

## Preference of University Students towards Cycling in Campus

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**Abstract:** Students have the potential for cycling, doing activities in and around campus. Nonetheless, bicycling is facing challenges that may reduce its attractiveness as compared to motorized modes. Weather, aggressive car driver, lack of cycling infrastructure, culture and social norm are some of the typical constraints that would discourage cycling in campus. All of these constraints should be considered in order to encourage students in university campus to cycle. However, a lot of factors can encourage students to cycling, such as the limitation of bus route, travel time, cost and individual physical condition. This paper presents the results and analysis on cycling preference as a possible transport mode in campus with the University of Malaya in Kuala Lumpur, Malaysia as a case study.

**Key words:** *bicycle, cycling, transport mode.*

### 1. INTRODUCTION

A university campus would usually be an area where all the activities take place involving students and university staffs. Generally, a university campus in Malaysia usually contains lecture rooms, laboratories, clinic, banks, offices, cafeterias, retail outlets, residential college and sports facilities. Therefore, traffic movements within campus mainly involve students and staff, as well as external visitors and contractors occasionally attending functions, meetings or any events.

In University of Malaya, there are 12 residential colleges in campus which support more than 10,000 students out of 25,000 undergraduate and postgraduate students. Currently, students staying in campus use motorcycles, cars and campus buses to move around in campus. Only a small number of students walk by foot and a much smaller number who cycles around campus. Two types of buses are available in campus, one is the public bus operated by Rapid KL which goes to the city and the other is the university bus which goes around only within the campus.

The public bus fare is RM 1 (about USD\$ 0.30) with average frequency of one in every 30 minutes. The university bus is free of charge, but frequency is very low, thus students have to wait for long time to take the bus.

### **1.1 Dependence on private vehicles**

In University of Malaya, the buses do not cover all roads in the campus network. This is one of the reasons why students prefer to use private vehicles, especially for students who live in residential colleges. High dependence on private vehicles subsequently causes a very bad effect on traffic and environment in the University of Malaya campus, such as traffic congestion, air pollution and accidents (Karim, 1992).

Through university pro-active educational milieu, college campuses are privileged places to communicate sustainability and to help reshape society's transportation patterns (Balsas, 2003). Balsas also argue that university campuses can constitute a laboratory for testing and implementing various alternative transportation strategies, reducing infrastructure costs and minimizing their impacts on surrounding areas.

The significant benefit of reducing car usage in campus is for better future environment. For example, reduction in the number of cars 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).

### **1.2 Cycling for doing activities in campus**

Bicycle is one of the most sustainable forms of transport. Bicycle has no fuel consumption and brings good health to their users and others as well since it does not produce harmful smoke (Gatersleben et al, 2007). Besides, Gatersleben et al (2010) also states regular bicycle users also gain benefit of low cost of travel.

Gatersleben et al (2010) argue that there are four types of bicyclists on English roads: (1) responsible bicyclists who use a bicycle safely and responsibly; (2) lifestyle bicyclists which are keen bicyclists who spend time and money on bicycling; (3) commuters consists of professionals who use the bicycle to commute to work in all kinds of weather; (4) hippy-go-lucky bicyclists who use their bicycle for their everyday life activities.

In fact, there are bicyclists in University of Malaya, but the number is very small. Several discouraging factors affect students to avoid using bicycle in campus. These factors include aggressive car driver, bicycle availability, land topography and lack of cycling facilities. When asked about the reason people are unlikely to use a bicycle, they often refer to traffic safety, heavy traffic, inconsiderate drivers, pollution, bad weather, distance and travel time, gradient, not being fit enough and social pressure (Bannister, 1988; Davies, Gray, Gardner, & Harland, 2001; Gatersleben & Appleton, 2007; Kingham, Dickenson, & Copesey, 2001; McClintock & Clearly, 1996; Newby, 1993; Wardman, Hatfield, & Page, 1997).

On the other hand, students have high potential for cycling and a lot of factors can encourage them to cycle. Students are usually more environmentally conscious and receptive to new ideas. Those who are physically fit have restricted budgets, live close to campus and already own a bicycle can easily be attracted to start cycling in campus (Balsas, 2003). Certainly, environmental concerns, limited budget and their dynamic activities among youth can encourage student to cycle

in campus. Shannon et al (2006) argue that it is not hard to encourage student for cycling as a lot of factors could trigger the process, such as limited car parking permit for undergraduate students. The key factors that can motivate them are health, affordability, environmental concerns, time and pleasure (Bonham et al, 2010). Garrard et al (2006) also gave similar statement that motivators for cycling include physical and mental health, fitness, sustainability and affordability, in line with Cavil et al (2007).

### 1.3 Effect of weather on Cycling

Malaysia is a tropical country which only has two seasons throughout the year, rainy and dry seasons. The weather condition is different with the countries that have four seasons (spring, autumn, winter and summer). Nankervis argued that generally, there are three important elements of weather to be considered: wind, rain and temperature.

In four season countries, the number of bicycle riders will be decreased during winter season due to its extremely low temperature (Nankervis, 1998; Bergstrom et al, 2003). The same situation also happens in tropical country during rainy season. The number of cyclists will be decreasing at that time because people will choose not to cycle in rainy day. However, there is no huge temperature difference in tropical country, with the temperature commonly range between 22°C to 33°C. The authors tend to disagree with the typical perception saying hot temperature in tropical country will hinder people from using bicycle.

## 2. MATERIAL AND METHODOLOGY

In this study, data are collected from e-survey through a generated link with internet user community in the University of Malaya. The target respondents were students of University of Malaya who live inside campus. The contents of questionnaires were mainly about socioeconomic characteristics, trip characteristics of traveling to and within the University of Malaya, factors that become obstacles for them to cycle in campus.

## 3. RESULT AND DISCUSSION

Based on Table 1, the most widely used transportation mode by students from residential colleges to classes is motorcycle (42.5%), followed by car (29.0 %) and public transport (10.9 %).

Table 1 : Transport modes from residential college to classes

Transportation mode	Percentage
Motorcycle	42.5%
Car	29.0%
Walking	15.9%
Public Transport	10.9%
Cycling	1.7%

Most faculties act as centre of activities in University Malaya, and the mobility is covered by public bus and University bus. However, the route from residential colleges as the origin is only

covered by University bus which serves long time headway. This explains the high dependence of motorcycle and car among students who live in residential colleges compared to using public transport. Students also prefer walking (15.9 %) than using public transport if the distance to the destinations is not very far.

Concern then arises as the high dependence of motorcycle and private car (71.5%) will cause a few bad consequences, such as traffic congestion, air pollution and parking availability. Other than traffic congestion effects, parking availability become one of the current main problem in University of Malaya. Shoup (1997) and Dober (2000) argued that the major problem with automobile is the amount of parking it requires. In college campuses parking is a common problem with different slants (Balsas, 2003). Keniry (1995) also state that a university is a group of administrators, faculty and students held together by a common grievance over parking.

The current system in University of Malaya is implementing restriction of car usage among undergraduate students and parking management program which only allow specific registered vehicles to park. However, there are still many cases of limited parking availability among students and staffs especially in faculties. Therefore the authors suggest that the university will develop cycling environment and facilities in order to cope with these problems. In line with Brown et al (2001) who state that bicycles increase student's access to housing and employment, reduces the cost of attending college, and increases transportation equity.

Table 2 : Most frequent transport mode among students in campus

Mode from residential college to classes	Transport mode for activities in campus				
	car	motor	walking	cycling	public transport
Motorcycle	-	56%	25%	-	19%
Car	43%	-	57%	-	-
Public transport	-	-	25%	-	75%
Walking	-	29%	71%	-	-
Cycling	-	33%	67%	-	-

A survey was conducted to study the origin-destination activities in campus. The destination of the trip is the most frequently visited places among students which are the Sport Center, the Perdana Siswa, IPS, Student Clinic (Residential College 12), University of Malaya Central Library, mosque and Chancellery. The origin is taken from selected faculties in University of Malaya which are Faculty of Engineering, Medical, Science, Accounts and Islamic Studies. The distance from origin to destination is calculated based on the path traversed by car or motorcycle. The nearest distance from origin to destination is 265.2 meters (Table 3), from Engineering Faculty to Main Library. The farthest distance is 3,187.5 meters, from Islamic studies to DTC and Chancellery. Based on the distances calculated, all of Origin-Destination has potential for cycling.

Table 3 : Travel distance matrix (m)

Origin/ destination	Sport Center	Perdana Siswa	IPS	Student's Clinic (College 12)	UM Main Library	Mosque	DTC & Chancellery
<b>Engineering</b>	1805.6	501.2	1386.6	1386.6	265.2	1428.6	572.2
<b>Account</b>	2039.9	735.5	1620.9	1620.9	499.5	1662.9	806.5
<b>Science</b>	1356.0	286.0	987.0	987.0	296.0	1213.4	487.0
<b>Islamic</b>	629.7	3116.5	881.6	881.6	2880.5	1979.7	3187.5
<b>Medical</b>	2566.3	1261.9	2147.3	2147.3	1025.9	2189.3	1332.9

Table 4 shows the most visited destination by the student in student activities is Perdana Siswa Complex, followed by Main Library and Sports Center.

Table 4 : Most frequented destinations in campus

Origin/destination	Sport Center	Perdana Siswa	IPS	Student's Clinic (College 12)	UM Main Library	Mosque	DTC & Chancellery
Engineering	10.9%	41.2%	7.7%	7.6%	17.9%	6.3%	8.2%
Account	11.6%	41.9%	2.3%	2.3%	32.6%	2.3%	7.0%
Science	35.6%	24.4%	11.1%	2.2%	22.2%	2.2%	2.2%

Table 5 : Cycling experience

Have ever cycled before?	Percentage	The last time one cycled?	Percentage
Yes	94%	yesterday	3%
No	6%	few days ago	0%
		few weeks ago	13%
		Few months ago	84%

Obviously, bicycle is not a new mode of transportation for students. 94% of student said that they had experience in cycling, although 84% of them stated that they had used bicycle the last time few months ago (Table 5). Many factors are taken into consideration by the students in making the bicycle as a mode of transportation. Some of them are time, cost, safety, comfort, and the environment. However, there are those who think that bicycles are not transportation mode, but are only used for recreation purpose, workout, or just for kids to play.

The survey results show positive response in Table 6 where 86.9% of the students said they would use the bicycle if they are provided with bicycle facilities on campus. The most frequent reason of students who will use a bicycle if there are bicycle facilities is because of health, followed by the environment and shorter travel time. While the others also consider temperature, cost, fun and parking availability (Table 7). From Table 8 it is interesting to note that many people are willing to cycle between 4.25 -5.10 km.

Table 6: Willingness to cycle if facilities are provided

Cycling Facilities	Percentage
Yes	86.9 %
No	13.1 %

Table 7: Willingness to cycling

The reason of willingness to cycle	Percentage
Too hot for walking	4.1%
Health	28.6%
Environment	26.5%
Cost	4.1%
Fun	8.2%
Faster	24.5%
Parking area availability and accessibility	4.1%

Table 8 : Willingness to cycle in relation to distance

Distance (km)	Percentage
0.00 - 0.85	15.52%
0.85 - 1.70	13.79%
1.70 - 2.55	20.69%
2.55 - 3.40	6.90%
3.40 - 4.25	10.34%
4.25 - 5.10	32.76%

The survey done via the internet showed that the interest of men to respond to the questionnaire is higher than women. Table 9 shows the percentage of men and women as the respondents.

Table 9: Gender of respondents

Gender	Percentage
Male	53.4%
Female	46.6%

Table 10 : The willingness to cycle by gender

Gender	Willing to use	Not willing to use
Male	57.1%	33.3%
Female	42.9%	66.7%

Based on Table 10, cycling indeed is a physical activity that is usually preferred by male. In line with Dickinson et al, 2003, cycling culture is male, there is more attention to attract woman to cycling. Substantial gender differences in cycling participation in Australia and other English

speaking countries have led some researchers to suggest that women are not interested in cycling (Merom et al., 2003). This is not the case in several western European countries, where utilitarian cycling rates are high, and women cycle more frequently than men (Garrard, 2003).

### 3.1 Cycling preference model

Regression model was developed in order to show the correlation utility of cycling with cost changes ( $X_1$ ) and travel time changes ( $X_2$ ). Ranges of travel time changes scenarios made from decrease by 15 minutes until increase by 15 minutes and cost changes scenarios are from decrease by RM 2 until increase by RM 2.

From the regression analysis, the value for the utility was derived.

$$Y = -0.408 - 0.537X_1 - 0.057X_2 \quad (1)$$

where

$X_1$  = Changes in cost

$X_2$  = Changes in travel time

Sensitivity analysis was conducted to determine how sensitive the probability of cycling preference toward fare and travel time changes.

Figure 1 shows the sensitivity analysis with constant travel time, the preference to cycling for activities in campus is 35 %. This means that probability of preference to cycling is less than other modes that have faster travel time. Therefore, cycling travel time needs to be more than 5 minutes faster in order the preferences of cycling to be more than 50 %.

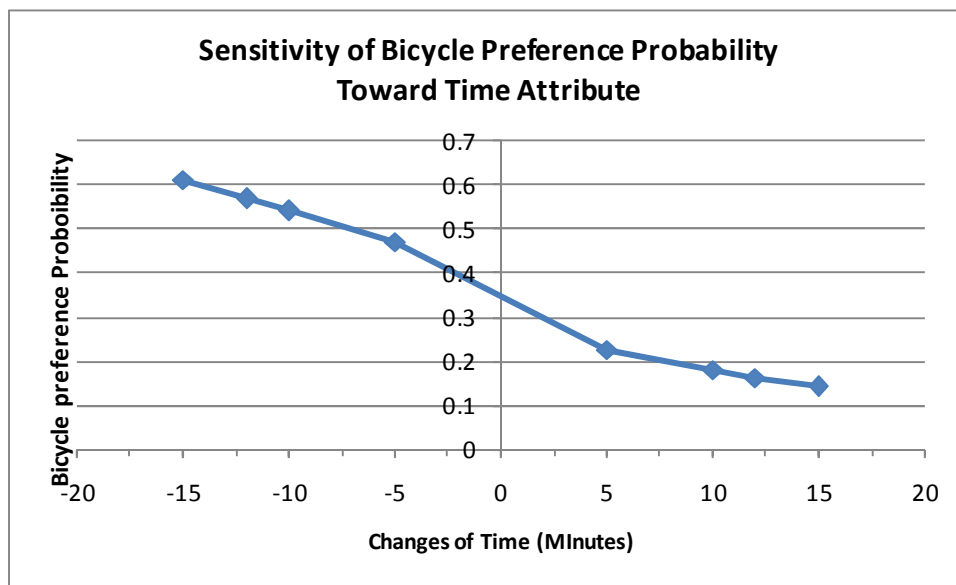


Figure 1: Sensitivity of Bicycle preference Toward Travel Time Attribute

Figure 2 shows that if the cost of cycling is equal to other modes, the preference of cycling is 28%. Therefore cycling has to be RM 1.5 cheaper to make the preference to be more than 50 %.

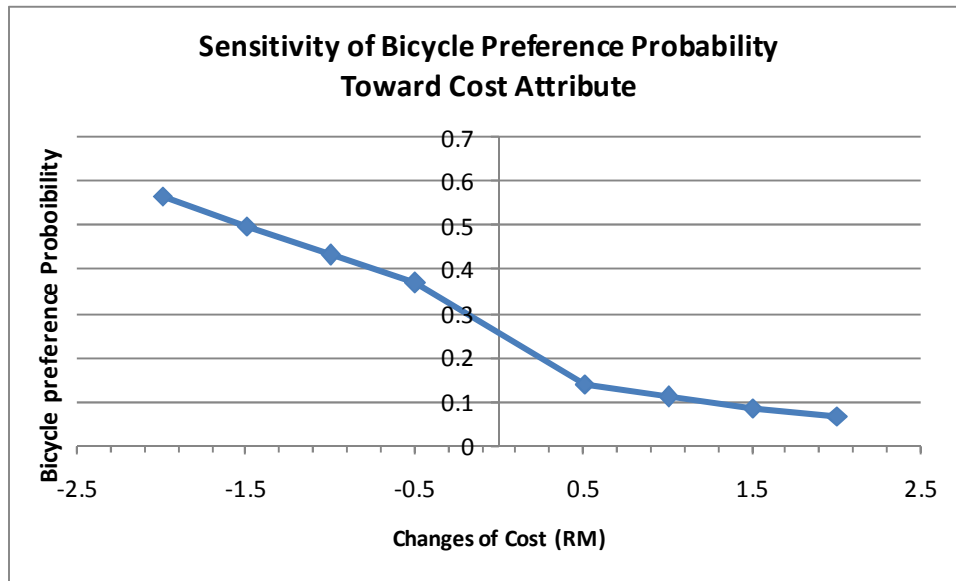


Figure 2: Sensitivity of Bicycle preference toward Cost Attribute

#### 4. CONCLUSION

The dependence on motorcycles and private cars as transportation modes by students in campus is still very high. There are a lot of constraints that are being considered by students to choose to cycle around campus. However, if proper bicycle infrastructure is designed by the university, students are willing to make bicycle as their transportation mode inside the campus. The gender perception in the society also influences the female students to refrain from cycling even if the facilities are provided.

From the regression analysis, the value for the utility was derived.

$$Y = -0.408 - 0.537X_1 - 0.057X_2 \tag{1}$$

where

$X_1$  = Changes in cost

$X_2$  = Changes in travel time

The probability of cycling preference is less than the other modes that have faster travel time. Its travel time needs to be more than 5 minutes faster for cycling and the cost is RM 1.5 cheaper to make the cycling preference more than 50%. It means that more efforts are needed to encourage student to cycle.



## REFERENCES

- Balsas, C., 2003. Sustainable transportation planning on college campuses, **Transport Policy** **10**, 35–49
- Bannister, C. (1988). **Travel to work patterns in England and Wales for pedestrian and cyclists-their policy implications**. Occasional paper, University of Manchester, Department of Planning and Landscape.
- Cavill, N., Watkins, F., 2007. **Cycling and health: an exploratory study of views about cycling in an area of North Liverpool, UK**. *Health Education* 107, 404–420.
- Davies, D., Gray, S., Gardner, G., & Harland, G. (2001). A quantitative study of attitudes of individuals to cycling. TRL report 481. TRL, Crowthorne. B. Gatersleben, H. Haddad / **Transportation Research Part F** **13 (2010)** 41–48.
- Dickinson, J., Kingham, S., Copsey, S., Pearlman, D., 2003. Employer travel plans, cycling and gender: will travel plan measures improve the outlook for cycling to work in the UK?, **Transportation Research Part D** **8**, 53–67.
- Dober, R., 2000. **Campus Landscape**, Wiley, New York.
- Garrard, J., 2003. Promoting cycling among women. **Health Promot. J. Aust.** **14 (3)**, 213–215.
- Garrard, J., Crawford, S., Hakman, N., 2006. **Revolutions for women: increasing women's participation in cycling for recreation and transport, summary of key findings**. Deakin University, Melbourne. Accessed on [http://www.sport.vic.gov.au/web9/rwpgslib.nsf/GraphicFiles/1006-59RevolutionsKeyFindings/\\$file/1006-59RevolutionsKeyFindings.pdf](http://www.sport.vic.gov.au/web9/rwpgslib.nsf/GraphicFiles/1006-59RevolutionsKeyFindings/$file/1006-59RevolutionsKeyFindings.pdf). on 2 July 2007.
- Garrard, J., Rose, G., Kai Lo, S., 2008. Promoting transportation cycling for women: The role of bicycle infrastructure, *Preventive Medicine* 46, 55–59
- Gatersleben, B., Appleton, K., 2007. Contemplating cycling to work: Attitudes and perceptions in different stages of change, **Transportation Research Part A** **41**, 302–312.
- Gatersleben, B., Haddad, H., 2010. Who is the typical bicyclist? . **Transportation Research Part F** **13**, 41-48.
- Karim MR (1992). Traffic accidents in university environment, **I.T.E. Journal (USA)**, July 1992, pp. 30-34
- Keniry, J., 1995. **Ecodemia—Campus Environmental Stewardship at the Turn of the 21st Century**, National Wildlife Federation, Washington, DC.
- Kingham, S., Dickenson, J., & Copsey, J. (2001). Travelling to work: Will people move out of their cars. **Transport Policy** **8**, 151–160.
- McClintock, H., & Clearly, J. (1996). Cycle facilities and cyclists' safety. **Transport Policy**, **3**, 67–77.
- Merom, D., Bauman, A., Vita, P., Close, G., 2003. An environmental intervention to promote walking and cycling—the impact of a newly constructed rail trail in Western Sydney. **Prev. Med.** **36**, 235–242.
- Nankervis, M., 1999. The effect of weather and climate on bicycle commuting, **Transportation Research Part A** **33**, 417-431.
- Newby, L (1993). **On the right tracks: cycle planning best practice and its potential in Leicester**. Research report No 3. Best Practice Research Unit. Leicester: Leicester Environment City Trust.
- Shannon, T., Giles-Corti, B., Pikora, T., Bulsara, B., Shilton, T., Bull, F., 2006. A active commuting in a university setting: Assessing commuting habits and potential for modal change, **Transport Policy** **13**, 240–253

Shoup, D., 1997. The high cost of free parking. **Journal of Planning Education and Research** **17 (1)**, 3–20.

Wardman, M., Hatfield, R., & Page, M. (1997). The UK national cycling strategy: Can improved facilities meet targets? **Transport Policy**, **4**, 123–133.