

Public Approach Towards Sustainable Transportation in UKM's Campus

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Abstract: In order to encourage the usage of public transportation in university campus, the service itself should be improved in the first place. This paper discusses the pattern of mode trip and the perception of current in campus transportation services from the point of view of campus community. From 288 out of 300 questionnaires, 13.6 % of responses came from UKM campus staff (faculty and university department) and 86.4% from students (undergraduate and postgraduate). Results show that there are about 18% of the campus community walking, 31% ride campus bus, and the rest 50% use private transportation to travel to the campus. Most of the campus community preferred walking within the distance of 100 meters and below for on-campus trip, but the travel modes varies when the trip distance exceeds 100 meters. Schedule inefficiency and comfortably level are being addressed as the main problems faced by the public transportation users in the campus.

Key words: Campus transportation, sustainable, mode trip, UKM.

INTRODUCTION

University campus can be defined as a small "city" because they commonly have their own communities, typical daily activities such as working, studying, and business even possessed their own independent infrastructure facilities (roadway, water supply, electrical supply, sewerage system, etc.). However, similarly, they are also shared the same problems as major cities troubled with such as transportation demand increased, traffic congestions, noise pollutions, and also environmental problems. The trend in motorization on campuses is also quite similar with those in society which the car-dependencies were dominant. Therefore, a sustainable planning of transportation must be provided before, present and after development of transportation system to encourage the non-motorized mode and public transportation.

The word "sustainability", "going green", or "green building" is coming up more often in discussions about the management of resources and business practices (Sustainable Campus Information Centre, 2009). A sustainable transport system is also should ensure the ability of future generations to meets their own needs (Balsas 2003, Richardson, 1999). On campus grounds sustainable transportation planning can be seen as providing incentives for walking, bicycling, ridesharing, taking mass transit, while discouraging the use of single-occupancy cars by passing on the full costs of parking to drivers, and linking transportation planning to land-use planning. Furthermore, in order to minimize the cost of infrastructure and their impact to environment, university campuses can also constitute a laboratory for testing and implementing various alternative transportation strategies (Balsas, 2003).

The campus administrators and planners should have a proper plan to conduct affective transportation behaviour based on the campus population and to develop the environmental awareness among the students, as 'they will progress to occupy influential roles in government, companies or other organizations' (Tolley, 1996). In fact, innovative transportation approaches are likely to diffuse from higher education to other parts of society. One of the problems is the campus planners and administrators have always accustomed with the dependencies of automobile and the reluctance to accept changes attitude (Balsas, 2003; Poinatte and Toor, 2001). Nevertheless, the students have the potential to become 'movers and shakers' of powerful forces if properly motivated, to establish the bicycle and pedestrian friendly communities since they are also more open-minded (Limanond, 2011; Balsas, 2003).

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Study Area:

Universiti Kebangsaan Malaysia (UKM) main campus which is located in Bangi, Selangor, about 35 km to the south of Kuala Lumpur and covers approximately 1,100 ha was chosen as the study area for this research. Currently, it has thirteen well-established faculties, thirteen research institutes, and fourteen centres. UKM encompasses an academic community of 2,278 (242 professors; 424 associate professors; 41 fellows; 1,316 lecturers and 255 tutors and teachers), 3,650 supporting staff and a students' population of 25,568 (Department of Registrar, 2010).

The active area of the campus can be roughly be classified into three types namely the residential colleges, the academic area, and the commercial area. There are 10 residential colleges residing in campus and most of students live in colleges especially undergraduate students. Among them are Burhanuddin Helmi Residential College (KBH), Ibrahim Yaakob Residential College (KIY), Ungku Omar Residential College (KUO), Pendeta Zaaba Residential College (KPZ), Aminuddin Baki Residential College (KAB), Dato' Onn Residential College (KDO), Tun Hussein Onn Residential College (KTHO), Rahim Kajai Residential College (KRR), Ibu Zain Residential College (KIZ) and Keris Mas Residential College (KKM). The surrounding areas also include staff housing area (Perumahan Bukit Puteri, PBP), administration buildings, faculties, club house, health centre, rest house and stadium (Figure 1).

The academic area includes several large common classroom buildings, office building for academic staff, administrative buildings, a cafeteria, a library, and laboratory buildings, which are within walking distance from each other. Meanwhile, the commercial area houses several convenience stores, a post office, a bank, a book store, a cafeteria, and one stop centre. This area is located approximately 2 kilometres away from the main entrance of UKM campus and near with several faculties and residential college. The campus is divided into several zones, where the walking distances are quite far from each others. Currently, there are a few covered walkways but no covered bicycle lanes provided to link these zones which make walking on uncovered walkways and cycling seems vulnerable to extreme climate conditions especially during raining and hot sunny day. Furthermore, the hilly geographical campus area, makes cycling the least popular commuting mode among the campus community.

The university also provides nominal fee bus service within the campus. The bus services operation hours are from 7.00 am until 8.00 pm, except during the mid-term and final examination which it will be extended until the midnight. Besides, there are also taxi and commercial bus services provided in the campus for the use of the students who live outside of the campus. There also park and ride service provided for the campus communities' convenience especially for those who live outside campus.



Fig. 1: Map of UKM Bangi (yellow pins show the faculty area, green pins for residential place)
Source: Google Earth, 2010.

MATERIALS AND METHODS

Sampling Method:

For this research, the target population was the students and staffs of UKM Bangi. Two categories of students were identified as samples; undergraduate and postgraduate. The administration staffs were selected as sample because they spend most of their working hours in the campus compared to the academic staff. A simple random sampling was used because of the large number of population and location size. The Cochran formulation was used to determine the number of optimum sample for this research.

Based on the calculation with Cochran's formula, the best sample size for this research was between 300 to 380 samples (Bartlett *et al.*, 2001). Therefore, 300 samples were chosen for this study after the consideration of the population that can be reached and limitation of the study.

Survey Questionnaires:

The questionnaire comprises of four sections. The first section includes respondent's personal background data such as gender, age, household income, affiliation with university either their faculty (student) or workplace (staff) were sought. The second section was designed to obtain their travel characteristics such as mode used to work, durations and others. For the third section, the questions were designed to identify the user's problems when using the transportation modes (walking, bus and private vehicle) on-campus. In the last section, the respondent was asked to rate their perception on sustainability attributes. Five point likert-scales were used for section two to four.

Data Collections and Analysis:

The questionnaires were distributed either from direct interview or collected gradually. The distributed area also has been determined beforehand to avoid the overlapping data. Then, data from the survey is aggregated and analyzed using the Microsoft Excel and SPSS 17.0 software. When using likert-type scales, it is imperative to calculate and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales one may be using. From the data analysis by SPSS, the overall Cronbach's alpha reliability coefficient is 0.834 which acceptable value for this study.

RESULTS AND DISCUSSIONS

Table 1 shows 73.6% out of 288 respondents were undergraduate student, 12.8% postgraduate student and 13.8% administration department of faculty and university members. In this paper, several results from the analysis were discussed such as the trip pattern in campus through the modal split among campus community and travel activities in campus.

According to result shown in Figure 2, about 36% of undergraduate students use busses as their primary mode of transport to their faculty, 24% preferred walking and the rest using private vehicles. More than half of them used public transportation because most of undergraduate students lived in the campus. Furthermore, the UKM's campus rule prohibited first year students to use their own transport to the faculties which may be the reason why public transportation being their main choice of travel mode. Majority of the postgraduate students and staffs lived outside the campus and they preferred own transportation to travel to the campus. Majority of staff are already married and the use of private vehicles were very essential for them because some of them have to send and pick their children to and from school and it is also very convenient to come to work on time.

Figure 4 shows the most active trip in campus is within the range of 100 meters and below which make walking as the main transportation mode among the community (1.00-2.33 low, 2.34-3.67 moderate, 3.68-5.00 high). This applied equally to undergraduate students, postgraduate students and staff. It is because almost all the classes take place in the same building or area, thus students simply walk from one lecture room to another during class periods. The staffs were also doing their trip on campus mostly when lunch hour which the cafeteria and pantry room in the same area with their workplace. However, walking frequency decreases when distance increases while the other two modes (bus and private transportation) were increased. Figure 5 shows the list of problems that often happen to respondents in campus (1.00-2.33 rare, 2.34-2.67 sometimes, 3.68-5.00 often). The most often problem while walking on campus is no covered walkway to destination especially when travel from one zone to another zone. This is one of the reasons why campus community was preferred to use either campus bus or private vehicle for extended distance. For bus users, the most frequent problems were the punctuality of bus schedule and poor comfort level which they often have either to take the bus even there were already packed or they have to wait another bus for the next session that usually take longer time that make the number of users to wait tend to increase. These scenarios often happen particularly at the morning peak hour because most students have classes or laboratories schedule in the morning. Walking and cycling are the most sustainable mode of transportation followed by public transport mode (bus, vanpool, etc.). In order to improve the campus transportation service, public opinions were one of important tools for successful implementation. Table 2 shows the short list of public suggestions that might improve the campus transportation mode.

Most of respondent suggest about improving the efficiency of services such as on-time performance and upgrade the facilities such as expand the bus route, bus stop improvement and covered walkways. Meanwhile, the programs to encourage campus community using public service such as 'Bus Riding Day', 'Free Car Day' and on campus parking charge seem to have a moderate support from the respondents. The bicycling mode currently was rare choice in campus because the geographical environment of UKM but it seems to get positive interest from respondents. Therefore, to promote this type of mode, incentives must be given such as bicycle loan and good facilities. The suggestion to provide electric bicycles also received high supports from respondents.

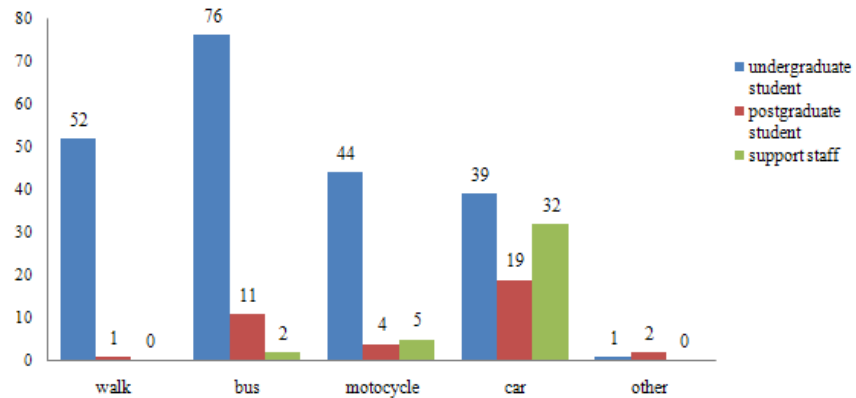


Fig. 2: Modal Split for Commuting to/from Campus.

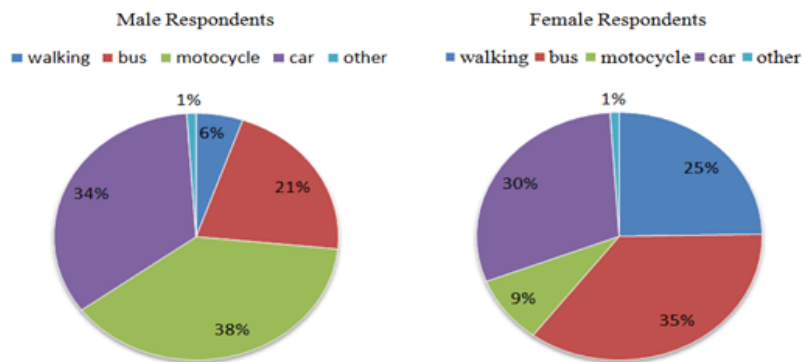


Fig. 3: Distribution of Respondents by Gender and Their Main Transportation Mode to Campus/Faculty.

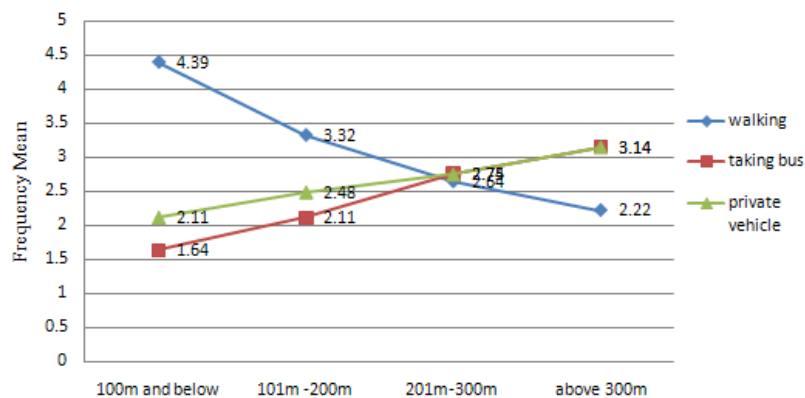


Fig. 4: Frequency Statistic of Trip Activities in Campus.

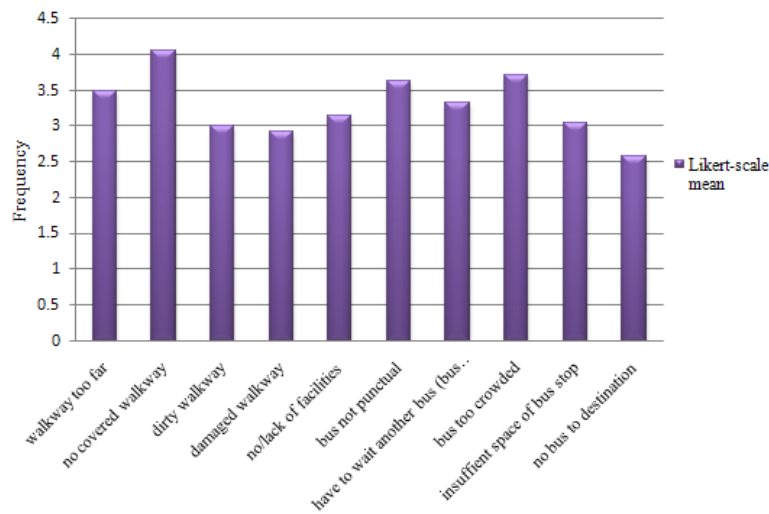


Fig. 5: Problems of Public Transportation Mode in UKM campus.

Table 1: Distribution of survey according to gender and the affiliation with the University.

Gender	Affiliation with the University			
	Undergraduate Students	Postgraduate Students	Support Staff	Total
Male	72 (25%)	7 (2.4%)	15 (5.2%)	94 (32.6%)
Female	140 (48.6%)	30 (10.4%)	24 (8.4%)	194 (67.4%)
Total	212 (73.6%)	37 (12.8%)	39 (13.6%)	288 (100%)

Table 2: Public Opinions About Improving Campus Transportation.

Suggestion	Mean	Suggestion	Mean
Campus Bus-Related Suggestions			
Provide bigger space of bus stop	3.81	Expand the bus route	4.13
Increase the number of busses on peak	4.38	Reduce waiting time	4.24
Provide the bus lane in campus	4.02	Provide the real-time panel on every bus stop in campus.	4.23
Walk-Related Suggestions			
Provide more strategic walkway	4.19	Provide more covered walkways	4.41
Expand the walkway route	3.92	Provide more basic facilities along walkway (toilet, public phone, etc.)	4.15
Park & Ride-Related Suggestions			
Provide the overpass to enter UKM (for P&R service)	4.07	Provide the facilities in Park and Ride area. (toilet, ATM machine, etc)	3.80
On-campus parking charge	2.97	Implement the Bus Riding Day (for non-resident user)	3.42
Bicycle-Related Suggestions			
Provide the electric bicycles for user	3.95	Provide bicycle loan service	4.00
Provide the rest area for bicycle lane	3.78	Bicycle Services Centre	3.84
University Program-Related Suggestions			
Develop bonus reward card for campus bus user	3.73	Promote free car day	3.49
Continuous promotion campaign	3.80		

Conclusion:

This study has identified the pattern of mode trip among community while develop the comprehension of public transportation problems in UKM campus. Transport planning needs to provide incentives for the use of alternative modes, while discouraging the single-occupancy transports. Even though there are varies of transportation mode pattern between undergraduate students, postgraduate students and staff when they make a trip to/from campus, walking is the main mode for making trip on campus in distances of 100 meters and below. So, improvement on walking facilities should be done such as covered walkway and basic facilities such as public toilet, public phone and rest place for every 100 meters distance to encourage walking in campus.

In order to promote bicycles usage in campus, incentives should be given such as bicycle loan and provide supporting facilities such as bicycle lane, rest area, and bicycle service centre. From this study, we can suggest

that to implement a successful sustainable transportation system in campus, the pattern of mode trip, the characteristic of user and the problem of public modes should be considered and implemented in the planning.

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