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Research paper

Bike Sharing Operation: Case Study in Bandaraya Johor Bahru

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Abstract

Bike-sharing is a system that allows people to rent bicycle at one of 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. The main goal when implement bike sharing (BS) is to introduce non-motorized vehicles that can substitute other public transport with more positive impact towards the transportation systems. The objectives of this paper are to identify the facility for bike sharing operation in Bandaraya Johor Bahru and to promote Bike Sharing to citizen of Johor.

Keywords: *Bike sharing; Bike sharing operation; Bike sharing facilities; Green transport; Non-motorize transportation.*

1. Introduction

In this global era, and with the rapid of economic development, transportation plays important rules in our daily life. Transportation is used to move people and freight from point of origin to the point of destination. The transportation is a crucial part of the solution to the nation's economic, energy, and environmental challenges - helping to bring better quality of life [1].
However, the use of the automobile has very much contributed to global warming phenomena, environment impact, traffic congestion, traffic accident and consumption of land. Nowadays, many countries have initiated programs to attract people to use public transport instead of using their private vehicles as the first mode of transportation. As an alternative plan, bicycle was thought of as it is convenient, environmental friendly and economic means of transportation. Therefore, the use of bicycles has become trendy for road users travelling short distances, relieve traffic congestion and promote green transport.

1.1. Transportation Problem in Johor Bahru

With the status of industrial state in Malaysia, the foremost problem that could be identified in Johor Bahru is the increasing of private vehicles as more and more cars hit the roads which results in traffic congestion, especially during peak hours in CIQ area. As demand rises, the roads are incapable of easing traffic flow when there is a high volume of traffic, especially at intersections which lead to traffic congestion as according to the growth of private transport in Malaysia, especially at Kuala Lumpur, Penang, Johor Bahru and Kuching have an increased car population more than 35% [2]. The lack of transport facilities also a problem which for short distance travelling because people nowadays mostly prefer to drive their vehicles even though it is a short distance. Less parking availability also another form of road congestion. Furthermore, with over growing new business around the city of Johor Bahru and without sufficient parking space as the number of vehicles keep on increasing, it will be more congested. An increase in the number of cars will make the situation even worse as it contributes a negative impact to the environment. This study will help to improve the traffic condition around the city of Johor Bahru by making a smooth traffic system and less congested traffic situation. With the implementation of bike sharing system, Bike Sharing can substitute others vehicles and subsequently improve the overall health of the public and reduce environmental pollution.

1.2. Bike Sharing (BS)

Today, most countries have begun implementing public bike sharing program and its growth across cities in Unites States of America, Canada and Mexico [3]. The result has been an augmentation of the mobility options available to residents of these cities. Bike sharing is popularly known in varied names such as "Public-Use Bicycle" (PUB), "Bicycle Transit", "Bike Sharing" or "Smart Bikes" that provide users to pick up the bicycle at any station and point to point trips [4].
Bike sharing system is one of new transports that have been introduced, which allow people to rent the bicycle at the station provided around the city in specific time and the charges for rental will be based on how many hours that they have been using the bicycle. The idea of bike sharing is simple as a non-motorized transport service, which anyone who rental the bikes and can take a bike from one station and return it to another, making point-to-point distance trips. The bike sharing system is for short-term rentals whereby their aim is to provide the service to all users with the availability of bicycles even though at the peak hours' time. In particular, bike sharing bicycles are designed in ways that promote stability and slower speeds which avoid any accidents that could happen as their way of will harm the other moving people around the city.

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2. Methodology

2.1. Research Design

Research method used in this study is a quantitative method. It used to explore and understand the experience of the respondent on the subject matter [5]. Quantitative research has become an acceptable in form of research in many different academic and professions fields. In many of these fields, qualitative research represents an attractive and fruitful way of doing research. In this approach, the researchers will be able to gain the insight of respondent experiences without focusing on the specific concepts and added to the uniqueness of data collection and analysis. The use of quantitative approach in this study is more appropriate than the quantitative method to capture the personal experience of the respondent. The total number of respondent was decided based on the table using sample size formula for finite population [6].

2.2. Data Analysis

The main method used to gain information from the target respondents is by distributing of questionnaire. The data derived from this technique will be used as the core references in the data analysis process. Questionnaires was distributed to the respondents at the city of Johor Bahru on implementing bike sharing and the facilities that will meet their expectation. It is filled in the form of self-administered, group-administered or postal questionnaires. The respondents need to answers a set of questions. It can be used in formative and summative functions. The scale use in the questionnaire is to make the respondent answer the statement that has been written in the questionnaire [8].

Other method used is reliability test in order to measure the internal consistency. Normally, Cronbach's alpha is used to measure the reliability. It is used when there are many types of questions in the survey with scale in each question. From that, the reliability test can be measured. Reliability is one of the statistical tool to measure how productive the surveying instrument data [7]. Cronbach's alpha has its own formula. Figure 1 shows the formula of Cronbach's alpha

$$\alpha = \frac{n}{n-1}\left(1 - \frac{\Sigma Vi}{Vtest}\right)$$

n = number of questions

Vi = variance of scores on each question

V test = total variance of overall scores (not %'s) on the entire test

Fig. 1: Formula of Cronbach's Alpha

Cronbach's alpha has the rule to see the internal consistency of the question in the survey. The ranges of coefficient of alpha is to observe the reliability test. Table 1 shows the rule of Cronbach's alpha [3].

Table 1: The Rule of Cronbach's Alpha

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3. Results and Discussion

Based on data collection, the finding from this study are:

i. Only 31% male respondents know about BS as compared to 69% female respondents. It shows that female respondents have most knowledge about BS.

ii. According to survey, majority of BS users belong to group 22 to 25 years old which still generation Y and as from the survey more female user wish to use bicycle.

iii. 76% of respondents who are single will use the bike sharing. It is because the single passenger consists of teenager, middle age and student whereby they may not have their own vehicles and prefer to use public transport. As for respondents who are already married. They have own vehicles as medium of movement and they only use public transport for certain situation as this bike sharing also will be their medium transportation at Bandaraya Johor Bahru.

iv. 72% of respondent who work at Johor Bahru area mentioned that it is suitable to implement Bike Sharing with good operation system in this area.

v. Data shows the highest modes of transport that the respondent commute daily are with their own vehicles which is 59%, motorcycle is 15% and the least which is bus is 14%. Thus, they can use bike sharing to their exact destination because bus mostly will only stop at the nearest bus stop. Bus user has higher potential to use bike sharing as to move around Bandaraya Johor Bahru as it is cheaper and more reliable.

vi. 72% of respondents are mentioned that they already know about the existence of bike sharing as new transport modes that have been used in many countries or places before it brought into Malaysia. By introducing this new transport system, it helps the development of transportation and also economics. Meanwhile, the rest of the respondents do not know about BS.

vii. 77% respondents reported that they will use BS at Bandaraya Johor Bahru, which they trust and believe this new transportation mode can help them in many ways to reach their destination fast, cheap and efficient. The rest of the respondents which are 23% are not going to ride the bike sharing as they more prefer to use other type of vehicles as maybe from the female user view their appearance may not be suitable to ride the bicycle.

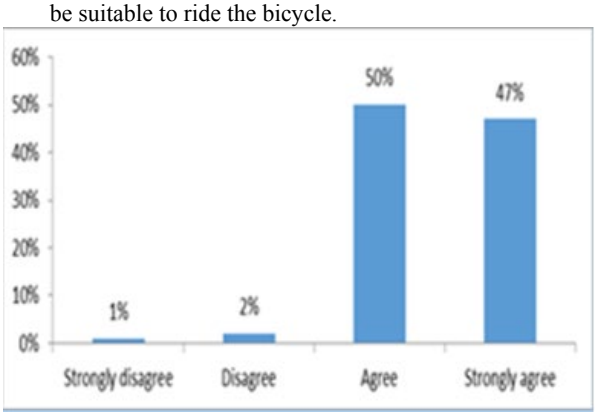

Fig. 2: Location of BS

i. Based on Figure 2, it shows strategic location of Bike Sharing station which could be located and convenient for the user. Around 50% of the respondents agree as the station should be installed at the strategic spot. Strategic loca-

tion of Bike Sharing station is very important and are highly been used by the user. Every strategic spot as makes it easier for the user to reach and to travel. It could help increase the efficiency of the operation to return the bicycle after rental.

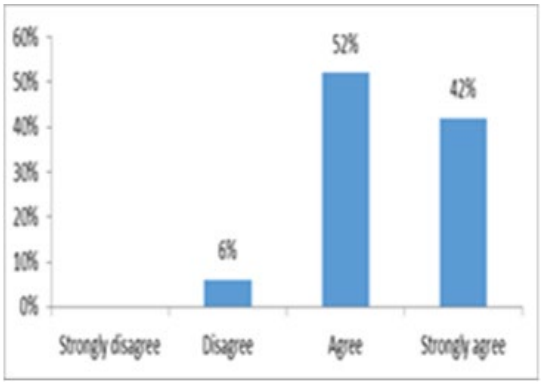

Fig. 3: BS as a New Mode of Transport

ii. Figure 3 shows the development in Bandaraya Johor Bahru will increase with the new modes of transportation which is Bikes Sharing. 52% of the respondents agree that the development can increased by having a easy movement in Johor Bahru area and at the same time it reduces the depency on private vehicles. Bike sharing is one of the top new transportations that have been installed in many countries as it received positive acceptance from the user.

iii. Several factors are being considered in order to implement bike sharing operation with the completion of a complete facility, systematic and sustained operation of "bike sharing." It will be able to convince user to use it .63% of the respondents agree that with perfect operation on facility, it has high possibility to succeed. Bike sharing operation must have complete facilities such as bicycle lane, docking station, bike sharing application and all safety measure.

4. Conclusion

The findings show that efficiency operational of bike sharing system is related to BS operation. Bicycle lane has play important role to determine the influence on operational performance of bike sharing system. The findings on the strategic location of BS station is to deal with one aspect of effectiveness of bike sharing systems where the bike station reflects the estimated tolerance time that a person would likely or willing to walk to the station. Travel time between BS station reflects the interconnection of user demand. From the findings, BS application should be imposed as it standardized where the technology application such as information about the station location, availability of bicycles facility provided all in the application. From these findings, there are several factor that are make researcher want to suggest for this improvement of the operation of bike sharing based on data that have been analyses that are related with the overall operation in terms of facility, infrastructure, system and payment method which is can influence the successfulness of the overall operation.

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