CHAPTER 3

PEDESTRIAN BEHAVIORAL INTENTION TO COMMIT CROSSING VIOLATIONS USING TRAFFIC LOCUS OF CONTROL (T-LOC)

*Clarice Lau Yeo Hang[1] & Kamarudin Ambak[2]**

[1-2] Faculty of Civil Engineering and Built Environment,
Universiti Tun Hussein Onn Malaysia, Batu Pahat, 86400, Malaysia.
*Corresponding Email: kamardin@uthm.edu.my

3.1 INTRODUCTION

Walking is the most basic and straightforward means of transportation. It is an important means of transportation, and pedestrian movement is still a significant part of today's metropolitan transportation networks [1]. A Pedestrian is defined as someone who walks rather than riding in or upon a motor vehicle or other vehicle. [2]. Every year, however, roughly 1.3 million people's lives are cut short because of a car accident. Between 20 and 50 million additional people are affected by non-fatal injuries, with many of them becoming disabled as a result of their injury. Moreover, half of all road traffic fatalities are caused by pedestrians, cyclists, and motorcyclists. [3]. A traffic accident claims the lives of over 1.3 million people every year. Between 20 and 50 million additional people are affected by non-fatal injuries, with many of them becoming disabled because of their injury. Road injuries and fatalities are serious issues in Malaysia, with over 6,000 people

killed in fatal accidents and over 10,000 people injured in minor and severe incidents each year. Pedestrian fatalities are on the rise, with more than 500 people killed each year [4]. According to the World Health Organization (WHO), Malaysia ranks seventh out of 10 ASEAN countries, with 7% of traffic deaths involving pedestrians. Approximately 17,300 pedestrian-related cases were documented throughout the 11-year period which is from 2005 - 2015. Approximately 53% of these occurrences resulted in death or serious injury (KSI). [4] In total, 6,161 pedestrians have perished on Malaysian roads in the last eleven years, with 2007 recording the greatest death toll (M-ROADS). [4].

Pedestrian walking is a method of getting to a specific location on foot. Short excursions are effectively served by this method of transportation. In moderate and low-income cities, walking is a popular form of transportation. On the roads, pedestrians face numerous challenges. Crossing the street is one of the most important challenges. Pedestrians face more difficulties crossing the road as the number of fast-moving autos on the road grows, potentially resulting in accidents. Accidents can also arise due to a lack of infrastructure, geometric qualities, or industry norms. One of the most important concerns affecting modern communities is road traffic accidents. In Malaysia, around 500 pedestrians are killed each year, and pedestrians are consistently ranked third in fatalities after motorcyclists and car occupants [4]. Pedestrian crossing behavior that is unsafe, and illegal is becoming more common, and it is regularly described as the primary cause of many pedestrian accidents. When compared to other road users, their susceptibility is frequently connected with significant injury severity and fatality. According to a study conducted by Queensland Transport in 2005, the unauthorized crossing was responsible for 15% of fatalities and 8% of injuries. In addition, at blackspot locations, pedestrian offenses were widespread. To save travel time and distance, people engage in risky behavior. In Malaysia, it was also shown that carelessness and unlawful crossings were responsible for more than two- thirds (70 %) of the reported fatalities, which largely occurred around

shopping malls and marketplaces [5]. It's amusing because these locations are usually outfitted with crossing facilities. Therefore, it was important to use the Traffic Locus of Control (T-LOC) to identify the internal and external factors of pedestrian behaviors. The relationship between T-LOC factors and Malaysia pedestrian violate to cross will be conducted. The Traffic Locus of Control is an effective model for analyzing human behavior about traffic accidents. This is because it can help to figure out the most effective ways to decrease the number of pedestrians involved in an accident.

The objective of the study is to identify the internal and external factors in T-LOC regarding pedestrian violation to cross. It also aims to determine the relationship between T-LOC factors and Malaysia pedestrian violate to cross. The significant of this study will aid the government in finding more efficient ways to solve pedestrian accidents in Malaysia. As a result of this study, the government will be more receptive to these issues, taking more fantastic initiatives and devising a novel approach to resolving the issue. Additionally, this research tends to remind the pedestrians of Malaysia to follow the traffic rules that had been set by the government by understanding the factors they are using the traffic facility dangerously.

3.1.1 LOCUS OF CONTROL (T-LOC)

The locus of control is a psychological term that describes how firmly people believe they have control over the events and experiences that shape their life. The tendency to view life’s outcomes as a product of one's actions and hence within one's control (i.e., internal locus of control), rather than being determined by external forces such as chance or powerful others (i.e., external locus of control), is known as locus of control [6]. External LOC people like to blame other people or circumstances for good or bad things that happen in their lives, whereas internal LOC people take responsibility for themselves and frequently opt to rely on their unique strengths in a variety of situations [7]. People who have a high internal locus of control attempt to control their environment, whereas

those who have a high external locus of control may feel helpless because they believe life's outcomes are out of their control [8].

3.1.2 PEDESTRIAN BEHAVIORS

The way someone acts is referred to as their behavior. It's what a person does to make something happen, change something, or maintain the status quo. Behavior is a reaction to events that occur both inwardly and externally: internally - ideas and feelings, and externally - the environment, which includes other people. Pedestrian behaviors are the description of a pedestrian's purposeful and unintentional features and activities while on the road. Pedestrian crossing behavior is frequently influenced by a variety of factors such as pedestrian features, motions, traffic circumstances, road conditions, and the environment [9].

3.2 MATERIALS AND METHODS

In this study, the quantitative method was employed to collect data through a questionnaire. The components of the Traffic Locus of Control (T-LOC) were used to create and form the questionnaire. The questionnaire has been separated into three sections, each with its own set of questions. On the third part, Likert scale questions based on Traffic Locus of Control (T-LOC) were devised to validate the respondents' agreement on pedestrian behaviors. The following are the sections of the questionnaire:

- Part A: Demographic data
- Part B: Respondent experience
- Part C: Respondent actions

The collection data then was analyzed using descriptive, correlation, and regression analysis to get the results.

3.2.1 SAMPLE SIZE

Residents of the Sibu area were targeted respondents for this study in order to obtain the relevant data. Sibu Division will have a population of 349,700 people in 2020 [10]. The sample size is required of 186, if Taro Yamane's formula is used. Finally, rather than any specific study environment, sample size estimation is dependent on the number of researcher options [11]. As a result, the sample size for the study has been set at 200 people. A total of 200 responses were collected throughout the survey and will be examined in three different ways.

3.2.2 PILOT STUDY

The pilot study was used in the first part of this research. The questionnaire was given to 30 people at random. A pilot study must be conducted initially to test the reliability and validity of the designed question in the questionnaire before the real study can begin. This reliability study enables researchers to identify the questionnaire's flaws, which may then be used to improve it. Alfa Cronboach's reliability is one of the most extensively used reliability measurements in social science and business. Alfa Cronbach's reliability describes the total (or average) reliability of a measurement, which can be a questionnaire or a test. The Alpha Cronbach coefficient varies from 0.1 to 0.9, with 0.7 and higher being acceptable and great for research [12]. In this investigation, the Statistical Package for Science and Social Science (SPSS) version 27.0 was employed. The coefficient value for this pilot study is 0.866, indicating that the prepared questionnaire is capable of achieving the study's objectives.

3.2.3 DESCRIPTIVE ANALYSIS

Descriptive analysis is a sort of data analysis that aids in the description, display, or summary of data in an intelligible manner so that patterns can be identified [12]. Descriptive analysis gives a quick overview of the sample or data set that was developed. The summary is presented in the form of easy-to-understand statistics, pictures, and graphs. By condensing

the entire population or a sample, compact, expressive coefficients allow for more accurate data collecting. Descriptive statistics are used to measure the variability or spread, whereas metrics are used to measure central tendency. The mode, median, and mean are all measures that describe the overall shape of a dataset. Kurtosis and skewness, as well as standard deviation and variance, are examples of variability measures. On the other hand, descriptive statistics is not allowing to conclude the data that had been examined or to form conclusions about any hypotheses that had been proposed. It is a simple and easy way to describe the data collected.

3.2.4 CORRELATION ANALYSIS

Correlation is a measure of how closely two variables are related. The result of the statistical Pearson's correlation coefficient measures the statistical relationship between two continuous variables. It is known as the best method for quantifying the relationship between variables of interest since it is based on the method of covariance. It gives information on the amount and direction of the link, or correlation, between the two variables. The Pearson correlation coefficient, r, can be in any range from +1 to -1. A value of 0 indicates that there is no association between the two variables. A value larger than 0 indicates a positive association. This is because as the value of one variable rises, the value of the other rises as well. A number less than 0 indicates a negative association. This is due to the fact that as the value of one variable rises, the value of the other decreases. The Pearson correlation coefficient which will be closer to +1 or -1 are depending on depending on the strength of the association between the two variables. This is because the strength of the relationship between the two variables will determine whether it is positive or negative. A score of +1 or -1 shows that the line of best fit includes all of the data points and that no data points deviate from it. R values between +1 and -1 (for example, r = 0.8 or -0.4) reflect variation around the line of best fit. The closer the r is to 0, the larger the variance around the line of greatest fit.

3.2.5 REGRESSION ANALYSIS

Regression analysis is a set of statistical processes for evaluating relationships between a dependent variable (Y) and one or more independent variables (x). It can be used to figure out how strong a relationship between variables is and forecast how they'll interact in the future. Multiple Regression Analysis was performed. Multiple regression analysis is performed to see if there is a statistically significant link between two sets of variables. It's a technique for searching for patterns in vast amounts of data. Multiple "x" variables are utilised for each independent variable: x_1, x_2, x_3, x_n. The equation for regression analysis is shown below. To justify the relationship between the components in Traffic Locus of Control (T-LOC), an analysis must be performed.

Multiple regression:

$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots \beta_n x_n.$
Y = Dependent variable (Behaviors and Intention)
$x_1, x_2, .. x_n$ = Independent variable (Internal and external factors)
$\beta_1, \beta_2, .. \beta_n$ = Regression coefficient

3.3 RESULTS AND DISCUSSION

3.3.1 DESCRIPTIVE ANALYSIS

Total 200 respondents have given their feedback for this study. Through the survey, Table 3.1 it can be found that there were 66 males (33.0%) had contributed to this survey. Meanwhile, the number of female respondents is 134, covering 67.0% of respondents. The age category 20 years old and below had the highest percentage of 77.2% followed by age categories of 21 to 30 years (14.9%), 41 years old and above (4.5%) and 31 to 40 years old (3.5%). For the race, there were 142 respondents (71%) Chinese, conducted in the study, followed by Malay race which are 38 respondents (19%). Then, the Iban race of respondents had the same amount as the other races, which were nine

respondents (4.5%). The fewest respondents involved in this survey are the respondents of the Indian race. There are only two respondents (1.0%) of the Indian race were involved in the study. A total of 176 respondents with a percentage of 88.00% had accepted their study until tertiary education. Twenty-four respondents with a percentage of 12.00% had accepted their study until secondary education. None of the respondents only received their study until primary education in this survey. It was found that 141 respondents (70.50%) were still studying. Twenty-nine respondents (14.5%) worked at a private company, while 16 respondents (8.00%) worked at a public company. The number of self-employed and retired respondents was the same, which was only seven respondents (3.5%).

Table 3.1: Respondent Demographic

Item	Frequency (n)	Percentage (%)
Gender		
Male	66	33.0
Female	134	67.0
Age		
20 years old and below	30	77.2
21 – 30 years old	154	14.9
31 – 40 years old	7	3.5
41 years old and above	9	4.5
Race		
Malay	38	19.0
Indian	2	1.0
Iban	9	4.5
Chinese	142	71.0
Others	9	4.5
Education Level		
Primary Education	0	0
Secondary	24	12.0

Education		
Tertiary Education	176	88.0
Occupation		
Student	141	70.5
Public Employed	16	8.0
Private Employed	29	14.5
Self Employed	7	3.5
Retired	7	3.5

Table 3.2 shows the respondent experience of pedestrian behaviors. The majority of respondents think they rarely using the pedestrian bridge with 50.50% while 26.00% respondents think they are using the pedestrian bridge in sometimes. There are10.00% and 7.00% respondents believe that they often and almost always using the pedestrian bridge. The minority pedestrian never using the pedestrian bridge with 6.50%. Next, the majority of respondents think they rarely using the pedestrian walkways with 32.00% while 29.00% respondents think they are using the pedestrian walkways in sometimes. There are alsp 24.00% and 13.00% respondents believe that they often and almost always using the pedestrian walkways. The minority pedestrian never using the pedestrian walkways with 2.00%. Other than that, the majority of respondents think they rarely using the zebra crossing with 32.50% while 31.00% respondents think they are using the zebra crossing in sometimes. There are also 23.50% and 12.00% respondents believe that they often and almost always using the zebra crossing. The minority pedestrian never using the zebra crossing with 1.00%. Then, the majority of respondents think they walk between one to five kilometers in a week, 45.00%, while 27.50% of respondents believe they walk less than one kilometer in a week. There are 15.50% of respondents think they walk five to ten kilometers weekly. 9.50% of respondents believe they walk more than ten kilometers weekly. The minority pedestrian does not walk in a week with 2.50%. After that, the majority of respondents think they walk between one to two times in a week, 45.00%, while 27.50% of respondents believe they walk less than one kilometer in a week. 15.50% of respondents think they walk five to ten kilometers

weekly. 9.50% of respondents believe they walk more than ten kilometers weekly. The minority pedestrian does not walk in a week with 2.50%. Last but not least, the majority of respondents does not have any accident history which is 86.00%, while 9.00% of respondents have one to two times of accident history. 3.00% of respondents have three to four times of accident history. 1.50 % of respondents have five to six times of accident history. The minority pedestrian has more than six times of accident history.

Table 3.2: Respondent Experience

Item	Frequency (n)	Percentage (%)
Frequency of the pedestrians using the pedestrian bridge		
Never	14	7.0
Rarely	101	50.5
Sometimes	52	26.0
Often	20	10.0
Almost always	13	6.5
Frequency of the pedestrians using the pedestrian Walkway		
Never	4	2.0
Rarely	64	32.0
Sometimes	58	29.0
Often	48	24.0
Almost always	26	13.0
Frequency of the pedestrians using the Zebra Crossing		
Never	2	1.0
Rarely	64	32.0
Sometimes	62	31.0

Often	48	24.0
Almost always	24	12.0
Kilometers of the Pedestrian Walk in a Week		
None	5	2.5
<1 kilometers	55	27.5
1 – 5 kilometers	90	15.5
5 – 10 kilometers	31	9.5
>10 kilometeres	19	3.5
Frequency of Pedestrian Walk to the destination in a week	45	22.5
None		
1 – 2 times	87	43.5
3 – 4 times	33	16.5
>5 times	35	17.5
Accident History as a Pedestrian in the Previous Five Years	172	86.0
None		
1 – 2 times	18	9.0
3 – 4 times	6	3.0
5 – 6 times	3	1.5
>6 times	1	0.5

3.3.2 CORRELATION ANALYSIS

The internal and external show small strength of association (r = 0.119, n = 200, p=0.092). There was a strong, positive correlation internal factors and intention to cross, which was statistically significant (r = 0.576, n = 200, p <0.001). There was also a strong, positive correlation internal factors and behaviors to cross, which was statistically significant (r = 0650, n = 200, p <0.001). The external factors show small strength of association with intention to cross. (r = 0.063, n = 200, p=0.373). External factors also show small strength of association with behaviors to cross (r = 0.005, n = 200, p=0.945). Table 3 shows the pearson

correlation analysis for variables.

Table 3.3: Pearson Correlation Analysis

	Internal	External	Intention	Behavior
Internal	1			
External	0.119	1		
Intention	0.576**	0.063	1	
Behavior	0.650**	0.005	0.679**	1

**. Correlation is significant at the 0.01 level (2-tailed)

3.3.3 REGRESSION ANALYSIS

The relationship between internal factors, external factors, intention, and behaviors was investigated using multiple regression analysis. A summary of R squares of 0.325 is shown in the Table 3.4, which represents a 33% change in the independent variable (Internal and External factors) on the dependent variable (intention to cross).

Table 3.4 R-Square of internal and external factors with intention

Model	R	R-Square	Adjusted R-Square	Std. Error
1	0.576	0.331	0.325	2.244

Predictors: Constant, External, Internal

The ANOVA table for regression is shown in the Table 3.5. The independent variables (internal and external factors) and the dependent variables are analyzed using ANOVA (intention to cross). The value of the mean square error (MSE), which was 5.037, is the variance of residuals (or mistakes). The F-statistic is equal to 245.847/5.037 = 48.81 when the Mean Square

(Regression) is divided by the Mean Square (Residual). The regression analysis revealed a significant association between the dependent variables (intention to cross) and the independent variables (p = 0.000b) (Internal and External factors).

Table 3.5 ANOVA for intention to cross

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	491.749	2	245.874	48.812	0.000
Residual	992.331	197			
Total	1484.080	199			

Dependent Variable: Intention

Table 3.6 shows a multiple regression analysis of the intention to cross with the internal and external factors. The β value of internal factors is 0.576 while the β value of external factors is -0.006. The independent variable of external factors has a strong relationship with the variable of intention to cross but the variable of internal factors is more dominant than the external factors.

Table 3.6 Multiple regression coefficients of intention to cross

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	1.853	0.506		3.659	0.001

3.4 CONCLUSION

This study successfully examined pedestrian violations using the Traffic Locus of Control (T-LOC) framework. Findings show that both internal and external factors significantly influence pedestrians' intentions and behaviours when crossing illegally. Using questionnaire data, the study achieved its first objective by identifying these contributing factors, and the second objective through respondents shared experiences. The T-LOC model

proved effective in explaining why pedestrians choose to violate crossing rules, highlighting those internal factors—such as personal attitudes and decision-making—play a stronger role than external factors like environment or traffic conditions. These results emphasize the need for targeted interventions addressing both psychological and situational influences. Strengthening awareness, improving pedestrian facilities, and promoting behavioural change are essential to reducing unsafe crossings. Overall, addressing these internal and external factors is crucial for enhancing pedestrian safety and reducing road-related risks.

BIBLIOGRAPHY

[1] Feng, Y., Duives, D., Daamen, W., & Hoogendoorn, S. (2021). Data collection methods for studying pedestrian behaviour: A systematic review. Building and Environment, 187, 107329.

[2] Kim, J. K., Ulfarsson, G. F., Shankar, V. N., & Kim, S. (2008). Age and pedestrian injury severity in motor-vehicle crashes: A heteroskedastic logit analysis. Accident Analysis & Prevention, 40(5), 1695-1702.

[3] World Health Organization. (2015). Global status report on road safety 2015. World Health Organization.

[4] Syazwan, S. M., Baba, M. D., Zarifah, H. N., Hafeez, A. A., & Faradila, P. N. (2017). Prevalence of distracted pedestrians while crossing: A study of Malaysia's situation. In MATEC Web of Conferences (Vol. 90, p. 01031). EDP Sciences.

[5] Mohd Syazwan, S., Baba, M. D., Aqbal, H. A., Azhar, H., Zulhadi, M., & Allyana, S. M. R. S. (2018). Revisiting pedestrian casualties in Malaysia and the escalating new threats. Malaysian Journal of Public Health Medicine, 18, 104110.

[6] Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological monographs: General and applied, 80(1), 1.

[7] Hennessy, D., & Porter, B. (2011). Chapter 12, Social, Personality and Affective Constructs in Driving. Handbook of Traffic Psychology.

[8] Keenan, A., & McBain, G. D. M. (1979). Effects of Type A behaviour, intolerance of ambiguity, and locus of control on the relationship between role stress and work- related outcomes. Journal of Occupational Psychology, 52(4), 277-285.

[9] Mental Health Branch. (2020, January 20). What is behavior? - Principles for effective support.

[10] Sarawak Government. (2020). The Official Portal of the Sarawak Government.
Sarawak.gov.my.

[11] Yamane, T. (1967). Statistics: An introductory analysis (No.

HA29 Y2 1967).
[12] Laerd Statistics. (2018). Pearson Product-Moment Correlation - When you should run this test, the range of values the coefficient can take and how to measure strength of association. Laerd.com.