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THE NEED ANALYSIS ON BIKE SHARING SYSTEM AMONG STUDENTS IN UNIVERSITI UTARA MALAYSIA (UUM)

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ABSTRACT

At the present time bicycle services are becoming important in the public transport due to its good impact on environmental and health issue. Bike Sharing System is a program in which many bicycle stations are set up and peoples can rent a bike to use for a certain time frame and return it at a different station. However, in order to promote cycling culture, a well urban planning along with reliable cycling infrastructure is a must. This article provides the result of a need analysis study on the critical factors in the operation of bike sharing system. The aim of this study is to determine the students' intention on bike sharing system among STML students based on the impact of bike sharing services. A survey was conducted on undergraduate students to determine the level of the critical factors among the participants based on the year of study. The research instrument for this study is a set of questionnaire that consists of 5-point Likert scale adapted from the Technology Acceptance Model. The outcomes of the study possibly reflect the young generation views on the bike sharing system implementation.

Keywords: Bike sharing system, need analysis, time and cost saving, eco environmental, behaviour

INTRODUCTION

Bicycle services play an important role in the public transport policies due to its good impact on environmental and health issue (Souza, Sanches, Ferreira, 2014). Bike Sharing System (BSS) has been seen in many developing cities and it was considered an extremely important part of making cycling more accessible to people. Bicycles are the most sustainable form of transportation, they are pollution-free, use of smallest space to ride and park, least expensive to use, and provide daily exercise for riders. Due to its environmental and health benefits, the bicycles have taken important role in transport policies in recent years. Bicycles were introduced in the 19th century, and had been widely used during World War times and until today people are still using it for transportation, recreational and sport purpose. Traditionally, bicycles are very efficient and effective mode of transportation for short and moderate distance travel. Following the expansion of the city, motorization development as well as increase of resident's income level, they are now demanding a faster and comfortable daily travel (An, Chen, Xin, Lin & Wei, 2013). The cycling culture has been starting expanded in worldwide in London, New York, Taipei and Melbourne. The cycling culture has been built because the issues of air pollution and congestion are increasingly.

Further, in a country such as Malaysia, which yet to heavily promoting the cycling culture, it would be more appropriate to start with a conventional type of cycle. In future, if the cycling culture is successfully promoted, government may consider investing on e-bike. In addition, to promote cycling culture, a well urban planning along with reliable cycling infrastructure is a must (Naess, 2012). One of the cycling infrastructures exists in Malaysia is the cycling route in Penang Island. Penang Island is leading other Malaysian states in promoting cycling cultures, with lanes that are outlined with green paint on existing road showing that they are shared (Chu, 2014). There is currently a 12km dedicated bicycle lane which connects Queensbay Mall in Bayan Lepas and Gama Supermarket and Departmental Store in George Town.

In a study conducted by University of Reading which is a public university located in Reading, Berkshire in England. The main campus, White Knights' campus comprises an ideal green environment for students to explore the natural beauty in campus. White Knight campus in the reading area is within easy walking and cycling to local train station. Most students use bicycle services to the reading station. The university has provided shuttle bus services at each route for the convenience of students go around the campus. However, in current situation, especially in peak time of morning session and afternoon session, the issues of bus crowded still happening. Students sometimes wait at the bus stop over time before their scheduled shuttle in order to secure one of the limited seats, further lengthening their commutes.

In University Utara Malaysia, the shuttle bus does not cover the entire road in the campus, which is one of the reasons why some of the students are willing to use their own vehicles in the campus. Having their own vehicles make it easy for them to move around the campus. However, not many students have enough money to buy their own vehicle as most of them don't have their own income and unable to afford too highly fuel cost. Besides, having their own car or motorbike will instill negative thinking for students that they will more likely to use their own vehicles than to use bicycle services. High dependence on private vehicles will causes bad effect on environment and traffic in campus such as traffic congestion, accident and air pollution (Karim, 1992).

Based on this situation, Universities should implement bike sharing service in campus to reduce the congestion in the bus, car and motorbike usage in campus for a better future environment. There are some reasons why students less using bicycle in campus. These factors include bicycle availability, lack of cycling facilities and location sport center far away from residential. The factors such as environmental concerns, limited budget and dynamic activities will encourage the students to choose for cycling in campus. However, how far those factors will affect the use of bike sharing services among the students is still not clear. Therefore, this study was conducted to identify the most critical factors of the students' cycling intention.

LITERATURE REVIEW

Students' cycling intention

Cycling intention has been intensively discussed in past studies, subject in transportation, health, as well as eco environmental aspects (Lafayette & Hill, 2011; Fernández, et al., 2016). Previous studies on intentions are usually referring to theories such as the Theory of Planned Behavior (TPB) (Arjen, 2011), the Theory of Interpersonal behaviour, the Norm-Activation Model (Korsakoff & Williams, 2015), and the Technology Acceptance Model (TAM) (Chan & Chao, 2011). Among these theories, this study seems it has more significant towards TPB and TAM. Theory Planned behavior (TPB) has been successful theories that is used to understand human behaviour (Millais, 2015). Recently, researchers have been applying TPB in transportation, particularly for cycle use (Fernández & Manson, 2016).

The primary concept of this theory is the intention that represent if a person would perform behaviour, how many willingness of he or she to invest (Malkovich & Štambuk, 2015). According to Malkovich, 2015, the Theory of Planned Behavior (TPB) has been clarified by Arjen (2011) that most favorable theories applied to forecast the cycling intentions. A research shown that 85% of the variance in intention to apply environmentally friendly method of transport is explained by TPB components (subjective norm, attitudes and perceived behavioural control) (Malkovich et al., 2015). Attitude referred to the degree in which people on adopting the specific behaviour (Malkovich et al., 2015). Subjective norm refers to an awareness of social pressure that people believe, accept and performing that behaviour (Millais, 2015). Finally, Perceived Behavioural Control (PBC) examine on the perceived easily or difficulty of performing specific behaviour, reflecting experience, as well as anticipating an obstacle which an individual is expected to overcome it to perform that behaviour (de Souza, Sanches & Ferreira, 2014).

Time and cost saving

According to Guntinas and Haddad (2010), the regular bicycle users can gain advantages of low cost of travel. The possibility of a sustainable bike share program at Bridgewater State University may affect the university in many positive influence such as a potential decrease in the number of shuttle services that are offered on campus, which would save the amount of fuel used for the campus shuttle, number of miles the shuttle is run, and operation and repair costs of the vehicles. The program using a radio frequency identification (RFID) docking system, build two-sided docking stations, install magnetic strip card readers for student matric card access, design a light system to inform the user if the bike is locked or if it requires maintenance to access using the BSS with efficiency.

Eco environmental

Bicycle is one of the most sustainable forms of transportation which they do not produce harmful smoke so that they have no fuel consumption and brings good health to their users. (Goestsch & Appleton, 2007). In the 21st century exists many reasons that encourage cycling as an environmental friendly activity. Despite cycling would decreases the problems of global warming such as less pollution and the increases energy usage, at the same time, it also improves the health and well-being of students. Cycling allow people to travel for leisure due to the cycling are three times as energy efficient and faster compare to walking (Jalalkamalia et al, 2012). Apart from elevated technology, it is essential to encourage the public to increase their awareness about environmental protection. Besides, instead of repeatedly broaden roads to make room for motor and vehicles, the government should start building extra lane for the cyclist and pedestrian.

Behaviors

There is a prevailing low sense and irresponsible users toward public property. For example, certain irresponsible users have damaged the bicycle, parked them at certain locations that block someone else, and dump the bicycle after used. It is an essential for a university to provide educational program and resources to students not only to promote cycling in university, but also to ensure that students are more discipline and aware about riding safety. Thus, proper implementation of BSS can have a long-term positively effects through creating a good cycling culture and build up students' travel behaviours. The University of California, Santa Barbara is an excellent example of a school that it has taken a great step to build up their users' discipline by providing infrastructure for cyclists. According to Shahen et al., (2014), using bike sharing can reduce car use. From the survey, 40% users overall reduced car use while 60% remain no change. The research proved that 93.8% of users had raised their awareness of cyclist on road while driving (Murphy & Usher, 2015). The results show that BSS have a positive role of students' behaviors (Molina et al., 2013). Cycling has now become a vital part of transport systems and transport planning, thus it is reasonable to conduct this research to have a closer look into it.

Need Analysis

Need Analysis is the process of identifying and evaluating needs in a community or other defined population of people. The identification of needs is a process of describing "problems" of a target population and possible solutions to these problems (Sun, 2015). The "problems" in this study are the crowded bus at peak time while students are rush for their class and time consuming when waiting for bus. Consequently, it is believed that BSS is needed to provide the students an alternative to evade from arrive late and save time. This study provides some enlightenment of the need of BSS by highlighting the factors that affect the student cycling intention.

METHODOLOGY

This study was completed through quantitative approach. A survey was conducted on School of Technology Management and Logistics (STML) students. All the respondents are undergraduate students from Universiti Utara Malaysia (UUM). A set of questionnaires was

developed and distributed to target respondents through Google Document. Data collection exercise was done in two weeks within the month of October 2017. IBM SPSS Statistics 24 is used to analyze the data collected using descriptive analysis. The perception of the students on different year of study was analyzed by looking at the significant differences between the lowest mean score and the second lowest mean score. The perceptions are considered homogeneous if the mean difference is less than 5% while they are considered heterogeneous if the mean figure than 5%.

FINDINGS AND DISCUSSION

Specifically, the objectives of the study are to identify the critical factors in the implementation of Bike Sharing System (BSS) and to determine the level of agreement of the critical factors among the participants based on the year of study. Three critical factors which become the reasons of the use of BSS identified from this are reduction of time and cost; eco environmental of the practices and student's behavior. Table 1 shows the mean score of each factor.

Table 1.

Overall Mean Score

| No. | Variables | Mean Score |
|-----|----------------------------|------------|
| 1 | Reduction of time and cost | 3.645 |
| 2 | Eco environmental | 4.065 |
| 3 | Student's behavior | 3.655 |

The mean of variable 2 students' perception toward eco environmental of BSS in UUM is 4.065 is higher than the mean of variable 3 student's behaviour of using BSS in UUM which is 3.655. While the mean of variable 1 reduction time and cost involved when BSS implemented is the lowest among others, which is 3.645. There are many students agree that BSS can achieve eco environmental goals. The goals for more students to bike are to help university reduce greenhouse gas emissions and reduce car travel with creating an affordable and convenient form of public transportation. From the survey, we can see the success of 'STML Go Green' program in nurturing environmental awareness among STML students. The program aims to raise awareness of the students towards environmental protection and mobilize students into gradually changing their behaviour.

The next higher means is student's behaviour of using BSS in UUM. By sharing with others through a publicly available scheme, students' behaviour use bicycles on an "as-needed" basis, without the costs and responsibilities associated with ownership. This is to allow more students to bike and take public transit instead of driving. BSS implemented can develop the sense of student responsibility, discipline and interest. Responsibility of students at the self-service station and ability to pick up and drop off station at any station is important too. Reduction time and cost involved when BSS is implemented to be classified as agree and the mean is almost same with variable 3. Nowadays, students try to avoid crowded in the bus or late to class so that they chose to drive a car or use a motorbike in the university. After the survey was done, students agree that BSS implemented in UUM can reduce time to wait for

bus and expenses cost for driving car. Students consider that it can increase financial savings by reducing petrol expenses and car service for individuals that had own private vehicles.

Table 2.

| N | | Mean | Overall | | | |
|-----|---------------------------|--------|---------|--------|--------|-------|
| No. | Questions | Year 1 | Year 2 | Year 3 | Year 4 | Score |
| 1 | Reduce congestion in bus | 4.310 | 3.310 | 2.890 | 3.130 | 3.510 |
| 2 | Save time | 4.310 | 3.540 | 3.000 | 3.390 | 3.650 |
| 3 | Save fuel cost | 4.190 | 3.730 | 2.580 | 3.430 | 3.590 |
| 4 | Reach destination quickly | 4.410 | 3.920 | 3.000 | 3.610 | 3.830 |

Table 2 shows that among the variables in Reduction of Time and Cost, the mean of Reach Destination Quickly is the highest that is 3.830 compare to others and Reduce Congestion in Bus has the lowest mean, 3.510. The mean of Reach Destination Quickly has exceeded 3.7% from the average mean that is 3.645 and the lowest mean is Reduce Congestion in Bus that is 2.7% lower than the average mean. Reduce Congestion in Bus scored the lowest and second lowest mean are Year 3, 2.890 and Year 4, 3.130 respectively. The difference between these mean score is 4.8% and considered as homogeneous because it is below than 5.0% and it means alike. While for the Save Time variable, the lowest and second lowest mean are Year 3, 3.000 and Year 4, 3.390 respectively. The significance between these are 7.8%, so it is considered as heterogeneous because it is more than 5.0% and the heterogeneous here means unalike or distinct from one another. Save Fuel Cost have the lowest and second lowest mean that is Year 3, 2.580 and Year 4, 3.430. The significance between these are 17.0%, so the mean also heterogeneous. Besides that, Reach Destination Quickly scored the lowest and second lowest mean are Year 3, 3.000 and Year 4, 3.610 respectively. Thus, the significance between these are 12.2% and the mean considered as heterogeneous. Furthermore, the mean of Reach Destination Quickly of the BSS is available for Year 1 students is the highest 4.410 because they want to reach the destination on the time.

Table 3.

Eco Environmental

| No. | Questions | Questions Mean | | | | | |
|-----|--|----------------|--------|--------|--------|-------|--|
| | | Year 1 | Year 2 | Year 3 | Year 4 | Score | |
| 1 | Awareness level towards environmental issues | 4.190 | 3.500 | 3.790 | 3.740 | 3.830 | |
| 2 | Reduces noise and carbon | 4.220 | 3.850 | 3.950 | 4.040 | 4.030 | |

| | emissions | | | | | | | |
|---|--|-------|-------|-------|-------|-------|--|--|
| 3 | Improve the level of healthy lifestyle | 4.470 | 3.620 | 4.210 | 4.170 | 4.130 | | |
| 4 | Create ideal green environment | 4.470 | 4.080 | 4.210 | 4.260 | 4.270 | | |

The result of eco environment is presented in Table 3. It shows that the overall mean score of Create Ideal Green Environment is the highest that is 4.270 and Awareness Level Towards Environmental Issues is the lowest overall mean scored which is 3.830 throughout all the years of study. The Year 3 students and Year 4 students have a significant about 1.8% on Reduce Noise and Carbon Emissions and it means they are homogeneous as below than 5%. Same goes to the Year 3 students and Year 4 students have a significant about 0.8% on Improve the Level of Healthy Lifestyle and it means they are homogeneous as below than 5%. On the other hand, the highest of mean scores for each element are above 4.0 among Year 1 students. In contrast, Year 2 students rated the lowest of mean scores for each element among the years of study. It means that the Year 1 students are strongly agree that implemented of BSS have positive influence towards eco environmental compare with other years of study. Yet, there are some unexplained factors as human perception into internal and external factors that pull Years 2 students away from every element of eco environmental. However, the overall mean score for all years of study students are 4.065 means which shows that they still have a positive perception level towards BSS could encourage eco environmental issue.

Table 4 demonstrated that among the variables of Student's Behaviour, the mean of Willingness to Cycling is the highest that is 3.960 compare to others and Nuisance to Other Road users has the lowest mean, 3.400. The mean of Willingness to Cycling has exceeded 6.1% from the average mean that is 3.655 and the lowest mean is Nuisance to Other Road users that is 5.1% lower than the average mean. Students of Nuisance to Other Road users scored the lowest and second lowest mean are Year 3, 3.050 and Year 4, 3.090 respectively. The difference between the mean score of these years is 0.8% and considered as homogeneous because it is lower than 5.0%. This shows that Year 3 and Year 4 think that this system will slightly inconvenient to other road users.

Table 4.

Student's Behaviour

| No. | Questions | Mean | | | Overall Mean Score | |
|-----|----------------------------------|--------|--------|--------|--------------------|-------|
| | | Year 1 | Year 2 | Year 3 | Year 4 | - |
| 1 | Nuisance to other road users | 3.840 | 3.380 | 3.050 | 3.090 | 3.400 |
| 2 | More discipline | 4.160 | 3.770 | 3.680 | 3.520 | 3.820 |
| 3 | Patience while long wait for bus | 3.940 | 3.460 | 3.000 | 3.090 | 3.440 |
| 4 | Willingness to cycling | 4.340 | 3.730 | 3.580 | 4.000 | 3.960 |

Year 1 students are the most disagree that riding a bike consider Nuisance to Other Road Users because the mean of Year 1 is higher than the average mean. Within question More Discipline, the lowest and second lowest mean are Year 4, 3.520 and Year 3, 3.680 respectively. The significance between these is 3.2%, so the mean of more discipline is homogeneous. Most Year 3 and Year 4 students are not agreed with this statement. Then, Year 1 students are most agreed that they will be more discipline by using cycling infrastructure because it is the highest mean among them. The question of Patience While Long Wait for Bus lowest and second lowest mean are Year 3, 3.000 and Year 4, 3.090. The significance between these are 1.8%, so the mean also homogeneous. Most Year 4 students have their own vehicle, so patience or no patience while waiting bus is no longer important for them. The mean of Year 1 student that agree will be patience while longer waiting for the bus is up to 3.940 because most of them did not have own vehicle and bus is main or only transport for them. Besides that, Willingness to Cycling scored the lowest and second lowest mean are Year 3, 3.580 and Year 2, 3.730 respectively. Thus, the significance between these are 3.0% and the mean also considered as homogeneous. Furthermore, the mean of Willingness to Cycling if the BSS is available for Year 1 students is the highest 4.340 because they are very interested on this BSS.

CONCLUSION

The need analysis on Bike Sharing System (BSS) among STML students in Universiti Utara Malaysia (UUM) examined the critical factors in the implementation of BSS namely Time and Cost Saving, Eco Environmental and Students' Behaviour. The aim is to determine the level of agreement of the critical factors among the participants based on the year of study. It provides some information about the perception of the students on BSS and their cycling intention. It is found that, from the students' perception, eco environmental is the most important factor in the implementation of BSS. Year 1 students are mostly willing to cycle if the BSS is available compared to other year of students. Moreover, Year 1 students also have higher awareness level towards environmental issues compared to years 2,3, and 4. Most students are agreed that they will be more discipline by using cycling infrastructure. The year 1 students have a strongly agree with positive perception towards this BSS while the respondents from years 2, 3, and 4 moderately agree of perception for the system. Besides providing awareness about the needs and important of BSS, the outcome of this study reflects the young generation views on the BSS implementation. They are concerns about the environment and some opinions specified by the respondents about the BSS recorded are the need of innovation in cycling route plan with rooftop and monitoring procedure. They suggested that routes with rooftop should be developed in campus which it connect all residential in every route to all areas of lecture halls, library, Varsity Mall and cafe for students' convenience. The implementation of bikes sharing system in the campus can be monitored by expending students' matric card to access the system.

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