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The Influence of Cycling Device and Pro Environmental Awareness Towards Cycling in the Campus

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Abstract : The cycling culture in the university can be inculcated by understanding the obstacles and the influencing factors that could affect the students' interest in cycling. In this study, the data were collected through 7 days travel log survey together with a set of questionnaire. The objective of this study is to investigate the potential of cycling device to encourage cycling among students in the campus. Results from the survey showed that the students who were pro-environment would likely to support cycling culture and claimed that the cycling device had significantly affect their intention to cycle. This study also suggests that by improving the cycling facilities and inculcating cycling culture through policies and practices appear to inspire students to commute by bicycle.

Keywords: Cycling, Sustainable Transport, Pro – environmental behaviour, Cycling Device

1 INTRODUCTION

Cycling, also known as "active travel", is an easy way to integrate physical activity into daily life with many benefits for health. For individuals with sedentary behaviour, riding a bicycle could help to reduce the risk of heart disease, blood pressure, and the risk of overweight and obesity, and improve mental health (Frank et al., 2004). Cycling has been proved to be faster than other transport modes and it allows the cyclists to avoid traffic jams, especially in urban areas. Meanwhile, Dickinson et al. (2003) also claimed that cycling give benefits to environmental sustainability by improving the air quality with no direct emissions of pollutants especially carbon dioxide (CO_2).

Even though cycling has more advantages compared to other modes of transport, many individual still refuse to cycle. The reason for not cycling may vary depending on individuals, attitudinals, and built environment characteristics. The barriers include health reasons, lack of sufficient exercise or fitness, personal factors (too busy), lack of time, inconvenient, uncomfortable, and difficulties in trip chaining (Dickinson et al., 2003; Stinson and Bath, 2004). Therefore, information provided such as cycling device is intended to influence others' perception and behaviour change towards cycling activity.

Information has an important role in supporting and influencing the travel decisions of individuals. Lyons (2006) revealed that information such as CO_2 emissions, calories consumption, and other travel information serve a number of important roles by making the individual to aware of the travel options, assist in a plan making, undertake and successfully complete the travel option pursued. Furthermore, the concern over climate change, air pollution,

traffic congestion on the road network, and health lead the citizens to change the way of their travel. Travel information about transport-related attributes such as travel time, travel cost, and more recently, transport- related carbon emissions and calories consumption act as instrument that influence the changes in travel behaviour (Waygood and Avineri, 2011).

On the other side, emissions from motorized transportation has been declared as among the top three contributors to university's ecological footprint (Bonham and Koth, 2010). The analyses show that the extensive trends in using motorize vehicles in university campuses had increased the CO_2 emissions among the university's society. In addition, motorize vehicles were also reported to have a direct impact on individual's personal carbon footprint. The arising in CO_2 emissions from human activities specifically university's society was claimed to be one of the causes of accelerated global climate change (Caulfield and Brazil, 2011).

Factors such as increasing traffic congestion, lack of land for parking, pressures to reduce traffic's impact on surrounding neighbourhoods, and financial resources constraints had enlightened the universities to implement strategies to reduce the dependency on private vehicles and increase the use of alternative modes of transport amongst the university's students (Salmon et al., 2003. In 1990, the Tallories Declaration acknowledged that the universities were responsible in securing ecological, economical as well as social responsibility (Balsas, 2003). This is because university is a unique place to reduce the automobile dependency and is supposed to increase the active transportation. Encouraging cycling as mode for recreation and transportation is one of the underutilized strategies to increase physical activity among university's student. Therefore, the universities have to encourage a modal shift from motorize vehicles campus including private cars and motorcycles to other active transport such as cycling. Thus, this study is not only limited to address the perception towards the infrastructures but also to understand the students' knowledge about cycling and awareness to cycle. This study also tended to examine the effect of cycling devices information to perception and intention towards cycling activities.

2.LITERATURE REVIEW

Cycling is a transportation which is powered by human with zero pollution. It improves air quality, and is an ecologically friendly activity that brings no harm to the environment. Koth (2006) stated that cycling is a sustainable transport option. Individuals can contribute their role in combating the increasing greenhouse gas emissions by shifting their transportation mode to cycling in their everyday life. Nowadays, concern over the environmental pollution and road congestions has led to an interest in promoting cycling for utilitarian purposes, including commuting. On the other hand, the determinants for commuting by bicycle are influence by many factors. For instance, impact of individual socio-demographic factors, attitudes and perceptions, and built environment factors on the cycling behaviour (Heinen et al., 2010).

2.1 Socio-demographic characteristics

According to Schwanen and Mokhtarian (2005), Heinen et al. (2010), and Heinen et al. (2011), a decision to commute by bicycle is influenced by socio- demographic factors, built environment, and attitude and perception. Gender is one of an influencing socio-demographic factors. According to several researchers, men are more likely to cycle compared to women (Ryley,

2006; Dill and Voros, 2007). However, Witlox and Tindemans (2004) found that women are cycling more than men in an active population. Conversely, for non-working age groups, they also found that men cycle more. Garrard et al. (2008) reported that in countries such as Netherlands and Belgium, women shows significant number of cycling compared to men as these countries have high cycling rates, whereas in other countries with low cycling rates men seem to cycle more. However, only few researchers found that there is no significant different between men and women cycling behaviour (Witlox and Tindemans, 2004; de Geus, 2007; Wardman et al., 2007).

Age was also found as one of the influencing factors. For example, according to Lohmann and Rolle (2005), senior citizen sometimes are physically incapable to cycle, and this golden-age claimed age as a reason not to cycle. Meanwhile, Moudon et al. (2005), Zacharias (2005), and Dill and Voros (2007) reported that cycling level varies linearly with age. Besides, studies by U.S. Department of Transportation in National Survey of Pedestrian and Bicyclist Attitudes and Behaviour claimed that cycling rates are declining by age. However, several studies reported that age shows no significant factor in practising cycling culture (de Geus, 2007; Wardman et al., 2007; and Zacharias, 2005).

Next, socio-demographic variable is income. Handy and Xing, (2011) found that this two point are significantly cor0relates with bicycle commuting, but compromise in term of direction and lack in ef81fect size. Pucher and Buehler, (2006) highlighted that people with high income results in less cycling as an impact from the aggregate level. Individuals that having high income implies that one is able to spend more money on transport in general, including buying a car (Wiltox and Tindemans, 2004). In addition, Parkin et al. (2008) concluded that in England and Wales, there is a link between lower incomes and lower bicycles shares for commuting. This is due to economic disengagement that leads to crime, safe storage, bicycle availability, and image issues. In contrast, Stinson and Bhat (2005) and Dill and Voros (2007) found that there are positive connections which people who earn more will tend to cycle more often. The reason is having a higher income enables a person to spend money on a bicycle, which in turn growth the bicycle use. Furthermore, wealthy people usually pay greater attention to their health, and therefore cycle more. However, Dill and Carr (2003) and Zacharias (2005) claimed that there is no such relationship with income towards bicycling behaviour.

2.2 The built environment

Built environment affects a person's choice to commute by bicycle. The relationship between built environment characteristics, infrastructures, and commute cycling is complex. Built environment aspects such as high street network connectivity and density may encourage the use of bicycle (Southworth, 2005). The connectivity of the path network is determined by the presence by the degree of path continuity and absence of significant barriers. Increase in bicycle commuting are also associated with adequate cycling infrastructure or facility improvement (Buehler, 2012). These specific infrastructure or facility improvement includes bike lanes (a striped lane on a roadway) and paths separated from motor vehicle traffic.

On top of that, continuity of bicycle infrastructure is also vital, either separate lanes or marked sections on roads where a bicycle facility is presents throughout the route. The reason is because discontinuity of a route segment could deter some people from cycling. Stinson and Bhat (2005) found that improper end of a facility would lead to negative perceptions to cyclists. This seems to be more important for inexperienced than the experienced cyclist, and especially

transportation trip as opposed to recreational trips. Increase the bicycle paths has been found to result in a higher share of cycling (Barnes and Thompson, 2006). Besides, according to Dill and Voros (2007) individuals might tend to cycle more if there is bicycle paths, which is easy to reach and well connected to useful destinations.

2.3 Cycling in Universities

Transportation issue is the major concern that needs to be faced by any universities that are endeavoring towards sustainability in campus. Awasthi et al. (2011) states in their study that sustainable transportation is related with energy efficient vehicles. The term energy efficiency can be characterized as clean fuels like biodiesel, electricity, car-pooling, and park-and-ride (Lu and Pas, 2009). Limanond et al. (2011) encouraged the sustainable transport where bicycling was one of the major challenges that have been identified by the universities due to mobility of their population including students and staffs. Furthermore, the metropolitan location of University of South Australia lead to a growing number of university staff and students and business professionals that enhance the possibilities of active travel. As a result, a study undertaken there showed that the campus generates the highest carbon emissions and uses more energy to travel, more than twice of the other suburban campus (Allen, 2008).

The purpose of cycling in the campus is to promote campus sustainability towards ecological, economical, and institutional sustainability (Emanuel et al., 2011). Among universities in Australia and North America that have undertaken environmental audits and ecological footprint, analyses show that there were consistently poor ratings in the area of transport (Dawe et al., 2004). The top worst rank of those University's ecological footprints are taken from the private motorized automobile use and air travel. Therefore, Bonham and Koth, (2010) study suggested that universities can improve their environmental credential and introduction trading schemes incentive for such improvement in emission to promote cycling.

Other than that, a number of health benefits are specific to cycling. Since cycling is a low impact exercise, it creates less strain on and injury to joints and prevents further injury to the damages joints (Chorus et.al, 2006). This qualifies that by cycling its benefits for many other stages and kinds of injury. Additionally, a 150-pound cyclist burns approximately 410 calories when pedalling 12 miles an hour. Therefore, if bicycling were incorporated into daily routines and commute, the campus community would be healthier, save money, and decrease health care cost (Davis, 2010).

A case study at the University of California at Davis (UC Davis) is among the universities that are strongly advocates for campus cycling. UC Davis was awarded a Bicycle Friendly University (BFU) by the League of American Bicyclist in 2005. At this university, they have wide offerings of cycling facilities to encourage non- motorized transport. However, a case study done for staffs and students by Muhammad Fadzil (2015) at Engineering Campus, Universiti Sains Malaysia revealed that only 19.2% of the respondents commuted by cycling compared to 55.4% who commuted using motorized vehicles, particularly motorcycle and car. Therefore, to build enthusiasm for the cause, the universities should maintain wider streets, well-marked bike lanes, inviting pathways, abundant bike parking, and mutual respect between cyclist and motorists, which has encouraged the number of bikes per capita for the area (UC Davis, 2012)

2.4 Effect of information on reducing carbon footprint

Cycling is a simple and cost-effective way of reducing emissions. Therefore, nowadays, several cycling devices show information such as not only speed, travel distance, travel time but also and carbon offset. The purpose is to calculate the cyclists' carbon offset based on travel distance using bicycle in a particular day. A carbon offset is a reduction in emissions of carbon dioxide or greenhouse gases made to compensate for or to offset an emission made elsewhere (Sloan et al, 2013)

In addition, Lyons (2006) claimed that travel information such as calorie consumption and carbon offsets are important to educate individuals to be pro-environment person and making the individual to aware of the travel options available. This information is presented to people both as a service to users as means to change their behaviour to reduce output. Moreover, according to previous research, CO_2 emission information can be presented in scientific form (Brazil et al., 2013; Avineri and Waygood, 2011; Caulfield and Brazil, 2011). According to Avineri and Waygood (2011), in United Kingdom (UK), there are many ways to present information regarding transport- and travel-related carbon emission which is through online journey planning or carbon calculator in terms of mass.

Rose and Ampt (2001) through Travel Blending in Australia and Taniguchi et al. (2003) throughTravel Feedback Program in Japan were examples of travel programs that gives feedback to participant in the form of mass of CO_2 emissions produced including other various aspects of their travel. The objectives of these programs were to raise the awareness on the issues in changing travel behaviour and reduce motorized vehicle emission. Participants were provided with information that are most likely related to their travel behaviour rather that expecting individuals to seek for their travel information. This study shows that 95% of the participants wanted and agreed on transport device while 15% of regular car use reported that they had changed their travel patterns.

Moreover, when dealing with car purchase and route choice, experiment examined by Garrard et al. (2006) showed that involving CO_2 information in the vehicles able to change the travel decision that leads to more sustainable travel. Meanwhile, Chorus et al. (2006) concluded that "Information provision on the performance of the currently chosen alternatives… may help change car-drivers' choices in the long run." As highlighted, the review found that the ex-post information are particularly valuable in altering subsequent trips.

Although there are plenty of researches and programs that expose users to CO_2 emission information. Coulter et al. (2007) found that many cyclists might not fully understand and familiar with the outputs when it were presented as mass. His study figured out that different ways of information may polay varying "effectiveness" to the individuals. For example, the "earth" format was easily understood with simple and clear advice on how to reduce output compared to CO_2 information that presented in mass.

3.0 METHODOLOGY

In order to achieve the objectives of the study, 100 cyclists in the campus were recruited in a cycling program through advertisements posted in the social media and fliers. It was 20% of the cycling population in the campus. The objective of the program was to reduce the carbon footprint and promote healthy lifestyle among the students. The recruited students who agreed to participate in the program were asked to use cycling device for seven days, recorded their

cycling activities in seven days' travel log and answered a questionnaire survey. As a token of appreciation, the students were given souvenirs and extra-curriculum point from the organizer. At the beginning of the program, a briefing and group discussion session were conducted to explain the objectives of the program. The session was also used to acknowledge several information needed to design the questionnaire survey. Selected answers for the questionnaire design were constructed based on the group discussion.

After attending the briefing session, the participants were instructed on how to install and use the cycling devices. Figure 1 shows the cycling device that was used in this study. Several information such as trip distance, average cycling speed, maximum cycling speed, calorie consumption, carbon offset, and total distance travelled can be gained from the device. Each student was provided with a travel log to record the information from the devices, start time, end time of cycling, and destination of cycling for every bicycle trip that they had made during the 7-day program. The respondents were also required to provide other information such as their name, age, and gender.

Figure 1. Example of information from the Cateye Cycling device

On the seventh day, the respondents were asked to return the device to the organizer and were required to answer a questionnaire survey. The questionnaire consisted of questions regarding the frequency of cycling per week, reasons to choose bicycle as a transportation mode in the campus, the problems they faced while cycling in the campus, perception towards others' reluctancy to use bicycles, and suggestions to improve bicycle culture in the campus. There was also a question to investigate the pro-environmental level of the students. The questions used in the questionnaire survey are represented in Table 1.

Table 1. The questions and answers in the questionnaire form

Questions	Choice of Answer
How frequent do you cycling in the campus?	1. Once a week 2. Twice a week 3. Five days a week 4. Every day including weekends
Why do you choose to cycle in the campus?	1. Adequate travel distance to cycle 2. Save cost 3. Health concern 4. Environment concern 5. I like cycling 6. Do not have a choice
What is the main problem that you face while cycling in the campus?	1. Unpleasant bicycle facilities 2. Weather (Hot, heavy rain, etc.) 3. Limited bicycle parking spaces 4. Accident risk with motor vehicles
In your opinion, what is the reason for other students to not cycle in the campus	1. Insufficient facilities 2. Insufficient time to cycling activity 3. Lack of fitness 4. Minimum bicycle parking space 5. Accident risk 6. Unpleasant weather 7. Affordable to own motor vehicle
In your opinion, which is the best action to encourage students to cycle in the campus?	1. Improve cycling facilities 2. Promote bicycle education program 3. Provide adequate and varied bicycle parking facilities 4. Encourage cycling culture through policies and practices
Which of the following device that is most likely affecting you • Trip distance • Average Speed • Maximum Speed • Calorie consumption • CO_2 offset • Travel distance	1. Strongly no influence 2. No Influence 3. Influence 4. Strongly influence
Which of the following statement described you	1. I am not worry about climate change. 2. I am worry about climate change, but I don't know what to change. 3. I am worry about climate change and I am planning to reduce my impacts. 4. I have made changes in the last year to reduce my impact.

After completing the program, all data from both travel logs and questionnaires were processed in Statistical Product and Service Solutions (SPSS). The data were analyzed for descriptive analyses and ordinal regression analysis. The ordinal regression analysis was carried out to investigate the affecting factors on students' perception towards cycling device information. In this study, the dependent variables was the students' perception towards the information on the cycling devices. *(Answer scale : 1= strongly not influence, 2= not influence, 3 = influence, 4=strongly influence).* Meanwhile, the independent variables were age, gender, cycling frequency, data from the seven days' travel log, and pro-environmental level. For pro-environmental level, the coding for answers was based on the level of awareness, *1 = I am not about climate change, 2 = I am worry about climate change, but I don't know what to change, 3 = I am worry about climate change and I am planning to reduce my impacts, 4 = I have made changes in the last year to reduce my impact.* Meanwhile, for gender, the coding was 1 for female and 2 for male. The general equation for ordinal regression is as follows.

$$\ln\left(\frac{prob\ (event)}{\left(1 - prob\ (event)\right)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k \quad (1)$$

where,

event = Dependent variables (Students' perception towards cycling device)

β_0 = Constant number

$\beta_{1,2,..n}$ = Estimated parameters

$X_{1,\,2,..n}$ = Independent variables (Age, gender, , cycling frequency, data from the seven days' travel log, and pro-environmental level)

5 RESULTS

5.1 Descriptive analysis of the respondents

This section discussed the results obtained in this study. The sample for this study represents the 20% of cycling population in the campus, including 18 cyclists who also owned a motorcycle. Respondents were 52 % female and 48% male. The age distribution is fairly normal with more than half (52%) of the total respondents were 20 years old.

In terms of cycling frequency, the distribution analysis is shown in Figure 1. Most the respondents (49%) reported that they use a bicycle for daily activities. It is followed by 26% respondents who cycling five days a week, 17% twice a week (during weekends), and 8% of respondents claimed to cycle only once a week. Figure 2 shows the reasons of cycling in the campus. Most of the students (33%) claimed that adequate travel distance between locations in the campus was the main reason for them to cycling. It is followed by 29% of them who agreed that cycling could save their transportation cost; 12% of them claimed that their likelihood to cycle as their main reason, 9.39% claimed for health concern and 9% ranked the environmental concern, respectively. However, there were 8% of the respondents claimed that they cycling because they didn't have a choice.

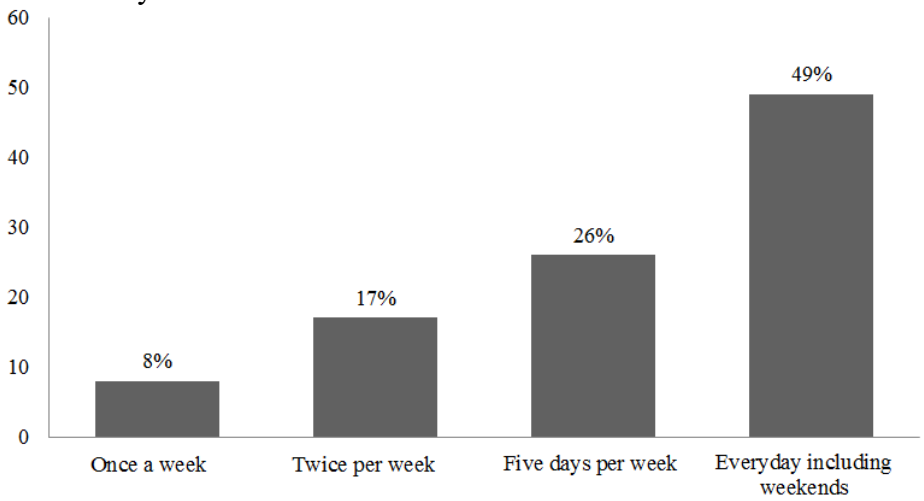

Figure 1. Frequency of cycling in the campus among the students

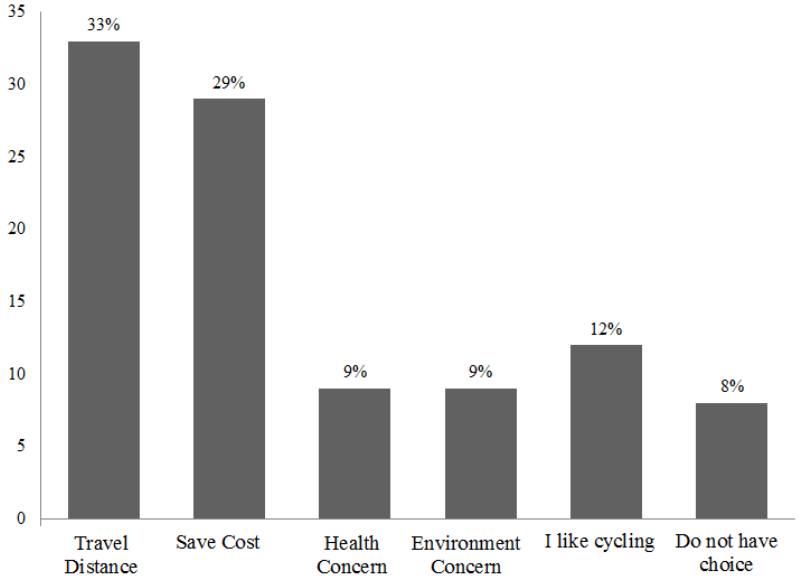

Figure 2. Students' reasons to cycle in the campus

Figure 3 and Figure 4 show the results on the problems faced when using bicycles for commuting, and opinion on why other students refused to cycle in the campus. Most of the students (43%) reported that the most dominant problems when cycling in the campus was the

weather, either heavy rain or too hot to cycle. It is followed by the limited bicycle parking spaces (24%), unpleasant bicycle facilities (20%), and accident risk with motor vehicles (13%).

In terms of the opinion for reasons of why other students are deterrents to cycle in campus, 31% of the students claimed that their friends were able to drive/have their own private motorized vehicles. Meanwhile, 16% criticized on the limited parking spaces, weather (16%), and insufficient facilities (13%), respectively. This shows that the lack of appropriate facilities such as parking, covered bicycle lane, and other facilities play major roles as a hindrance towards bicycling activity in the campus. Other factors such as accident risk with motor vehicles (9%), students' fitness (9%), and insufficient time to cycle (6%) were also reported.

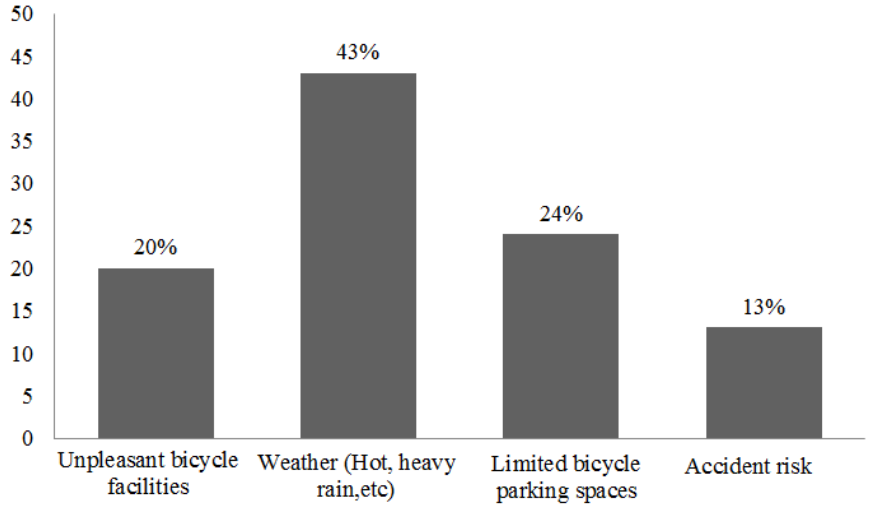

Figure 3. Problems faced during cycling in the campus

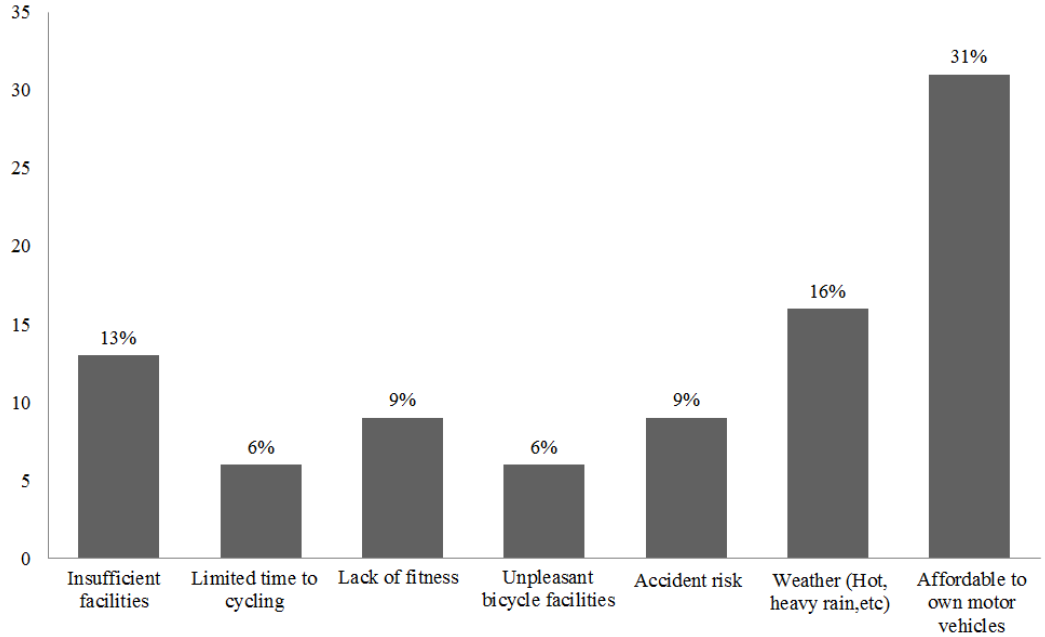

Figure 4. Respondents' perception towards other students' reluctancy to cycle in the campus

The students were also asked to give their suggestions in open ended answers to improve the cycling facilities on campus (refer to Figure 5). The qualitative answers were grouped into several important keywords. Therefore, the finding shows that 66.3%, (N = 57) of the respondents from the total respondents suggested that the university should provide adequate and proper bicycle parking facilities for students in this campus. It is followed by the need to improve the cycling facilities such as bicycle path (59.3%, N= 51), encourage the cycling culture through policies and practices with (51.2%, N=44), and encourage cycling activities and programmes (19.8%, N=17)

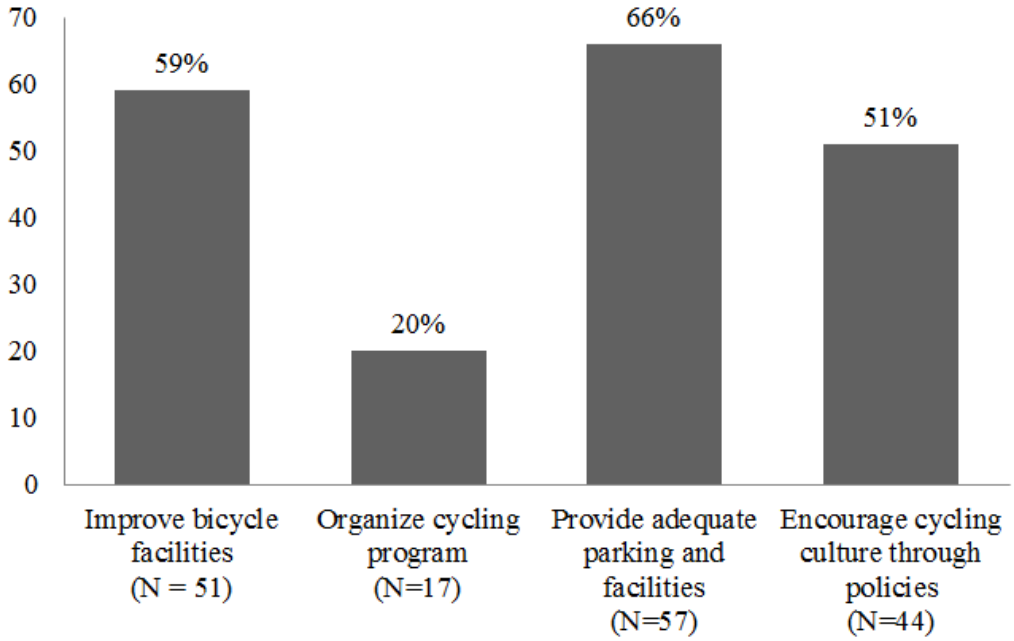

Figure 5. Respondents' suggestions for cycling culture improvement in the campus

Table 2. The influence of cycling device on respondents' cycling behaviour

Does the information in the device influence your cycling behavior?	**Strongly not influence (%)**	**No influence (%)**	**Influence (%)**	**Strongly influence (%)**
Travel Time	12.8	12.8	39.5	34.9
Trip distance	10.5	18.6	41.9	29.1
Speed	11.6	17.4	33.7	37.2
Calorie Consumption	20.9	23.3	33.7	22.1
Carbon offset	18.6	41.9	19.8	19.8

Total distance	24.4	12.8	30.2	32.6

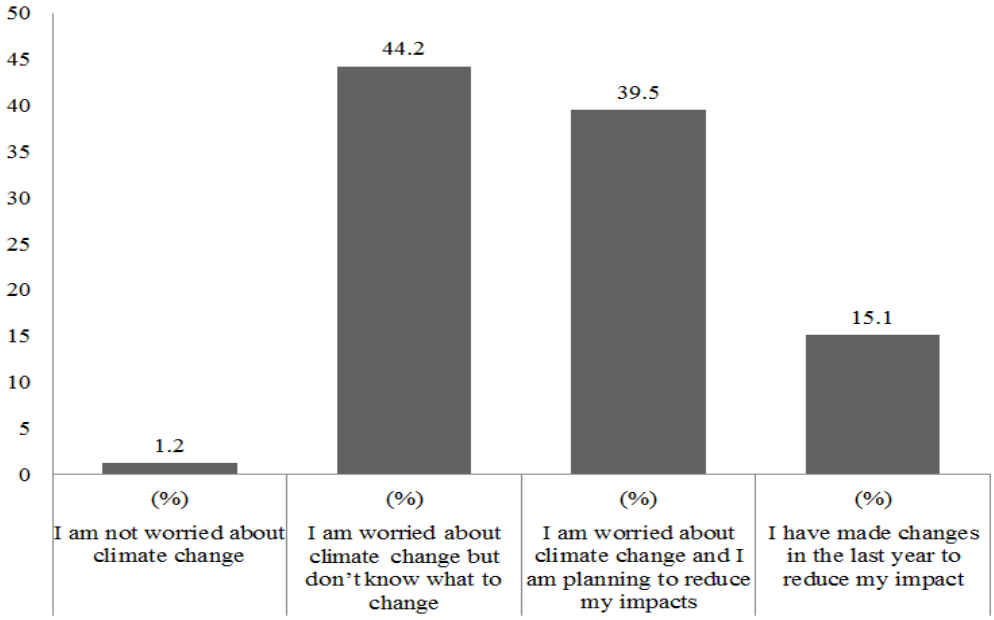

Figure 6. Pro-environmental awareness among the respondents

On the other hand, Table 2 shows that most of the information from the cycling devices was claimed to have high percentages of the answers such as *influence* and *strongly influence*: travel distance (39.6%), average speed (41.9%), maximum speed (33.7%), calorie consumption (33.7%), and total distance (32.6%), except for the carbon offset. A total of 42% of the respondents claimed that carbon offset didn't influence their cycling behaviour. Meanwhile, in terms of pro-environmental awareness, the results are represented at Figure 6. Majority of the students (44%) claimed that they were worried about climate change, but don't know what to change, 39% worried about climate change and planning to change their lifestyles or travel behaviours, 15% believed that they had already made a change, while 1% did not worry about the effect.

5.2 Statistical Analysis

The statistical analysis was also carried out to examine the influence of the information from the cycling devices to the students' cycling behavior. Total data from the cycling devices such astravel distance, average speed, maximum speed, calorie consumption, carbon offset, and total distance were obtained from the 7-day travel diary.

Table 4.7 shows the results from the ordinal regression analyses. The results show that the travel time, carbon offset, and pro-environmental level were significantly affecting the students' perception towards the effectiveness of trip distance information on the cycling device. The negative result indicates that the students with high results on travel time and carbon offset claimed that the trip distance information was not really influence their cycling behaviour. However, the students with high pro-environmental level agreed that the trip distance information did influence their cycling behaviour.

Table 3.The results from ordinal regression.

Information from cycling device	Sig. Parameter	Estimate	p- value	Pseudo R-Square
Trip distance	Travel time Carbon offset Pro-Environment Level	-13.121 -1.638 2.23	0.016 0.054 0.000	Cox and Shell =0.477 Nagelkerke=0.519 McFadden=0.257
Average speed	Travel time Average speed Carbon offset Cycling frequency Pro-Environment Level	-14.00 0.214 -1.583 -0.834 1.870	0.008 0.056 0.042 0.001 0.000	Cox and Shell =0.506 Nagelkerke=0.549 McFadden=0.227
Maximum speed	Travel time Carbon offset Travel distance Age Gender Pro-Environment Level	12.642 -1.793 0.215 0.605 1.13 1.981	0.018 0.041 0.070 0.040 0.032 0.000	Cox and Shell =0.472 Nagelkerke=0.510 McFadden=0.247
Calorie consumption	Age Gender Pro-environmental level	-1.243 -0.02 0.847	0.000 0.047 0.010	Cox and Shell =0.372 Nagelkerke=0.400 McFadden=0.171
Carbon offset	Gender Cycling frequency Pro-environmental level	-2.659 1.171 1.305	0.000 0.047 0.000	Cox and Shell =0.438 Nagelkerke=0.472 McFadden=0.218
Total distance	Pro-environmental level	1.534	0.000	Cox and Shell =0.325 Nagelkerke=0.349 McFadden=0.147

The data of travel time, average speed, carbon offset, cycling frequency, and pro-environmental level were also significantly affecting the students' perception towards the average speed's information. The results indicate that the students with less travel time and lower value of carbon offset would likely to perceive that average speed information did not affect their cycling behavior. However, the students with high average speed data would likely to claim that speed information on the device was relevant. Similarly, the students with higher

environmental concern would likely to perceive that the information regarding average speed was important

Travel time, carbon offset, travel distance, age, gender, and pro-environmental level significantly influence the perception towards maximum speed information on the device. All variables have positive coefficients except daily carbon offset. The results indicate that the students with less production of daily carbon offset would likely to perceive that maximum speed information influences their cycling behavior. However, for the students who have higher travel time, travel distance, male and senior students were more likely to claim that the maximum speed information in the cycling device motivates their cycling behaviour. Similarly, the students who claimed that they had higher pro-environmental awareness would likely to appreciate the information.

Next, the students' age, gender and pro-environmental level were significantly influenced the perception of calorie consumption information. Younger and female students would likely to perceive that this information is important. Besides, the students who more pro-environment appreciated the information regarding the calorie consumption on the device.

Moreover, the results for perception towards carbon offset information shows that female, more frequent cycling and high level of pro-environment were likely to claim that the carbon offset information was significantly influencing the cycling behavior. This indicates that female students would likely to be more acknowledged on the purpose of carbon offset information compared to male students. Similarly, for the students who frequently cycling and had high levels of pro-environment we more appreciate on the carbon offset information.

Total distance refers to the cumulative trip distance in each trip. The results show that the total distance information were strongly influenced the students with high level of pro-environmental awareness. The other determinants were found as not significantly influencing.

5.DISCUSSION

The purposes of this study are to understand the reasons to cycling and not to cycling in the campus, and to investigate the effectiveness of information on the cycling devices as a motivation for the cycling activities. The findings provide several important insights. First, the dominant deterrents to cycling activities in the campus are the unpleasant weather. The unpleasant weather is representing the hot, humid, and heavy rain that will affect the perceived risk towards cycling activity. This is similar to the results in Bangalore, India (Verma et, 2016) and Singapore City (Meng et al, 2016) where most of the cyclists claimed that weather is the main factor for the discomfort during cycling. However, for this study, the experiment was held during the height of El Nino on tropical regions. Thus, the impacts of the weather may be more exaggerated than the actual case. However, this factor also related to the inadequate cycling infrastructures in the campus. It is agreed that to construct covered cycling paths in the campus are costly and not practical, but it is possible to improve the built environment and landscape in the campus with suitable trees that could shade the paths and cool the campus areas.

In addition, the respondents in this study assume that the permission to drive their own private motorized vehicle would likely to be one of the factors for other students to not cycling in the campus. It is similar to the condition in Bandung Institute of Technology

(Belgiawan et al, 2016), an American University of Beirut (Danaf et al, 2014) where when the students were allowed to drive their own cars or motorcycles in the campus, their likelihood to use motor vehicle were higher than to practice the active mode. On the other hand, the respondents also suggest to increase the cycling culture in the campus through policies and campaigns. It is agreed that providing the adequate infrastructure is one important factor. Policies and campaigns could increase the awareness towards the benefits of cycling, not only for the individual's health but also for the campus environment. For example, the university should endorse a cycling campaign that also includes the long term behavioural change towards cycling in the campus (Utter and Lovelace,2016). The campaign should also include the whole community of the university including the staffs in order to gain a better outcome.

In terms of the effect of cycling devices, the findings show that the information from the cycling device were claimed as useful for the cyclists. Interestingly,the male students would likely to appreciate the information on speed while the female students were more likely to value the information regarding calorie consumption. This might represent the difference in attitudes and interests between both genders. However, most of the respondents claimed that the carbon offset information had no influence to their cycling behaviour. There are two possibilities regarding this issue. First, it shows that the students have less interest and awareness of the information regarding carbon pollution effects to the environment. Second, they were not familiar or did not understand the meaning and purpose of the carbon offset information. In this study, it is assumed that the respondents were categorized for the second reason.

This is because the findings from the ordinal regressions show that pro-environment level significantly affecting all perceptions towards the information on the cycling device including the carbon offset infromation. It shows that the students with high pro-environmental level would likely to appreciate the information from the device. However, the findings also reveal that most of the respondents were actually concerned about the environment but didn't know what to do to be pro-environment. Therefore, it is suggested that there should be more education and awareness of behaviour change for the university community, including on changing the travel behaviour in more sustainable ways such as cycling and walking. Besides, the terms such as carbon footprint, carbon offset, and carbon calculator should be emphasized in the campaigns and policies.

7. CONCLUSION

From the results obtained, it can be concluded that the interest to cycle in the campus might be discouraged by the lack of the cycling infrastructures including the built environment of the campus. However, most important findings is that the students were likely to have a concern towards the environment and climate change problem, but do not confident that cycling could give effect on the environment.

Nowadays, the existence of cyclic device that could give information about the carbon offset is a praiseworthy effort to promote green transportation. However, awareness or knowledge is needed in order to appreciate and value such information. The findings for this study might be different if the respondents were more familiar with the information on the devices. For example, if the respondents understand that the carbon offset is the reduced value

of carbon emission that formed from cycling, maybe they would likely understand that cycling has effects towards the environment.

Furthermore, it is the time for the university to be more concerned on the sustainable transport in the campus. Instead of strategizing the sustainability and provide a better built environment for the students, policies and campaigns on active mode would likely to reduce the carbon emission from transportation and increase the health and aptitude level of the community in the university.

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