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Normative Approach to Evaluating Accessibility Residents' and Tourists' Trip Comfortability Perspective in Karbala City, Iraq

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ABSTRACT

One of the most significant aspects of urban transportation planning is accessibility. A variety of studies have been conducted on calculating accessibility using motorized modes in metropolitan areas. In this paper, the accessibility of four different modes of transport was assessed in Karbala City Centre (KCC). Religious-Cultural Cities that have experienced an increase in problematic urban areas with economic, social, and environmental issues are impacting their livability which require critical research to guide policy planning and development. Religious-cultural tourism is a strong motivator to preserve cultural heritage in tourist destinations. It helps to preserve heritage as an invaluable tourist attraction. In recent years, a city's rapid growth has resulted in an increase in tourists, people, and cars, along with a limited expansion of the roads. This has resulted in frequent traffic complications and excessive congestion, which negatively affects the environment, economy, travel time, and safety that is causing inconveniences to its citizens and visitors. This paper studied and analyzed the performance using Minitab Statistical Software of the transport network structure inside the KCC using a Likert Scale Survey and measured the level of comfortability during people's (residents and tourists) journey to KCC. This work found that 61% of participants responded concerning the integration of various types of public transport inaccessible and 57% the integration of private and public modes of transport is not available. As a result, the use of the knowledge and understanding of accessibility measures to better plan and organize the structure of roads.

1. Introduction

Human communities rely heavily on the mobility of people, goods, and information. Societies that are increasingly dependent on transportation systems to provide the needs of culture and distribution. A good quality site should be easily accessible, which relates to the capacity to travel freely within, across, and between public spaces (Greg, 2017; Radwan & Morsi, 2020). While Litman's point of view claimed that 'At the neighbourhood level, accessibility is determined by the quality of walkways and cycling facilities, street connectivity, geographic density, and mix,' (Litman, 2003). Furthermore, the green site

should be taken in consideration when improving urban area, the future designers should think about how important green spaces are for making people feel more comfortable in hot weather (Almatar, 2024).

On one side, people are becoming more aware of the importance of accessibility, it is now more important than ever to analyse accessibility. On the other side, the principle of accessibility would need treatments that are coherent and integrated with other relevant sectors such as land transportation, public transportation, land use...etc. (Brömmelstroet et al., 2016).

The development of tools for accessibility assessment would lead to policy recommendations for improving accessibility

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and as a result, sustainability (Páez et al., 2012; Yeang, 2006). Increasing accessibility in society is a tool for achieving greater social participation, hence social justice, and thus social sustainability.

It's significant to examine the current state of accessibility, as well as users' opinions and attitudes with the most efficient means of accomplishing this. Using cultural tourism is an alternative technique for promoting quality of life through sustainable local development and enriches the host communities (Vasiliadis et al., 2016). Religious-Cultural tourism provides a powerful incentive to maintain cultural heritage features in tourist sites. It contributes to the preservation of cultural assets as key tourist attractions (Hsiao-Hsien Lin & Jao-Chuan Lin, 2021; Vasiliadis et al., 2016). Religious-Cultural tourism is no longer restricted to visiting historic sites.

Traveler satisfaction is important variables in ensuring a better future. Many organizations now consider traveller satisfaction to be a noteworthy measure for evaluating their work's quality. The role of various forms of transportation has received a lot of attention in research on factors that influence travel satisfaction (Friman et al., 2017; Lancée et al., 2017; St-Louis et al., 2014; Wang et al., 2000). A hierarchy of modes was established based on the density of people that can be accommodated with pedestrian movement at the top of the hierarchy followed by metro, then the bus, and finally car or taxi in Makkah Central Area. They concluded that initial dispersion from the holy place should be on foot with metro stations and bus terminals located about 600 meters from its border, Cars and taxis should be banned from the central part of the city (Temple et al., 2013). Tourist satisfaction is achieved by creating proper processes that ensure that the services offered to match the tourists' expectations (Shergill & Sun, 2008; Taghavi & AG, 2017). The satisfaction of visitors from a destination is a crucial consideration in picking a location. This indicates that if tourists are content with their travel to a destination, they are likely to return or recommend it to others. For most service providers, tourist satisfaction has become a top priority.

Studying transportation networks to measure the efficiency of the transport system and its effectiveness by understanding the relationship between all road users and the results obtained during a certain time (Páez et al., 2012). Through good planning and infrastructure, the Karbala City Centre (KCC), as an eco-tourism and religious historic destination, can provide a foundation for the growth of sustainable tourism. The goal of this research is to figure out what elements influence the satisfaction of tourists visiting KCC besides the residents to assistance an appropriate decision for tourism development, as well as increase tourist satisfaction.

The main goal of this study is to examine accessibility from the standpoint of residential and tourist (considering road street network performance) satisfaction in the KCC in Iraq. This research studied how people perceive accessibility in the city because user expectations were among the most significant challenges. As a result, the normative method was used to comprehend expectations, normative accessibility is defined in terms of an analyst's or policymaker's expectation - an expectation that may be based on some understanding of the conduct in question (Páez et al., 2012). The concept of accessibility is at its most useful when applied normatively (Farrington, 2007). The normative approach is beneficial because it assists in addressing specific research, policy, and planning issues by assisting in understanding the current situation considering the desired outcome, policy, and planning interventions.

2. Methodology

Karbala is one of the Islamic world's very special cities. It is well known for its religious aspect. Imam Hussain's Holy Shrine (the Holy Prophet of Islam's grandson), with some of his relatives and friends located in KCC. It is about 110 kilometres southwest of Baghdad, capital city of Iraq (Alourafi & Alrawi, 2020).

The population of Karbala province increased to (1,218,732) in 2018. About 63% of them live in the city of Karbala (Danilina & Aldaini, 2022). Traffic has been estimated to

increase annually in KCC by (5%) of growth (Central Organization for Statistic and Information Technology, Iraq.; Sofia et al.,

2018). Location and the map of KCC is shown in Figure (1).



Figure 1. Figure 1. location of Karbala city (MapLand, 2008)

Furthermore, Figure 2. shows an example of the number of tourists (in millions) visiting KCC on several main occasions during the year, the number declined in the years of war against ISIS since 2014, fortunately, the war is finished, and the number of tourists returns to increase. The

increase in traffic congestion in KCC was recognized as a major urban issue, in this study. A questionnaire is conducted to evaluate the journey comfortability to the KCC addressing both residents and tourists.

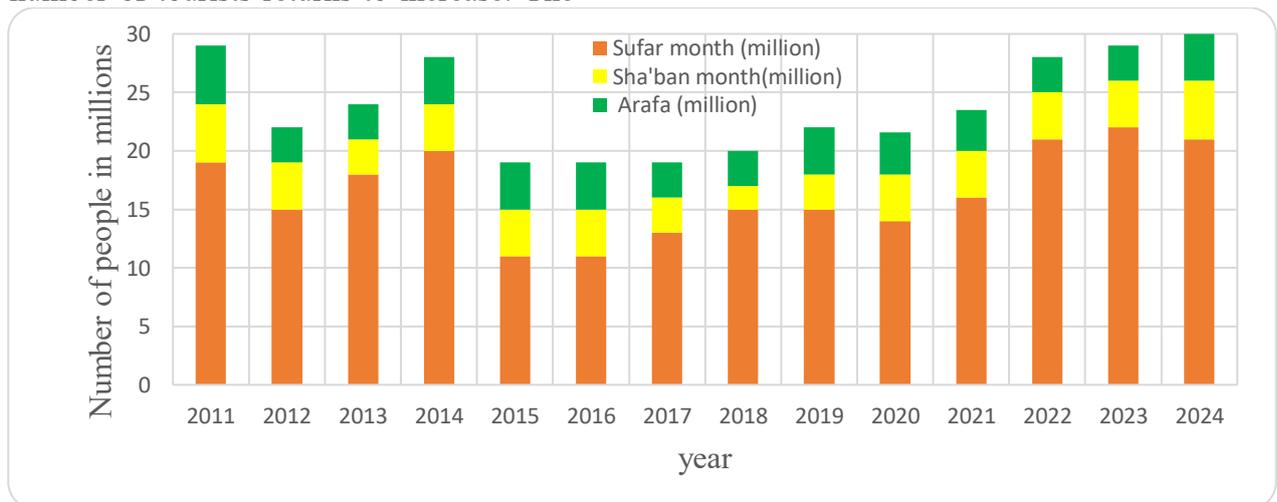


Figure 2. The number of visitors to Karbala at the main events

The comfort defined when evaluating public space by Radwan and Morsi “ an urban space must be relaxed, this ensures ample shade, parking, sidewalks, public transport with bus

stops, parks, bike paths, etc.” (Radwan & Morsi, 2020).

These surveys, which describe and evaluate humans, places, and events, are composed of a

series of self-assessment questions. Evaluative continuation is numerical or adjectival scales; the question should be carefully reviewed to ensure that it is not open to various interpretations. multiple choice questions would have (5-7) response alternatives (Fowler, 1995).

When considering accessibility in the context of liveability, accessibility is one of the functional place quality dimensions of liveability (Table1). Pedestrian accessibility, public transit quality, and the vitality and viability of services make up this dimension. Using the table of liveability dimensions as a guide (Yeang, 2006).

Table 1: Relationship between functional place quality features, indicators of accessibility and their criteria

Functional Quality	Availability Indicators	Criteria of Indicators
Pedestrian Place	Non-Automotive Accessibility	Sidewalks of street type Walking paths Cycling routes
	Road safety	Calming movement Separate bike paths Safe sidewalks
Public Transportation Quality	Transport vehicle Availability	Public transport Type of road/Transport Infrastructure
	Integration of modes	Integration of various types of public transport Integration of private transport and types of public transport
Vitality and viability Services	Streetscape	Outdoor furniture/Landscape Elements Cleanliness Parking for cars (visual intrusion from the parking lot)

The three Functional Qualities have indicators, and every indicator should have its own set of accessibility criteria, which should be checked one by one to conclude. The journey to the KCC and its road street network need to be assessed from the road users' point of view. The Survey has 5 Indicators of Accessibility with 17 accessibility indicators, was conducted in the August-September summer of 2024 using internet platforms. A 6-point Likert scale was used, and the responses varied between 6 levels of satisfaction from unavailable to very good.

According to the assumption that the average score for each criterion is three, the total average score is seventeen times mutable by three – 51 using Minitab Statistical Software. That instance, if the evaluation result is a score between zero and fifty-one, the city's accessibility is below average, and a new transportation system proposal is needed to be improved. On one hand the status of each criterion should be evaluated when creating a system, and it should be determined what should be established and what should be improved. On the other hand, the (very good) score for each category is five, making the overall a very good score seventeen times five - 85. The result is 85,

the city's accessibility is excellent; nevertheless, if the result is between 51 to 84, the city's accessibility is above average. This time, the characteristics that are below average should be examined, and improvements or rehabilitation should be implemented to improve accessibility and, as a result, the trip's comfortability. The plans and policies that go along with them should then be identified for improvement.

3. Results and discussion

The measurement of accessibility is contributed to the proposal for a new transport system. The study was conducted on social networks, addressed to both residents and tourists separately, to determine the attitude/opinion of residents and tourists of the KCC regarding accessibility. The questionnaire is provided to residents and tourists of KCC in approximately equal proportions. The results reflect their opinion to the accessibility of the city. The study used information from 356 participants, as shown in tables (2) and (3), the majority of participants were men 56%, and the rest were women. Locations of participants - 47% of tourists and 53% of residents. The age

group of participants was even, and the largest group was between the ages of 20 and 30. The degree of education of the participants was 85%

of bachelor's degree and above. The percentage of car ownership was 54%.

Table 2. Socio-demographic characteristics of participants (N = 356)

No.	Personal Characteristics	Resident %	Tourist %	Total %
1.	Age Distribution			
	20-30	41	14	28
	31-40	16	37	26
	41-50	19	32	25
	+ 51	24	16	21
2.	Gender			
	Female	52	40	44
	Male	48	60	56
3.	Education			
	High education (University degree)	77	92	85
4.	Car owner			
	yes	44	65	54
	No	56	35	46
5.	Traveling type			
	Privet car	46	79	62
	Taxi	22	9	16
	Public bus	32	12	23

Cronbach's reliability coefficient was frequently calculated to ensure the research instrument's stability and consistency. Cronbach's alpha values closer to 1 suggest that the scale is more stable and consistent. The threshold value for most social science research is 0.60. (Tavakol & Dennick, 2011). and values between 0.70 and 0.80 are acceptable and good, while those above 0.80 are excellent (Ringim et al., 2011).

Cronbach's alpha was calculated based on the standardized items had a value of (0,8948, 0,8775) for residents and tourists respectively, which confirms the high consistencies and stability of the instrument. The distribution of attitudes and opinions of 356 responders was as follows.

Table 3. Participants often visit the city centre of

Participates	Time No. visiting Karbala city centre			
	1-2 times a year	3-4 times a year	5-6 times a year	> 6 times a year
Tourists Karbala	39%	21%	18%	23%
Resident Karbala	1- 4 times a week	5- 7 times a week	1 time a week	>1 monthly
	49%	14%	27%	10%

When questionnaire data were examined, the average total score of all questionnaires was 31.91, indicating that KCC's accessibility was below average and The Statistic conducted on the average score,

deviation, and coefficient of variation for each indicator of Accessibility (Table 4).

Table 4. Statistical analysis

Indicators of Accessibility	VA	NVA	SS	IM	CT
Average	2.04	1.50	2.11	0.96	2.60

Stander deviation (SD)	0.69	0.73	0.62	0.51	0.02
Coefficient of variation (CoV)	0.34	0.48	0.29	0.53	0.01

All the standard deviations were low, and the data were clustered around the average as shown in table 4, and the maximum CoV was for the (IM) integration of modes of transport (0.53), but the average of the data was 0.96 which is very low assessment for this indicator.

The findings of the questionnaire have been calculated as percentages and displayed in charts for each Indicator. Figure (3) represent the assessments and attitudes of residents and tourists of KCC who took part in a questionnaire survey.

The result of the indicator "Car accessibility", in which there are three questions varied in the

answers, for public transport (VA1) 56% of the answers are unavailable, 26% were average and only 3% of the answers were very good. This percentage indicates that there is a need for a new transport plan to provide this service to people to improve network performance, and the authorities need to step in to solve this problem.

As for transport infrastructure (V A 2), the result was 46% average, while 27% and 10% were weak and very weak, and this indicates the need to improve transport infrastructure.

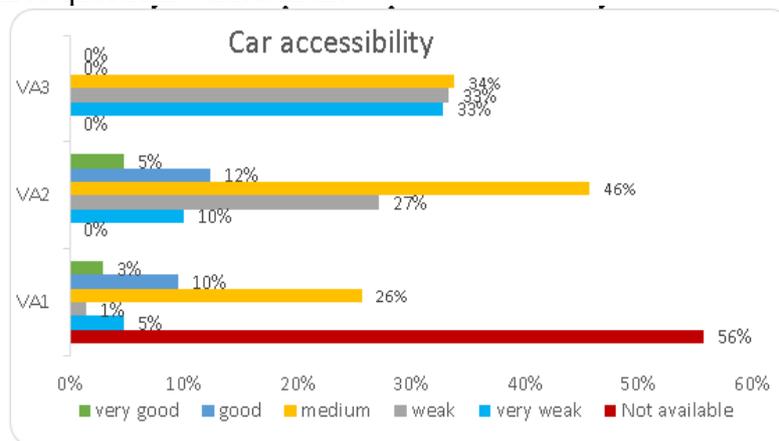


Figure 3. Results of the survey on automotive accessibility

The third criterion in this section was access to urban routes (3), and 36% of participants were average, but 33% and 31% were weak and very weak. There is no answer to "good" or "very good", which indicates the need to increase the possibility of entering the city for both residents and tourists.

Accessibility indicators for non-automotive vehicles have four criteria. As shown in Figure (4) the results of the respondents on pedestrian paths (NVA1) were 34% weak, 31% very weak, and a little 4% and 8% as very good and good, which is a very small percentage, which means that pedestrian paths need to be improved. Then the condition of the sidewalk (NVA2) has 36% and 32% of very weak and weak indicators, respectively, while very good has only 1%. This

shows that the condition of the sidewalk is not very good and there is a need to improve its condition. The third criterion in this indicator was pedestrian signs and road crossing signs (NVA3), 46% of respondents were not accessible, 22% were very weak and only 2% were very good. This result shows that there is a great need to improve pedestrian signs and road signs crossing the road to improve the safety of all users. The last criterion in this indicator was cycling routes (NVA4), and the majority of participants (56%) answered that it was not available, and only 4% answered that it was average. The result indicates that the bicycle path should be included when improving non-automobile transportation.

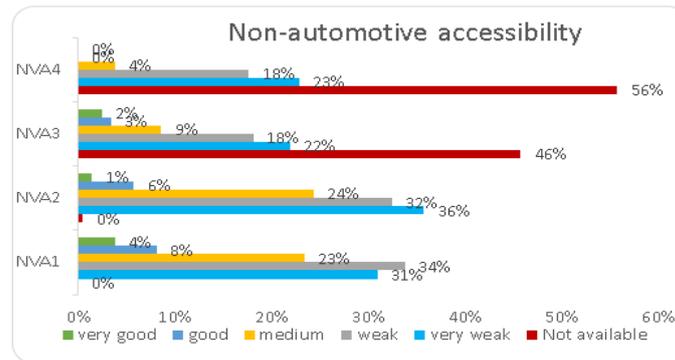


Figure 4. Survey results on non-automotive accessibility

The third indicator was the streetscape as shown in Figure (5), and according to the first criterion, outdoor furniture (SS1), the responses were 38% weak and 25% average, according to the second criterion, landscape elements (SS2) were 21%, 28%, 34% very weak, weak and average, respectively, while the third criterion was accessible recreation areas (SS3) accounted for 24%, 28% and 33% of very weak, weak and average, respectively. These criteria need to be improved in the plan of the city administration. Criteria The presence of a buffer zone between

the road and the carriageway (SS4) is considered inaccessible by 51% of respondents, and this is a very important factor for the safety of pedestrians and cyclists.

The criteria for parking on the street (SS5) were 24% inaccessible, 23% very weak, and only 5% good and very good. While the criteria for off-street parking (SS6) were 39%, they were weak, and 27% were average. Most parking spaces are located in the city centre or the old town, so respondents were not satisfied with these services.

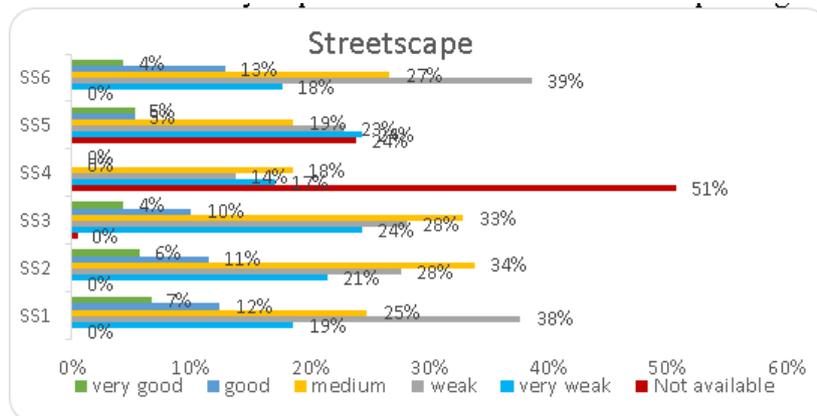


Figure 5. The results of the survey on the criteria of streetscape

The fourth indicator as shown in Figure (6) was the integration of modes of transport: the first criterion was the integration of various types of public transport (IM1), as shown in the diagram, which 61% consider inaccessible, and 0% consider good and very good.

The second criterion was the integration of private and public modes of transport (IM2), 57% said it was not available, 12% - good, and

0% - very good. These results indicate a lack of public transport and a lack of integration between different modes of transport.

The fifth indicator as shown in Figure (7) was (Comfortable Trip), which includes: the first criterion is a comfortable area for people in shopping malls (CSH), 30% answered as average, but 34% were weak, these criteria need to be improved in the future.

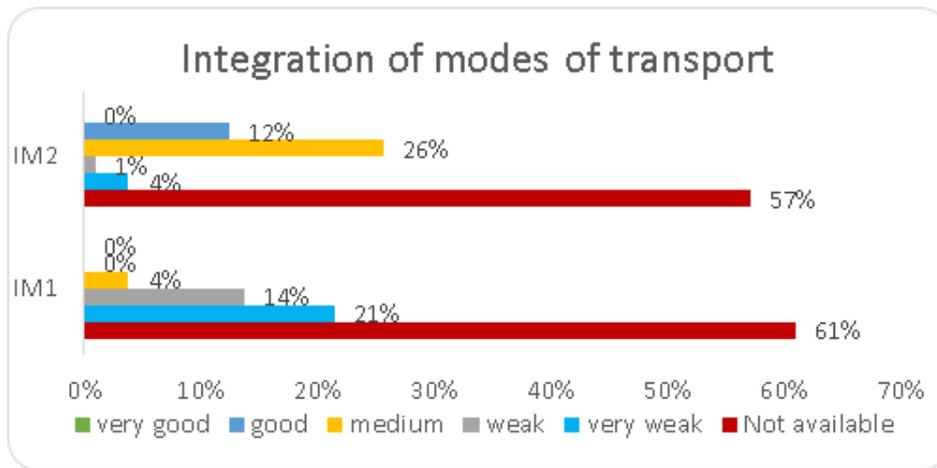


Figure 6. The results of the survey on the criteria Integration modes of transport

The second criterion was the comfort of the trip (CT), the results were in the majority 27% average, but 22% very weak, 26% weak, and only 7% very good. These results indicate the

need to improve the infrastructure of the transport system and add a very important asset to it.

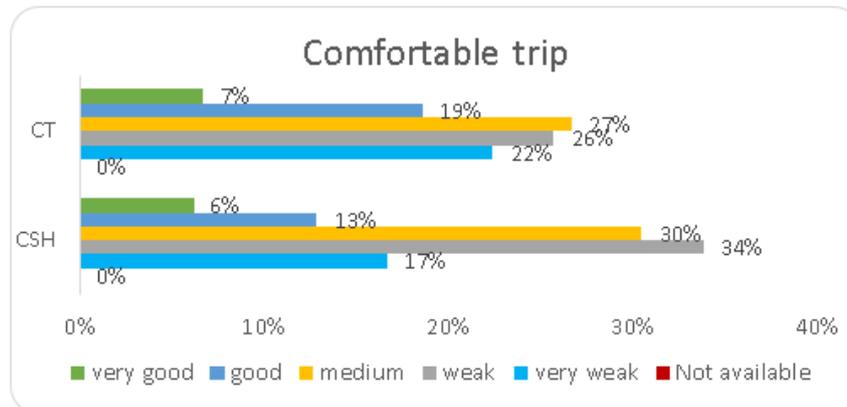


Figure 7. The results of the survey on the criteria of a comfortable trip

4. Conclusions

Urban cities have to expand and improve their road network per quality and safety because a good road network is an important part of the development pillar of any region, that meets the optimal satisfaction of travellers, as well as increases the degree of urbanization. The KCC has a rapid growth population and an increase in religious tourists by millions annually (people and cars) along with a limited expansion of the roads network. Besides, due to the difficulties of critical situation in economic and wars in Iraq, all that has resulted in frequent traffic complications and excessive congestion, which negatively affects the accessibility and congestion in KCC. The overall findings of the questionnaire survey, it can be noticed that

seven out of the seventeen accessibility indicators were chosen as "not available," and five criteria were chosen as weak. The remaining five criteria have been chosen as "average." In Addition, a score of 31.91, the average of all scores is also below the predicted average. According to the findings of this survey, KCC' accessibility is below average, new transportation system, upgrades strategies, with plans and policies that address all accessibility criteria should be improved.

The study found that there is a distinct lack of planning and concern for the needs of road users, whether they are automobile, bicyclist, or pedestrian mobility demands. Due to fast urbanization, a growing rate of motorization of more than 10% per year, and a lack of comprehensive planning, developing countries

have insufficient formal public transportation to meet the whole demand for mobility within the city (Al-Daini et al., 2020; HT & R., 2011). The study suggests that the government review the scientific proposals, which are done with a scientific method to solve the problem of traffic jams and the needs of pedestrians (road users) in the city.

The result of the survey indicates several important points for the authorities to consider when developing the city:

- 1) Sustainable urban transport should be utilized, including trams, metro, and monorails, given their role in achieving sustainability in mass transit in densely populated cities.
- 2) The city needs to operate and develop a new fleet of public transportation and its infrastructure that serves at least the main roads and streets that lead to the central city from four gates.
- 3) Reorganize the location of the parking lot and improve their infrastructure because there is a lack of integration between public transport and private transport.
- 4) Every public place that has cultural tourism attractive sit needs to promote pedestrian and cycle paths consistently, KCC must adopt this strategy of improving and increasing the non-vehicle area with the criteria mentioned above especially the 'buffer zone between road and pathway', which is considered very important for road users' safety in the city and a separate safe path for the bicycle.

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