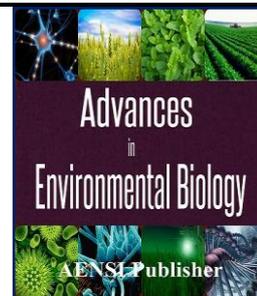




AENSI Journals

Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: <http://www.aensiweb.com/AEB/>

Bicycle Sharing System In Upm Serdang Campus And Its Impact On Promoting Cycling As A Green Transportation System

¹Shirin Vosoughi and ²Nangkula utaberta

¹Department of Landscape Architecture, Universiti Putra Malaysia

²Department of Architecture, Universiti Putra Malaysia

ARTICLE INFO

Article history:

Received 28 September 2015

Accepted 15 November 2015

Available online 24 November 2015

Keywords:

bicycle sharing system, in-campus transportation, green transportation, Universiti Putra Malaysia, Serdang

ABSTRACT

The purpose of this study is to analyze and illustrate the bicycle sharing system of UPM Serdang campus to realize the benefits of this sharing system and provide suggestions to improve sharing system to promote cycling as a green transportation choice mode. The quantitative method used in this study provides a questionnaire to achieve bicycle riders' preference towards cycling inside campus area. This study can be an example to use for other universities' campuses. The outcome of the paper is to provide a methodology that shows the strengths and weaknesses of a cycling system, providing a real support to decisions in order to properly allocate resources and to optimize the bicycle network.

© 2015 AENSI Publisher All rights reserved.

To Cite This Article: Shirin Vosoughi and Nangkula utaberta, Bicycle Sharing System In Upm Serdang Campus And Its Impact On Promoting Cycling As A Green Transportation System. *Adv. Environ. Biol.*, 9(23), 106-110, 2015

INTRODUCTION

In general, bicycles are sustainable, relatively inexpensive and affordable compared to other travel modes[1]. They provide door-to-door transport, not lead to waiting, times compared with waiting at public transport stops[13,14]. In addition, they are environment friendly, inexpensive and essential elements in multi-modal transport chains[2]. In some developed countries such as Netherlands and Japan, bicycle is considered as an important and major mode of transportation, and an alternative to automobile. In urban transportation case, bicycle appears to be a viable mode of commuting.

The method used in this study was quantitative. The survey instrument used to specify cyclist preference and knowledge toward cycling sharing system. The sample of 327 cyclist students collected from UPM Serdang campus. According to a table for the sample size of 2,177 student cyclist regarding the use of bicycle in campus area, the sample size required to be representative of the opinions which is 327, with a degree of accuracy of 0.05 expressed as a proportion[3].

2.0 Bicycle Shaing System:

Public bicycle systems, also known as bicycle sharing systems, have been introduced as part of the urban^{11,12} transportation system to extend the accessibility of public transportation systems to final destinations. Bike-sharing systems allow people to rent a bicycle at one of many automatic rental stations scattered around the city, use them for a short journey and return them at any station in the city. A crucial factor for the success of a bike-sharing system is its ability to meet the fluctuating demand for bicycles and for vacant lockers at each station. This is achieved by means of a repositioning operation, which consists of removing bicycles from some stations and transferring them to other stations, using a dedicated fleet of trucks. Operating such a fleet in a large bike-sharing system is an intricate problem consisting of decisions regarding the routes that the vehicles should follow and the number of bicycles that should be removed or placed at each station on each visit of the vehicles. By integrating with other public transportation systems and providing free or affordable access to bicycles for city travel, the public bicycle systems are used to lessen the use of automobiles for short trips inside the campus areas, thereby alleviating traffic congestion and reducing noise/air pollution[4].

The idea is that the commuters can take the bicycles whenever they need them and leave them behind when they reach their destinations. Since public bicycles were first introduced in Amsterdam in the 1960s (the so-

Corresponding Author: Nangkula utaberta, Department of Architecture, Universiti Putra Malaysia

called white bicycle plan), public bicycle systems have been promoted in urban cities around the world such as Paris, Barcelona, Berlin, Montreal, Salt Lake City, and so on[8,9,10]. The success of the systems have the most number of bicycle stations, but only with basic facilities such as locking system for safekeeping, and bicycle racks.

Recent technological advances have led to a whole new generation of shared bicycling systems. Bicycles can now be checked out using mobile phones or RFID smart cards enabling real-time tracking of bicycle usage. There are over forty bicycle sharing programs in the world including Vélip' in Paris, which has 20,000 bicycles and 1,450 stations[5]. Analysing the impact of factors such as time of day and station activity in the prediction capabilities of algorithms is important. A rental station typically includes one terminal and several bicycle stands. The terminal is a device capable of communicating with the electronic lockers, which are attached to the bicycle stands. When a user rents a bicycle, a signal is sent to the terminal that the locker has been vacated. A user can return a bicycle to a station only when there is a vacant locker. All rental and return transactions are recorded and reported in real time to a central control facility. Thus, the state of the system, in terms of the number of bicycles and number of vacant lockers available at each station, is known to the operator in real time. Moreover, operators of bike-sharing systems make this information available to the users online[6]. Furthermore, their models shed light on some of the factors that influence the predictability of station usage behaviour. As sharing bicycling station usage data, can reveal patterns of bicycling usage. It would be essential to use this type of information in bicycle stations; as a smart facility that can help to predict the number of bicycles, which should be available for use in every station. In addition, longer distance cyclists are likely to prefer restaurants on the route, while cyclists with a high recreational specialization level in the cognitive dimension (i.e. knowledge and skill) are unlikely to choose leisure routes. Although in their study no groups expressed a significant preference for the attribute of complete facilities, the interaction term of riding time in the multinomial model had a positive and significant effect, implying that this attribute had systematic differences in the preferences of the participants. Basic facilities are still insufficient for cyclists, and there is a need for additional facilities, such as restaurants, for cyclists engaging in extended cycling excursions. In addition, it is necessary to consider these marginal attributes when implementing bicycle-friendly environments to increase the popularity of cycling[7].

3.0 Bicycle Shaing System In Upm Serdang Campus:

The "green movement" started several years ago at UPM campus but still it is not functioning optimally. There are more than 2000 bicycles inside UPM campus which are sold to degree and bachelor students by university with bonus and discount to promote cycling as from the sharing program lots of bicycles were lost or broke and the program didn't work. Later in 2013 another movement start with the found of Coca-Cola company which was very interesting. The man station located at faculty of biology and they borrow bicycle in exchange of for empty cans or 8 plastic bottles from 8 am to 5 pm. Unfortunately, students didn't start using sharing system as it was expected. One of the most important part of any organization is the management and in this case university's authorities.

The students are interested to respondents green sharing system but the program extension is stopped and it just for specific area in main campus. Organizational management, in this case the university administration, are the pivotal part of any institution [9]. A large fund was specified by Coca-Cola Company to promote cycling at UPM. During the two years that this fund has been available, the progress of the objectives has been very sluggish, limited only to certain campus locations, and inadequate. Currently it seems to be at standstill. The program began without the basic research on the needs and preferences the cyclers, and evaluation of the campus and off-campus transportation facilities. Even the voluntary input and participation of the UPM campus experts on green design, road design, and landscaping, due to political issues, was not welcomed.

RESULTS AND DISCUSSION

From the questionnaire, opinion of respondents on their choice mode of transportation system was asked. Their knowledge of bicycle sharing system was asked. The respondents' opinions about features such as the cost, ease of use, comfort, security, accessibility, visibility, capacity, aesthetics, and user friendliness were asked.

In terms of background factors, it is necessary to distinguish the younger respondents -age group 17 to 20- from others in several terms of preferences. This age group was also more aware of bicycle sharing systems, using bicycle for transportation, and bicycle as a preferred mode of transport elsewhere. The finding of this study parallels the study which found that the age of respondents did influence their preference[8].

4.1 Bicycle Sharing System Awareness Factor:

The results showed that 56.27% of responders were not familiar with bicycle sharing system, while 43.73% were familiar. In this study the higher rate of awareness was among individuals who had diploma as their formal qualification (see Table 1) and this awareness encouraged them to use bicycles with more frequency than the other age groups. The age group ranking highest was 17 to 20 year old respondents (see Table2). This 17-20 year-old diploma trackers are in their last years of study. The main source of information at UPM, for these mostly Malay students, was social networks such as Facebook, which would publicize the Coca-Cola bicycle sharing program.

Table 1: Cross Tabulation of Familiarity with Bicycle Sharing System, and Formal Qualifications.

			Are you familiar with bicycle sharing system?		Total
			Yes	No	
No entry	Count		3	2	5
	% within Formal qualifications		60.0	40.0	100.0
Foundation	Count		14	20	34
	% within Formal qualifications		41.2	58.8	100.0
Formal qualifications	Diplomas	Count	26	27	53
		% within Formal qualifications	49.1	50.9	100.0
	Bachelor	Count	75	90	165
		% within Formal qualifications	45.5	54.5	100.0
	Master/Ph.D. (postgraduate)	Count	25	45	70
		% within Formal qualifications	35.7	64.3	100.0
	Total	Count	143	184	327
		% within Formal qualifications	43.7	56.3	100.0

Table 2: The Cross Tabulation between Familiarity with Bicycle Sharing System, and the Age Groups.

			Are you familiar with bicycle sharing system?		Total
			Yes	No	
No entry	Count		4	2	5
	% within Formal qualifications		66.7%	33.3%	100.0
17-20 years old	Count		32	36	34
	% within Formal qualifications		47.1%	52.9%	100.0
Age group 21-29 years old	Count		89	110	53
	% within Formal qualifications		44.7%	55.3%	100.0
30and above	Count		18	36	165
	% within Formal qualifications		33.3%	66.7%	100.0
No entry	Count		143	184	70
	% within Formal qualifications		43.7%	56.3%	100.0
Total	Count		143	4	2
	% within Formal qualifications		43.7	66.7%	33.3%

4.2 Owning A Bicycle Or Participating In A Bicycle Sharing Program: The Preference Index:

Almost 80% of the respondents preferred using their own bicycle instead of sharing system (see Table 3). This might have resulted from lack of information on advantages of sharing systems, or out of concern for responsibility of caring for the shared equipment. A third reason might have been lack of well-connected in-campus bicycle paths, and the difficulties associated with using the system's bicycles off campus. This may be a good subject to address in a future research project. According to the author's observations, bicycle-sharing system at UPM in Serdang campus is inadequate, with underdeveloped roadways and connections; this could be the main reason for inadequate utility of the sharing system by students.

There has been a large fund from Coca-Cola Company to increase cycling especially at UPM campus. During the two years that this program has been implicated, it has not been effective as had been expected; leading to waste of time and economical loss. The program began without the necessary research and knowledge of the in-campus transportation. Although the department related to green design, the road experts, and landscape designers were eager to promote cycling in UPM Serdang campus, due to some institutional political issues the "cycle to recycle" project at UPM came to a halt. The students are interested to participate in the green sharing system, but the program expansion stopped and remained limited to specific areas in the main campus. The lack of connected roads and unorganized sharing system, lead the students to prefer using their own bicycle instead of ones in the sharing program.

Table 3 Preference of Owning or Sharing Bicycle.

Own Bicycle or Sharing System	Number	Percent
No entry	5	1.53%
Own	261	79.82%
Sharing System	61	18.65%

Conclusion:

Public bicycle systems have attracted a great deal of attention in recent years, having been used as a new inner-city transportation mode that can be integrated with existing public transit systems in many cities. This study considers cycling in a campus area.

The optimal design of the public bicycle sharing system requires an integrated view that encompasses the travel costs of users, the facility costs of bike stations, the setup costs of bicycle lanes, as well as the service level. The main problem is that cycling roads are limited to specific areas which are not covering whole campus and it is a hold factor which makes students to avoid using sharing system. Bike riders should use some main roads which are not really safe for cycling. Second problem is that there is only a main station and users should bring back the bicycle to the main station by themselves which it is not comfortable as UPM Serdang campus is a vast area. It means the sharing system doesn't run completely. There should be reasonable number of trucks to move bicycles from main station to the vacant lock down stations as well as changing locking systems from manually to automatic in lock down station in whole campus. It is impossible to be informed how many bicycles are in each bicycle station while there is no tracking system. Also it is necessary to increase level of awareness about existence of sharing system in campus by running some cycling group activities inside the campus and promoting sharing system in university website which could be available for whole students. The well connected cycling road network inside whole campus is vital for succeeding the sharing system.

Future research would be useful in at least the following directions. First, It would therefore be useful in a practical application to include how the bicycle lanes can be created on the existing street network. Second, the travel demands may vary over a day (or a replenishment lead time). It would therefore be helpful to develop a formal model incorporating demand variation and to evaluate the influence of demand variation on the system design and routing choices. Third, the calculation of the bike inventory level at rental stations is conservative since the reuse is not accounted for. It would be helpful to develop a more accurate estimate.

REFERENCES

- [1] Gatersleben, B. and H. Haddad, 2010. Who is the typical bicyclist? *Transportation Research Part F: Traffic Psychology and Behaviour*, 13(1): 41-48. doi:10.1016/j.trf.2009.10.003
- [2] Yazid, M.R.M., R. Ismail and R. Atiq, 2011. *Procedia Engineering The Use of Non-Motorized For Sustainable Transportation in Malaysia*, 00. doi:10.1016/j.proeng.2011.11.147.
- [3] kaplan, kaplan and Morgan, 1970
- [4] Lin, Jenn-Rong, and Ta-Hui Yang, 2011. "Strategic Design of Public Bicycle Sharing Systems with Service Level Constraints." *Transportation Research Part E: Logistics and Transportation Review*, 47(2): 284-94. <http://linkinghub.elsevier.com/retrieve/pii/S1366554510000839> (September 23, 2013).
- [5] Froehlich, Jon, Joachim Neumann, and Nuria Oliver, 2009. "Sensing and Predicting the Pulse of the City through Shared Bicycling." (3): 1420-26.
- [6] Raviv, Tal, Michal Tzur, and Iris a. Forma, 2013. "Static Repositioning in a Bike-Sharing System: Models and Solution Approaches." *EURO Journal on Transportation and Logistics* 2(3): 187-229. <http://link.springer.com/10.1007/s13676-012-0017-6> (September 27, 2013).
- [7] Chen, Ching-Fu, and Pei-Chun Chen, 2013. "Estimating Recreational Cyclists' Preferences for Bicycle Routes – Evidence from Taiwan." *Transport Policy* 26: 23-30. <http://linkinghub.elsevier.com/retrieve/pii/S0967070X12000029> (March 28, 2014).
- [8] Yamashita, S., 2002. Perception and Evaluation of Water in Landscape: Use of Photo Projective method to compare child and adult resident's perceptions of Japanese river environment. *Landscape and urban Planning*, 62(1): 3-17
- [9] Abd-Razak, M.Z., N. Utaberta and A.N. Handryant, 2012. "A Study of Students' Perception on Sustainability of Campus Design: A Case Study of Four Research Universities Campus in Malaysia," *Res. J. Environ. Earth Sci.*, 4(6): 646-657.
- [10] Abd Razak, M.Z., N. Utaberta, N. Abdullah, M. Tahir and A. Che Ani, 2011. "Sustainable Campus Design in Malaysia: An Evaluation of Student's Perception on Four Research University Campuses," *Appl. Mech. Mater.*, 71-78: 4313-4316.
- [11] Ismail, N.A., N. Utaberta, M. Yazid, M. Yunos and S. Ismail, 2015. "Malaysia Going Greens: A Study on Community Commitment towards a Greener Urban Living Environment," *Adv. Environ. Biol.*, 9(95): 498-503, 2015.

- [12] S. Ismail, L., Lu Sun, S. Yusman Yusoff, N. Utaberta, M. Yazid Mohd Yunos and N. Atiah Ismail, 2015. "Public Awareness Hub through Urban Spaces Case of Kuala Lumpur Trash Museum," *Adv. Environ. Biol.*, 9(95): 445-451.
- [13] Mirrahimi, S., N.M. Tawil, N.A.G. Abdullah, M. Surat and I.M.S. Usman, 2011. "Developing Conducive Sustainable Outdoor Learning: The Impact of Natural environment on Learning, Social and Emotional Intelligence," *Procedia Eng.*, 20: 389-396.
- [14] Utaberta, N., M.A. Othuman Mydin, N. Ismail and S. Ismail, 2015. "IN THE SEARCH OF GREEN SCHOOL DESIGN IN MALAYSIA: AN OUTDOOR LEARNING EXPERIENCE OF RAINBOW TROOP AND TOTO CHAN," *J. Teknol.*, 75: 9.