspective. Also, planting and greenery barely can be found in Tun
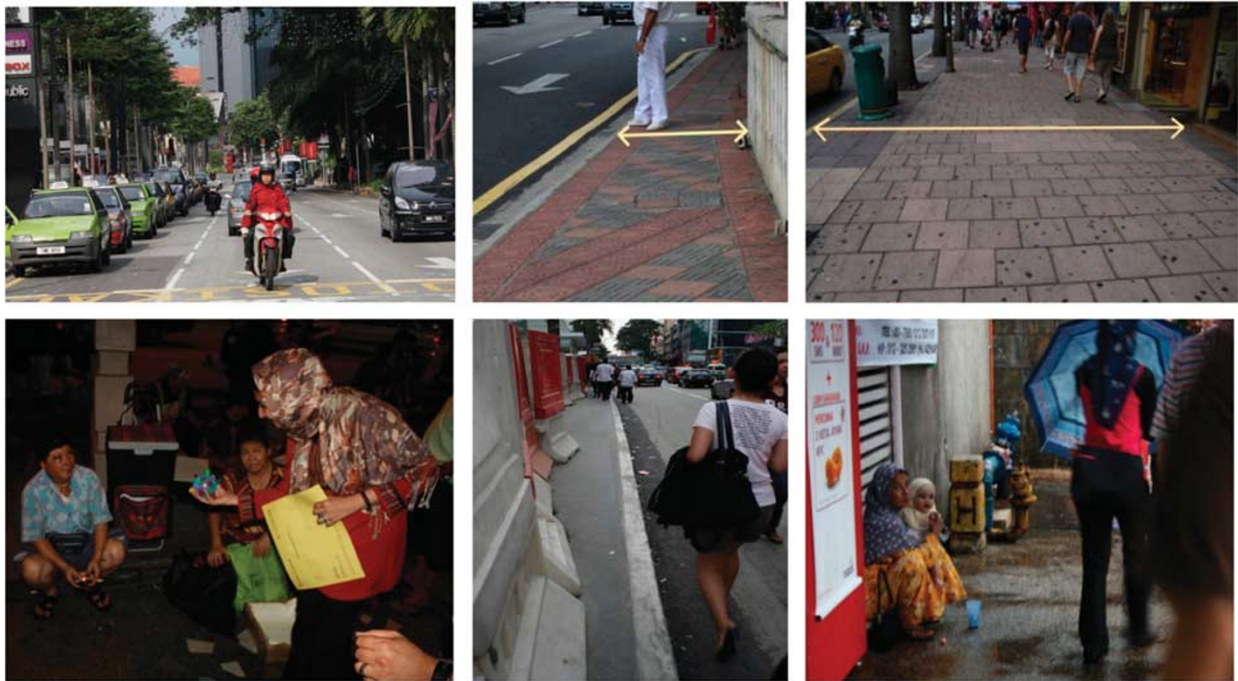
Figure 13: The pictures show the size and scale of road and pavements of Bukit Bintang Street and activities occurred in pavements that are related to proportion of space.
Note: (First row- from left to right): The first picture shows three lines of Bukit Bintang Street while one line is usually occupied with taxis. As this street is the most popular street of Kuala Lumpur and too many private cars pass this street every day and night, three lines is inadequate and this street considered narrow for this traffic volume. The second and third pictures show the scale of pavements at different part of the street. (Second row- from left to right): the first picture shows peddlers selling their stuff on the pavements. The second picture pedestrians walking along the road rather than using the sidewalks. The third picture shows beggars at the pavement. In overall, because of pavements do not have a regular pattern in this street and some parts of pavements are narrow or occupied by sidewalk's cafes, street shows, peddlers, beggars and and so on, some pedestrians usually pass through the road rather passing through sidewalk.

Figure 14: The pictures show the size and scale of Tun Perak Street.
Note: As seen in Tun Perak Street, two lanes exist in each direction of the road. Pavements of this street are not usually crowded but because of high volume of private cars that pass this street, size of road is not proportionate with traffic volume and seems so narrow.

Figure 15: The pictures illustrate the contrast between architectural styles of different buildings in Bukit Bintang Street.
Note: (From left to right) The first picture shows the new modern buildings like hotels and shopping malls at east part of the street. The second picture illustrates older buildings at west part of the street that are mainly two to eight storey buildings. This contrast and lack of harmony between different buildings disturb the visual integrity of the street.

Figure 16: The pictures illustrate the contrast between architectural styles of different buildings in Tun Perak Street.
Note: In most parts of the street, old ruined buildings are seen beside high rise buildings and only few historical buildings have been conserved. So there is no harmony and integrity between different buildings at the street.

Figure 17: The steps on the pavements without ramp in Bukit Bintang Street (left picture) and Tun Perak Street (right picture).
Note: These steps are a kind of barrier for people with wheelchair or pram. So the studied street have inadequate facilities for disabled people.

Figure 18: Sometimes double parking being seen in Bukit Bintang Street (left picture) and some people park their cars at the pavements in Tun Perak Street (right picture) because of inadequate parking space.
Note: People who come to this street usually look for parking in adjacent streets and always complain about parking space and its price in Bukit Bintang Street.

Figure 19: The main accessibilities to Bukit Bintang Street via public transportation being provided by monorail and taxis.
Note: Monorail has only one line and very limited capacity that always is overcrowded at peak hour. Also, taxis in this street usually do not use taximeters because of looking for more profit. So, these are not covering all people transportation needs and because of inadequate access to public transportation people usually rely on their own cars.

Figure 20: The only accessibility to Tun Perak Street via public transportation being provided by LRT.
Note: Even though LRT has two lines, station is usually overcrowded with long queues especially at peak hours. Except LRT, other public transportation like bus and taxis are hardly found in this street. So, with high volume of traffic, access to public transportation is inadequate.

Perak Street, while rows of trees are seen in Bukit Bintang Street. In addition, correlation between facilities for disabled people and livability is only seen in Bukit Bintang Street. This also may be explained because of Bintang Walk in this street, which needs more facilities and user friendly pavements for pedestrian specially disabled people.

In addition, respondents believed that the livability of these two areas is enhanced by proper paving, maintenance and cleaning, though their effects are not as significant as traffic management, and adequate parking space.

It is also notable that the result of correlation analysis between these identified physical attributes and street livability of the studied areas are weak; however, the qualitative examination of physical attributes of these two areas has shown the strong evidence for the importance of these physical attributes in enhancing livability in both streets. This may be because of the fact that there are differences between objective and subjective perspectives for considering livability. Respondents of questionnaire surveys may have not considered the effects of these physical attributes more seriously. This perception about the impact of physical attributes on the quality and livability of the studied streets might have caused the week results for correlation coefficient analysis.

In overall, comparisons of the results of both areas and the finding of the two major attributes – traffic management and adequate parking space – common in both streets, reveals that vehicular traffic management and its positive effects are the main attributes to have quality and livable streets in inner parts of Kuala Lumpur. On the other hand, it is apparent that Bukit Bintang Street with a one way road is more livable than Tun Perak Street that is a two way road with heavier traffic congestion. It shows that traffic calming measures have direct effects on livability of the streets. Therefore, these

Figure 21: Public transportation cannot cover all people transportation needs in these two streets as too many private cars pass Bukit Bintang Street (left picture) and Tun Perak Street (right picture).
Note: Heavy traffic congestion are seen at the peak hours, raining time and weekends nights and slow traffic movement of vehicles at other times of day. So these areas do not have quality traffic management.

Figure 22: Pictures from different parts of bukit Bintang street.
Note: In Bukit Bintang Street streets some buildings are well renovated but some facades need repairing and painting. Dirty floors and accumulation of rubbish are also seen in some parts of the streets. These pictures show that the quality of maintenance and cleaning in this street is very low and this area is not well maintained.

Figure 23: Pictures from different parts of Tun Perak street.
Note: Like Bukit Bintang Street, in Tun Perak Street some buildings are well renovated but some facades need repairing and painting. Dirty floors and accumulation of rubbish are also seen in some parts of the streets. These pictures show that the quality of maintenance and cleaning in Tun Perak Street is very low and this area is not well maintained.

Table 2: Users' perception of quality and livability of Bukit Bintang street

	Agree		Neither agree nor disagree		Disagree		Mean	Standard deviation
	Frequency	Percent	Frequency	Percent	Frequency	Percent		
Quality and livability	66	44	48	32	36	24	1.80	0.803

Table 3: Users' perception of quality and livability of Tun Perak street

	Agree		Neither agree nor disagree		Disagree		Mean	Standard deviation
	Frequency	Percent	Frequency	Percent	Frequency	Percent		
Quality and livability	21	14	57	38	72	48	1.66	0.713

Table 4: KMO and Bartlett's test of the studied streets survey

KMO and Bartlett's test			
		Bukit bintang	Tun perak street
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.645	0.617
Bartlett's Test of Sphericity	Approx. χ^2	147.039	239.214
	DF	45	105
	Sig.	0.000*	0.000*

findings reinforces the findings of previous researches especially livable streets (Appleyard and Lintell, 1972; Appleyard, 1981) that revealed traffic impacts on livability of streets. Furthermore, because of Bukit Bintang is well-known for its walkability, these findings confirm the other earlier researches' results such as Sauter and Huettenmoser (2008) on Switzerland's streets, and Park's (2008) study in California and research in Morden city in Canada who found that traffic management had a great effect in encouraging people to walk.

In addition to effects of traffic, other studies have shown similar results on examination of physical attributes of urban spaces. For instance, finding the

significant correlation between planting and livability of Tun Perak Street reinforces the study of Layne (2009) and Bosselmann *et al* (1999) that shows the importance of landscape setting in urban spaces. Moreover, the significant correlation between the livability of Bukit Bintang Street and facilities for disabled people corroborates the findings of Mackett *et al*'s (2008) study in England streets about the importance of provision of facilities for street access and other needed services for disabled people. Forsyth *et al*'s (2008) research on effects of physical characteristics on walkability of the neighbourhood also illustrated similar results.

Generally the results of this study confirm mostly the earlier researches with a few exceptions. For example, in contrast to 's findings on effects of visual pollution of irregular commercial signs in the historical parts of the city center, no significant correlation found between irregular signage and livability of studied areas, especially in Bukit Bintang Street that has this problem more seriously. Since this problem has hidden impact on

Table 5: Reliability test of Bukit Bintang and Tun Perak streets

	Reliability statistics	
Studied street	*Cronbach's α*	*Number of items*
Bukit Bintang	0.813	14
Tun Perak	0.757	13

Table 6: Result of evaluation of identified physical attributes within the studied streets

The identified physical attributes	*Bukit Bintang street*		*Tun Perak street*	
	Mean	*Standard deviation*	*Mean*	*Standard deviation*
Paving	1.92	0.823	2.38	0.772
Shelter and canopies	1.66	0.730	2.44	0.755
Suitable street furniture & seating	1.96	0.795	2.26	0.772
Signs	1.66	0.713	2.12	0.761
Planting	1.80	0.840	2.54	0.641
Lighting	2.04	0.761	1.85	0.725
Sculpture and Fountain	2.20	0.855	—	—
Proportions of space	1.40	0.635	2.68	0.509
Harmony between architectural style of different buildings	2.12	0.768	2.26	0.746
Facilities for disabled people	1.82	0.820	2.54	0.641
Parking space	1.52	0.730	2.80	0.449
Traffic management	1.16	0.419	2.84	0.328
Maintenance and cleaning	1.98	0.832	1.92	0.719
Accessibility	1.90	0.795	1.88	0.706

Table 7: Significant correlation between the livability of the streets and identified physical attributes in both studied areas

No	*Physical attributes*	*Street livability*	
		Bukit bintang	*Tun perak*
1	Paving	0.185*, *P(0.023)* < 0.05	0.171*, *P(0.031)* < 0.05
2	Planting	0.062, *P(0.445)* > 0.05	0.160*, *P(0.040)* < 0.05
3	Proportions of space	0.079, *P(0.336)* > 0.05	0.227**, *P(0.005)* < 0.01
4	Facilities for disabled people	0.185*, *P(0.023)* < 0.05	0.029, *P(0.729)* > 0.05
5	Parking space	0.282**, *P(0.000)* < 0.01	0.212**, *P(0.009)* < 0.01
6	Traffic management	0.240**, *P(0.002)* < 0.05	0.264**, *P(0.000)* < 0.01
7	Maintenance and cleaning	0.191*, *P(0.019)* < 0.05	0.202*, *P(0.013)* < 0.05

quality of the areas, may be because of unaware-ness of people about the negative effects of this issue, this correlation was not found significant.

However, these reviewed studies have chosen different methods to evaluate their case studies; this discussion and the comparison illuminated the common findings that verify the result of this research. It is very regretful that the idea of livable streetscape and importance of physical environ-ment was defined more than four decades ago, yet our streets still have common physical attributes that are missing in our streets such as adequate planting which enhance the quality of space and promote street livability.

Conclusion

The purpose of this study was to identify different street physical attributes which determine livabil-ity and quality of streetscapes. It was specially focused on the streets that are located in the old part of Kuala Lumpur city. The study has met its objective and answered its research question by identifying four physical attributes as determi-nants of street livability in Malaysia. These are: paving, parking space, traffic management, and maintenance and cleaning.

The result of this study proves that the street physical attributes promote the livability and qual-ity of a street. However, users' perception on the influence of different physical attributes was not similar. Therefore, for improvement of quality and livability in the studied areas, some practical recommendations are suggested to enhance the quality of identified determinants of street livabil-ity – paving, parking space, traffic management, and maintenance and cleaning. Since all these attributes already exists in this area, and the problems are related to adequacy and quality of these attributes, following measures are recom-mended to Kuala Lumpur City Hall as the policy maker organization to improve quality and ade-quacy of these attributes.

To improve the quality of damaged paving and maintenance and cleaning of the areas, it is suggested to redesign and renovate the abandoned space, ruined facades, pavements, and paving and flooring of the studied area. More attention is also needed for collecting garbage and cleaning pavements. KLCH may need to increase the public services of these areas. These measures, especially the ones related to repairing and renovation of damaged areas, will enhance the quality of physical environment.

The other attributes are parking spaces and traffic management that need improvement. As adequacy of parking space is related to traffic management and how much people use public transportation. First it is advised to build LRT lines in Bukit Bintang Street because Monorail cannot cover all transportation needs. Second, enhance quality of existing Monorail and LRT in the areas by adding more wagons and increasing their speed at peak hours. After improv-ing the public transportation, to enhance walkability of Bintang Walk in Bukit Bintang Street, it is sug-gested to encourage people to use public transporta-tion and ban entrance of private cars to this street. This will transform Bukit Bintang Street to a 'transit mall' (Rubenstein, 1992, p. 23).

These measures will increase adequacy and efficiency of public transportation and will decrease traffic volume of private cars and its negative effects. Besides, building cheap parking space in both streets is recommended to avoid double parking or parking at the pavements. Since there are some abandoned spaces in both spaces, it is suggested to use these spaces for parking space.

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