

[LOG 8] THE RELATIONSHIP BETWEEN SAFETY, ENVIRONMENT AND INFRASTRUCTURE TOWARDS CYCLING CULTURE AMONG UNIVERSITI UTARA MALAYSIA STUDENTS

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ABSTRACT

Cycling is one of active transport which emphasis on developing environmental - friendly transportation which is suitable to keep the sustainability of environment. Moreover, cycling is very suitable for short trip especially in campus not only for going to lecture hall but also for leisure time activity. However, cycling in campus has not received well by students especially in Universiti Utara Malaysia. The aim of this study is to examine the relationship between safety, environment and infrastructure of cycling culture among students. The Reciprocal Determinism Model by Albert Bandura used in this study. This theory suggest behaviours that influenced by personal factor and social environment. The independent variable consist three elements which are safety, environment and infrastructure. In the other hand, the dependent variable is cycling culture. Data has been collected with 398 respondents participate in this research. The findings of the study are discussed and recommendations for cycling culture and future research have also been addressed. This study provides guidance to university stakeholders about the factors that should prioritize and deemed more likely to facilitate cycling among students.

Keywords: *active transport, environmental-friendly transportation, sustainability of environment, cycling culture*

INTRODUCTION

Cycling is one of the transport to commute for students who are living in the campus. It is also can reduce environmental pollution. Due to certain factors in Universiti Utara Malaysia (UUM) campus such as uncertain weather, lack of parking space, and high risk that exposure to road traffic accidents shows that students are discourage to cycle. Based on the situation in UUM campus, student more likely to ride their own motorized vehicles like car and motorcycle same goes to buses. This is because a university campus is the one of an area that all activities take place that involves students and university staff. Simplicity of transport of the region assumes a part in something that is critical for portability of the road users to set out from one place to other place (Nurdden et al., 2007). Besides, bicycle is something that can be owned and suitable for campus lifestyle (Bonham & Koth 2010). It is a good alternative in leading us for a more sustainable transportation system, reliable and environment friendly.

Students are not affectionate cycling in campus over factors for instance, the topography of the earth, the climate conditions and bicycle facilities which got less consideration (Moudun et al. 2005). To keep the sustainability of environment, cycling is better than driving because it emits carbon dioxide into the atmosphere. “A sustainable transportation system has been defined as one that satisfies current transport and mobility needs without compromising the ability of future and generation to meet their own” (Black. 1997 and Richardson, 1999).

In UUM, there are 16 student residential hall that support approximately 30 670 include undergraduate and postgraduate students inside. 14 students residential hall located inside the campus and 2 outside the campus (Bukit Kachi). Buses are provided in campus. In Universiti Utara Malaysia, the buses operate all road network in campus include student residential hall. This is the reason why students prefer to use private buses and private vehicles, especially for students who live in student residential hall in campus. High dependences on private vehicle subsequently cause a very bad effect on traffic and environment in the Universiti Utara Malaysia campus, such as traffic congestion, air pollution and accidents. The significant advantage of decreasing motorized vehicles usage in campus is for better future environment. For instance, reduction in the number of motorizes vehicles used means a decrease for parking area, so that the area can be planned for other facilities that are more useful (Shannon et al., 2006).

Active modes of transportation such as cycling represent potential means by which college can meet recommendation. Specifically, universities campuses have a unique environmental design that often discourages motorized transportation by relegating parking to the periphery and cultivating a dense network of destination that is easily navigable bicycle” (Balsas, 2003).

Universities have paid a great deal of attention to sustainability, yet they often disregard issues of transportation and land use (Norten et al., 2007). Most campuses have been designed as pedestrian campuses but are caught by a culture that encourage driving at every opportunity. Bicycle is one of the sustainable forms of transport, have a low consumption and bring health to their users. They are relatively fast over short distance, and provide a reliable and affordable form of transport for most sectors of the population (Lumsdon and Tolley, 2001).

In University Utara Malaysia however, the cycling culture is not well received due to several factors such as safety, environment and infrastructure. Students only tend to cycle for physical and leisure activities. “However, for the purpose of going to the class or perform daily routine, the students are interested in using motorized vehicles such as buses, cars, and motorcycle” (Wardman et al., 2007).

Research objective

The main objective of this research is to investigate that is it the variables influence to the cycling culture among university students. In detail, objective of this research is to examine the relationship between cycling culture towards safety, environment and infrastructure among UUM students.

LITERATURE REVIEW

Cycling culture

Cycling has impact to health, natural, transport, economic and social advantages (Bauman et al., 2008; Byrnes et al., 1999; Garrard et al., 2006) So as to support more people into cycling, especially for women. Unique consideration need to be paid to tend them to perspective of hazard associated with road safety (Bauman et al., 2008; Krizek et al., 2005; Garrard, et al., 2008; Garrard et al., 2012).

According to Dunn et al. (1999), cycling is active transport that friendly to environment form of transport which encompasses long distance journeys that can cover many urban and suburban trips. Active transports include cycling and walking that are more effectively for human being nowadays. Other than that, cycling is more cost effective highly than structured activities and vigorous (Sevick et al., 2000).

According to Landis et al. (2001) and Moritz (1998), there are lacks of cycling behaviour and environment correlates. Even there are promises that cycling is a travel mode and form of exercise, leisure and recreational but comprehensive understanding is still lacking. Previous study of transport that focused on quality of routes likes signalization, safety , traffic conditions, vehicles path design, also surface condition and environmental factors that associated to cycling.

Safety

As indicated by a review finished by the National Highway Traffic Safety Administration (2008), 88% of cyclists felt more undermined by drivers while out and about and 37% felt that uneven walkways and roadways were a danger to 38 individual safety. According to Pucher, Dill and Handy (2010) and Boelte (2010), sympathy toward security is regularly expressed as a huge boundary that influences driving propensities.

Various states, 12 urban zones, and school grounds over the United States stimulate a bicycle welcoming environment (Shinkle and Teigan, 2008). As demonstrated by the American Community Survey (US Census Bureau, 2010), from 2000 to 2008 bicycle driving extended 43%; regardless, under 1% (approximately 0.55%) utilize cycling as their otherworldly kind of transportation. Various urban ranges sometimes outperform 5%, in spite of the way that urban groups like Minneapolis once had a bicycle masses that made up more than 20% of its run of the mill downtown movement (Mapes, 2009).

In 2010, six fatalities and 167 injuries to cyclists were represented in the state of Alabama. Of these reported events, the greater part of wound and deaths jumped out at riders 16 years and more old. Among others, this age cluster consolidates understudies and the common workers, who may presumably use cycling as a sort of action and elective transportation (NHTSA, 2010).

A study from the Harvard School of Public Health investigated the use and danger of damage on bike particular trails against a bike path on the side of the road. Analysts noticed that physically separated cycle tracks are as more secure than in-road bicycle paths (Lusk et al., 2011). Separate cycling ways were used 2.5 times more than adjacent on-road bike paths and the relative danger of damage was 28% lower. Of these, the most secure cycle tracks were on avenues with minimal amount of motor vehicle

movement. This exploration examined a major limitation of expanded amounts of shared roads. One of these is the measure of parking that is consumed from the space with bicycle paths, bringing on more motor vehicles to use the bicycle path as a parking space (Lusk et al., 2011).

Environment

The type of landscape influences the shape of the built environment. For example, when a city is built in a hilly surrounding the city has slopes. (Heinen et al., 2010) argue that the presence of slopes have negative influences on cycling. At the other hand Titze et al. (2008) found that the presence of steep slopes had a positive influence on cycling for leisure purposes. Böcker et al. (2013) argue that landscape (slopes) have more impact than weather influences on cycling behavior. Although it is not clear if slopes have a significant influence on cycling experience, it has to do with the experience and the purpose of the cyclist.

Air pollution adversely influences the health of human population every year, particularly in regions that are thickly populated (WHO, 2006; COMEAP, 2010). While industry and business action contribute to the issue, road traffic also influences the amount of air contamination present (Caiazzo, Ashok, Waitz, Yim, and Barrett, 2013). Introduction to unhealthy air particles added to roughly 130,000 unexpected losses in 2005 (Fann et al., 2012) and 160,000 in 2012 (US EPA, 2011).

Individuals feel cycling with movement can put oneself in the method for air contamination and emissions from motor vehicles (Pucher & Dijkstra, 2003). However, research has demonstrated cycling can remove a person from the emissions of substantial movement, and the expanded number of trips by bike diminishes the quantity of motor vehicles on the roadway accordingly lessening the measure of discharges and air pollution from traffic (Rojas-Rueda, de Nazelle, Tainio & Nieuwenhuijsen, 2011). Furthermore, many individuals feel that cycling is neither helpful nor an appealing approach to drive from place to another place (Pucher & Dijkstra, 2003), as one may sweat or be exposed to common garbage, similar to dirt, puddles, or rain.

Infrastructure

Cycling infrastructure can be refers to the all equipment use by cyclists. Besides, for motor vehicle, they are not accessible for cycling ways. For example, cycling lanes, cycling paths, cycle track and cycling racks for park. Infrastructure impacts the air of cycling in different urban communities, both in and around college or universities. Infrastructure can either support or discourage the probability of cycling. Pucher, Dill, and Handy (2010) reported that proper and collected infrastructure would encourage an expansion in cycling. Much more, the expansion of bike infrastructure is "positively and significantly correlated with higher rates of bicycle commuting" (Dill & Carr, 2003). However, bicycle paths and ways alone did not increase the quantity of cyclists without availability to off-campus destination (Dill & Carr, 2003; Nelson & Allen, 1997).

There are different reasons that cyclists don't use bike ways and paths. For many, these reasons include poor development, weakening of paths, or lack of accommodation, implying that those arranging the infrastructure did not adequately plan bicycle routes (Pucher, Thorwaldson, Buehler & Klein, 2010; Taylor, Kingham & Koorey, 2009). Contend that rough terrain or separate paths increase the perception that cycling is

protected and more enjoyable. However, perceived fears should be considered when developing, planning, and implementing interventions and policies for better cycling environments.

Lacks of parking makes acute issues in densely populated areas that are not ready to give sufficient parking to the population (Arnott & Inci, 2006). When university authorities are not set up for population surges, small parking areas and transportation get to be troublesome to those that work, study, or live in the area (Balsas, 2003; Shang, Lin & Huang, 2007). This is because of population size and the outdated design of the universities. This is the situation of the University of Alabama, which was established in the mid-1800s.

Theoretical framework

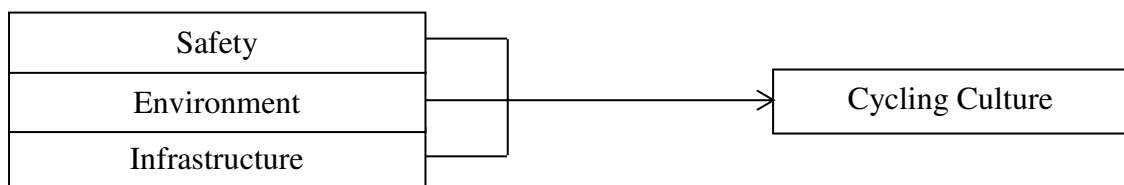


Figure 1
Research framework of cycling culture

From the theoretical framework of cycling culture toward safety, environment and infrastructure the hypotheses proposed in this study are:

- H1: There is a relationship between safety and cycling culture among UUM students.
- H2: There is a relationship between environment and cycling culture among UUM students.
- H3: There is a relationship between infrastructure and cycling culture among UUM students.

METHODOLOGY

This study is using quantitative method: questionnaire survey and this questionnaire was distributed to UUM students. Cross sectional study was conducted in this research to identify the factors that influence cycling culture among UUM students. The population of our study is focused on undergraduate students in UUM which is from ten (10) student residential halls located inside UUM main campus which is INASIS YAB, INASIS MUAMALAT, INASIS EON, INASIS SIME DARBY, INASIS MISC, INASIS PETRONAS, INASIS TM, INASIS TNB, INASIS MAS and INASIS BSN. Sampling size for this study decided to be 305 respondents based on the scientific guideline for sample size rules of thumb by Green 1991 cited in Tabachnick, B. G & Fidell L. S. (2014). The formula is $N \geq 50 + 8m$ (where m is the number of IVs) for testing the multiple correlation and $N \geq 104 + m$ for testing individual predictors.

DATA ANALYSES / FINDINGS

Demographic table

In our research study, 11 categories of demographic data were acquired from 305 respondents such as gender, age, year of study, college, programme and student residential hall. As shown in the Table 1, the ages among the respondents were between 19 to 27 years old. Respondents who were 22 years old hold the highest proportion of 25.2%. In term of gender, majority of the respondents were female which is 55.7% of total. The highest of respondents is from 4th year students with proportion 37.7%. The highest respondent is from student residential hall which is INASIS YAB with proportion 23.9% and the lowest is from INASIS TNB with proportion 1.0%. The primary mode of UUM bus shows the highest proportion with 66.6%. The respondents that have been used bicycle in campus which recorded 181 respondents with 59.3%. Respondents often to ride bicycle in campus is for exercise activities which recorded 180 respondents with proportion 59.0%, while the lowest is to attend class which recorded 9 respondents with proportion 3.0%.

Table 1
Distribution of the respondents

List	Item	Frequency	Percentage
Gender	Male	135	44.3
	Female	170	55.7
Age	19	25	8.2
	20	63	20.7
	21	48	15.7
	22	77	25.2
	23	68	22.3
	24	18	5.9
	25	4	1.3
	26	1	0.3
	27	1	0.3
Students	YAB	73	23.9
Residence Hall	MUAMALAT	33	10.8
	SIME DARBY	18	5.9
	PETRONAS	22	7.2
	TM	72	23.6
	MISC	48	15.7
	TNB	3	1.0
	MAS	18	5.9
	BSN	18	5.9
	Primary mode of transport	Walk	3
Bike		12	3.9
UUM Bus		203	66.6
Car		26	8.5
Carpool		5	1.6
Motorcycle		56	18.4

Cronbach's Alpha reliability

Table 2
Cronbach's alpha scores for variables

Variables	No. of Items	Cronbach's alpha
Cycling Culture	5	.710
Safety	7	.852
Environment	8	.813
Infrastructure	8	.851

Cronbach's Alpha reliability test is done to measure the reliability of each item in a same group. Although the standards for what makes a "good" α coefficient are entirely arbitrary and depend on theoretical knowledge of the scale in question, many methodologists recommend a minimum α coefficient between 0.65 and 0.8 (or higher in many cases) and α coefficients that are less than 0.5 are usually unacceptable (Chelsea Goforth, 2015).

Based on explanation given above, for the current research, the Cronbach's Alpha reliability is 0.852, 0.813 and 0.851 is considered acceptable.

Correlation

Table 3
Correlation result

	Safety	Environment	Infrastructure
Cycling culture	.158**	.086	.114*

** . Correlation is significant at the 0.01 level

* . Correlation is significant at the 0.05 level

Correlation analysis has been conducted between safety, environment and infrastructure and cycling culture. There are positive correlations between the two variables: Safety ($r = .158$, $p < 0.01$) and Infrastructure ($r = .114$, $p < 0.05$). The correlation is low. However, environment has been found not significant correlated with cycling culture.

Regression

Table 4
Regression result

	R ²	AR ²	F Change	Beta	t	Sig
Safety	.026	.017	2.730	.133	7.202	.000
Environment				.001	1.901	.058
Infrastructure				.047	.020	.984
					.693	.489

A simple linear regression has been conducted to predict cycling culture based on safety, environment, and infrastructure. A non-significant regression equation was found ($F(3, 301) = 2.730$, $p < .044$ with an R^2 of .026. All the independent variables were not significantly predicting cycling culture among UUM students.

DISCUSSION

The current study investigate the relationship of cycling culture towards safety, environment and infrastructure among UUM students. The result indicate that the safety, environment and infrastructure do not influence cycling culture among UUM students. This maybe because of several reasons. From this study, the normality test has been showed with normally based on histogram graph. However in the finding we has been found there are not significant between cycling culture with all independent variables which is safety, environment and infrastructure. First, 288 students often to used bicycle in campus and 123 do not ever cycling in campus. This is because, 260 or 65.0% used bus as a primary mode of transportation in campus. Others mode is motorcycles and cars, 21.0% and 8.3% respectively. This is the reason why students do not tend to cycle. However, respondents indicate that health and fitness is the popular reasons of cycling activities. 62.3% of collected data show that they tend to cycling for exercise and 26.5% for leisure activities. This is show that student consider cycling as health promotion. As a suggestion for the next research, researcher should focus only on respondents who cycling in campus and using qualitative research instead of quantitative.

Nonetheless, the information obtained from this level of analysis can be used to address barriers identified by students (cyclists and non-cyclists), which were of most concern. For example, both cyclists and non-cyclists mentioned they was concerned about the aggressive or distracted drivers while cycling. Moreover, approximately 18.5% of the cyclists they are strongly agree about they were at risk for being injured by a motor vehicle while cycling. Experiences with stolen bicycles might negatively influence cycling (Lawson, Pakrashi, Ghosh & Szeto, 2013). However, the study show 53.5% students agree about their bike will get stolen.

Environment factors, the study has been found the students mostly agree with 46.0% they afraid when they ride a bicycle, it would more than likely expose they to wet or windy weather. Also, the waether play a huge hole in their choice of mode of transport with proportation 49.0% agree with this statement. They also agree with the weather is not suitable in malaysia to cycle with proportation 46.8%.

For the infrastructure, these findings support previous research, which explains that facilities and infrastructure make cycling easier, more effective, and even attractive to the individual (Dill, 2004). The current study indicated inadequate there is nowhere to park bicycle (35.8%) agree, no facilities for locking or securing bicycle agree with (41.5%), there are inadequate cycle lanes or bike paths in that area neutral with (40.5%). Next, the bicycle parking areas are hard to use agree with (40.0%).

CONCLUSION

Non-motorized transport is the ideal modes for university campus, it is clean, inexpensive, maintain sustainability and space efficient. University like UUM that located in surrounded by green forest is very suitable to implement cycling culture among students to increase environmental friendly and fairly low cost. Moreover, the benefits from cycling are clearly perceived for a healthier life. To enlarge the number the beneficiaries it is needed to disseminate the benefits of cycling for a better life and

environment. However based on this research cycling among UUM students only for leisure and excersice purpose. Therefore, could not create cycling culture in UUM.

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