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# INFLUENCE OF THE SAFETY-SECURITY ATTRIBUTES ON THE WALKABILITY OF UNIVERSITY STUDENTS IN SRI LANKA

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**ABSTRACT**- Walking is the most common, and sustainable mode of transportation, which gives numerous health benefits as well. The relationship between pedestrian safety-security and walking preference is equally important in micro-environments like university neighborhoods, as in macro-environments, such as large cities. A framework has developed based on safety-security attributes [3] and elements [14] and a regression model was developed. The findings of this study could support to define walkability framework as a model which can be adopted in pedestrian planning in other city campuses and will promote walkability.

**Keywords:** Traffic-safety, Crime-safety, Built-environment-safety, University students.

## 1. INTRODUCTION

Walkability is defined as the quality of a neighborhood that supports and encourages people to access their destinations on foot or handicapped people by wheelchair. Pedestrians are persons traveling on foot as well as those using some appliance or objects to help them fulfill that action or to accompany them in fulfilling it. Safety is among the most important quality aspects of walking, in particular given the vulnerability of pedestrians (both in terms of accident probability and expected severity) and is a crucial factor not only in providing for the needs of existing walkers but also in attracting a portion of car users to walk [1]. Traffic safety [2], Crime safety, [3], and Built environment safety [4] are the three safety-security attributes identified through the literature review and safety-security elements were identified under each attribute. The walkability of micro-environments like university campuses is equally important as macro scales, in the pathway of sustainable city development as they are a large part of an urban area. Within that scope, the objective of this research was to assess the extent to which pedestrian safety-security influences the decision of walkability and propose a regression model. The following hypothesis was tested; Hypothesis 1 – Traffic safety influences the decision of walking university students, Hypothesis 2 – Crime safety influences the decision of walking university students, Hypothesis 3 – Built environment safety influences the decision of walking university students.

## 2. MATERIALS AND METHODS

### 2.1. Framework Development

Safety-security attributes that affect the walking preference of university students were identified through a comprehensive literature review and verified via Delphi technique. The framework is presented in Figure 1.

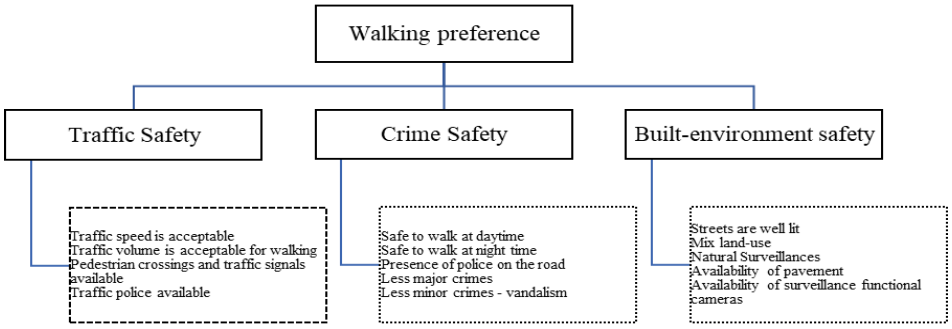


**Figure 1.** Conceptual walkability safety framework (Author)

## 2.2. Description of Study Area, survey design, and Data Collection

University of Sri Jayewardenepura (USJP) was selected as the study area considering the following facts: located in a highly urbanized area, availability of different modes of transportation, and easy access. There are about 13,000 students in the USJP. The street which was selected for the study is Pirivena Road from Wijerama junction to USJP which is the main street used by students to reach the university. Based on the standard technique for determining the sample size for a finite population [5], the sample size is 372. The study involved two stages of data collection: (a) a physical audit that was conducted to capture the safety-security attributes of intersections and sidewalks, and (b) an on-street questionnaire that was used to collect safety concerns from pedestrians and their views on improving safety. All the responses were managed and analyzed using Minitab version 20.2.

## 3. RESULTS AND DISCUSSION

As per the primary data collected through the questionnaire survey, from USJP students, the correlation analysis was used to identify the degree of the relationship between the walkability, each independent attribute, and the strength of the relationship between each attribute, and element (Table 1).

**Table 1.** Correlation of Attributes and Elements

| Elements | Pearson correlation | P-value |
|---|---|---|
| | **Traffic Safety** | |
| Traffic speed is acceptable | 0.130 | 0.012 |
| Traffic volume is acceptable for walking | 0.150 | 0.004 |
| Pedestrian crossings and traffic signals available | 0.131 | 0.012 |
| Traffic police available | (-) 0.060 | 0.248 |
| | **Crime Safety** | |
| Safe to walk at daytime | 0.207 | 0.000 |
| Safe to walk at night time | 0.051 | 0.325 |
| Presence of police on the road | 0.090 | 0.084 |
| Less major crimes | 0.134 | 0.009 |
| Less minor crimes - vandalism | (-) 0.055 | 0.278 |
| | **Built-environment safety** | |
| Streets are well lit | 0.700 | 0.000 |
| Mix land-use | 0.192 | 0.000 |
| Natural Surveillances | (-) 0.013 | 0.807 |
| Availability of pavement | 0.284 | 0.000 |
| Availability of functional surveillance cameras | 0.007 | 0.891 |

The following elements were found as significant since the *p-value* of those elements is less than the level of significance, 0.05; Traffic speed is acceptable (*p-value 0.012*), Traffic volume is acceptable for walking (*p-value* 0.004), Pedestrian crossings and traffic signals available (*p-value* 0.012), Safe to walk during daytime (*p-value* 0.000), Presence of police on the road (*p-value* 0.084), Less major crimes (*p-value* 0.009), Streets are

well-lit (*p-value* 0.000), Mix land-use (*p-value* 0.000), and Availability of pavement (*p-value* 0.000). Among the considered elements, Traffic police available with, Traffic Safety attribute, less minor crimes – vandalism with crime safety attribute, and availability of Natural Surveillances with Built-environment safety attribute, are negatively correlated, while all the other elements are positively correlated with their respective attributes. As presented in Table 1, the following elements were identified as insignificant, since the p-value is greater than the level of significance, 0.05. Traffic police are available (*p-value 0.248*), safe to walk at night time (*p-value 0.325*), Less minor crimes – vandalism (*p-value 0.278*), and Availability of functional surveillance cameras (*P-value 0.807*). That means those factors were not affecting the decision of, walking preference of USJP students, in university surroundings.

### 3.1. Regression model

The regression model was developed based on three identified main factors, Traffic Safety, Crime Safety, and Built Environment Safety. Considering the regression analysis for walking preference in USJP, the p-value for, safe from crime (*p-value 0.021*), traffic safety (*p-value 0.038*), and built environment safety (*p-value 0.001*) is less than 0.05. Therefore, the relationship between walking preference and, three safety influence factors is significant.

$$Walking\ Preference = 0.540 + 0.0125\ Traffic\ safety + 0.0532\ Crime\ safety + 0.8158\ Built\ environment\ safet$$

Model Summary

| S | R-sq | R-sq (adj) | R-sq (pred) |
|---|---|---|---|
| 0.539457 | 67.91% | 67.65% | 67.22% |

## 4. CONCLUSION

The study has identified main three attributes and fourteen elements that influence pedestrian safety-security. Further, the study identified significant and insignificant elements under each attribute. The findings of the study inform that safety-security attributes and elements are vital to consider when encouraging the walkability of university students. Further model validation needs to be carried out for a different sample.

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