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User Satisfaction of Accessibility to Public Transportation

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Abstract
This study evaluates user satisfaction with the bus in urban areas to improve public transportation services. Thus, bus facilities, bus accessibility, safety, and fare are critical dimensions for investigating user satisfaction when accessing buses in Kota Kinabalu, Sabah, Malaysia. A total of 450 questionnaires were collected using a descriptive design and quantitative approach. The results show that the factors that need to be emphasized are bus accessibility and public transport facility factors. This study assists transportation authorities in addressing low-satisfaction areas to improve bus services and enhance overall public transportation use.

Keywords: Urban Transportation, Bus Service, Accessibility, User Satisfaction

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1.0 Introduction

The existence of public transportation plays a vital role in providing options for communities to move more efficiently, especially in urban areas. Public transportation is the lifeblood of modern cities, offering more than just mobility; it connects communities, reduces congestion, and supports environmental sustainability. User accessibility to buses refers to the ability of people to easily reach and use bus services. Where bus facilities, accessibility, safety, individuals, and fares affect user accessibility to buses. This was supported by Zakaria et al. (2024), who stated that effective public transportation can assist users in easily getting to the bus. This concept emphasizes justice to various layers of society without discrimination and how it affects community mobility and quality of life. It also plays an important role in urban planning and sustainable development to create inclusive and user-friendly environments.

In the era of globalization, transportation is an important element for society, whether in urban or rural areas. According to Mazdi et al. (2016), transport functions as one of the main indicators in improving the quality of life and community well-being. Among the forms of transport that play an important role in meeting these needs is public transport. The ineffectiveness of public transport services is one of the main challenges for a country in its efforts to develop a more efficient transport system to increase population mobility between areas. This is also the case in Kota Kinabalu, one of the fastest-growing areas in Sabah, where there is no clear benchmark to measure the effectiveness of public transport. On the other hand, local authorities only rely on public complaints as a guide to improve the weaknesses of public transport services (Noor et al., 2016). Kota Kinabalu which has reached the status of a city on 02 January 2000

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should have high accessibility to public transport due to better infrastructure facilities and roads which have been upgraded from time to time.

Therefore, the research is being conducted in Kota Kinabalu to address the specific transportation challenges faced by residents, where public bus services may not currently meet user needs in terms of accessibility and satisfaction. This has been supported by a report from August Dean (2023) that only 20% of people use public buses in Kota Kinabalu as of 2023. This study aims is to assist the authorities in improving the public bus system in Kota Kinabalu by identifying low levels of satisfaction among users when they want to access a bus. Therefore, the objective of this study was to evaluate user satisfaction with public transportation by identifying the main barriers to accessing bus services.

2.0 Literature Review

This study applies a cloud transport effectiveness model (Eboli and Mazulla (2011) and model accessibility (Geurs and Wee (2014) to measure user accessibility to buses. Therefore, four dimensions affect the accessibility of users to the bus, as described below;

2.1 Dimensions of User Accessibility to the Bus

2.1.1 Public Transportation Facilities

Public transport facilities refer to the infrastructure and services provided to help people around efficiently, which involves bus stops, footpaths, and also comfort on the bus. According to Zakaria et al. (2024), enhancing public transport facilities can improve user satisfaction and perceived safety. The planning and management of public transport is important for every society because if public transport is not comfortable and suitable, the negative effects will be obvious when society starts to feel comfortable using public transport, which can lead to even worse effects such as environmental pollution, road congestion, and poor mobility (Al-Jameel et al., 2023). According to Litman (2023), a nearby bus station with residential or workplace areas increases user accessibility to public transportation and provides satisfaction and less stress to individuals while traveling. Minimizing the distance to public transportation amenities improves accessibility (Eboli and Mazulla, 2011).

2.1.2 Bus Accessibility

The accessibility of public transport, especially bus services, refers to the ability of a transport system to reach and serve users efficiently, ensuring that all sections of society can access it without barriers (Twardzik et al., 2024). It is an important concept in ensuring equitable mobility, whereby every individual, regardless of socioeconomic background or geographic location, can use public transportation to meet their daily needs (Saravanan, 2019). High accessibility allows people to access employment opportunities, education, and health services more easily, directly contributing to an improved quality of life (Lin & Cui, 2021). Factors such as route planning, service frequency, and integration with other modes of transportation play an important role in determining bus accessibility (Zuo et al., 2020). When public transport accessibility is good, it can reduce dependence on private vehicles, thereby reducing residents' cost of living and increasing social equality (Geurs & Wee, 2014).

2.1.3 Safety

Safety is one of the factors that affect individual access to bus services. When users feel safe, they are more likely to use the bus as their daily transportation option (Stjernborg, 2024). A sense of security is also influenced by the presence of authorities or security personnel at the bus stop and on the bus itself (Ladin et al., 2021). Criminal incidents, such as theft and harassment, can prevent users from using the bus, especially at night or in poorly lit areas. In addition, traffic accidents involving buses or pedestrians can also affect people's confidence in using this service. Jacob and Aeron (2000) found that public vehicles in African and Asian countries are often poorly maintained and that drivers do not receive adequate training. Meanwhile, in a study by Silvano and Ohlin (2019), it was found that the attitude of the driver who moves the bus before the passengers sit down and the situation where the driver suddenly presses the pedal break is also one of the reasons why users do not want to access public buses.

2.1.4 Fare

Bus fares are one of the factors that affect individual access to public buses (Noor et al, 2014). Affordable fares ensure that more individuals, including those from low-income groups, can use basic transportation as their primary mode of transportation. Wang and Cocoran (2021) argued that passengers with different financial capabilities should be given a fare discount appropriate to the situation of their economy to achieve more prosperous journeys. Therefore, reasonable fares allow residents to use public transportation more frequently and can increase their satisfaction when accessing public transport services.

2.2 Research Gap

Although a study on public transport was conducted in Kota Kinabalu using the elements of public transport effectiveness, Noor et al (2014) focused on determining customer satisfaction with the quality of bus services, Ladin et al (2021) focused on the main factors of residents using public transport, and Saravanan (2019) discussed how public buses access residential areas. However, studies that focus on user satisfaction with accessing public public transport have not yet been deeply explored. In addition, this study has added an 'individual' element as a measure of satisfaction with accessing public buses in Kota Kinabalu.

3.0 Methodology

3.1 Data Collection and Sampling Approach

This study uses a descriptive, quantitative approach. A five-point Likert scale was used in the questionnaire to assess the satisfaction level of users with regard to the accessibility of public buses. This five-point scale is 1) very dissatisfied, 2) dissatisfied, 3) moderate, 4) satisfied, and 5) very satisfied (Sahatsathatsana, 2014).The questionnaires were distributed in the Kota Kinabalu district, Sabah, Malaysia.

The sample calculation in this study uses the Krejcie and Morgan formulas. With a population of 527,600 people in Kota Kinabalu (Jabatan Perangkaan Malaysia, 2020), the minimum sample required for this study is 384 people. Therefore, the maximum sample taken in this study is 450 people. This study also uses a qualitative approach as support for quantitative data by conducting field observation methods. In addition, data collection methods through secondary data have also been done in this study to support the raw data. In this study, the researcher used non-random sampling, which is a purposive sampling technique. Purposive sampling refers to a sampling procedure in which a group of subjects with certain characteristics are selected according to criteria set by the researcher as respondents to the study. The selection of respondents is from a background that often uses public bus transport. A pilot study was conducted to ensure the reliability of the instruments.

3.2 Data Analysis

As for data analysis, this study uses descriptive analysis, which is the percentage in the demographic profile of the respondents and the purpose of using the bus. Meanwhile, mean score analysis is used to determine the level of satisfaction with the user's accessibility to the bus according to the factors formed from the factor analysis. Therefore, data was analyzed using IBM SPSS Statistics software by displaying tables and graphs as a result of the study.

3.3 Limitation Acknowledged

Difficulty in distributing questionnaires to respondents in bus stop areas due to time constraints; therefore, we focused on distributing questionnaires in shopping center areas by ensuring that respondents were actual users of public bus transport before giving the questionnaire to be answered.

4.0 Findings

4.1 Demographic Profile of Respondents

Data show that users between 20 and 25 years old are more (35.7%) using public buses in Kota Kinabalu. Females are also among those who use public buses the most (67.4%). Meanwhile, in terms of marital status, single individuals had a higher number of people using public buses (70.2%). Finally, users with high school education backgrounds were more likely to use public buses (43.4%).

Table 1. Demographic Profile

Age	**Percentage (%)**
<19 years old	20.3
20-25 years old	35.7
26-30 years old	17.8
31-35 years old	8.6
36-40 years old	5.8
41-45 years old	5.8
46-50 years old	1.8
51-55 years old	1.8
56-60 years old	.9
>60 years	1.2
Gender	**Percentage (%)**
Male	32.6
Female	67.4
Marital status	**Percentage (%)**
Single	70.2
Married	25.5
Divorced/Widowed	4.3
Educational	**Percentage (%)**
Primary	7.1
Secondary	43.4
Diploma/A Level	33.8
Degree	12.3
Never school	3.4

4.2 Use of Public Buses

The main purpose of using the bus among users is to meet the closest people and do leisure activities, with the largest number at 53.2% followed by shopping at 43.7% and going to the market at 40.3%.

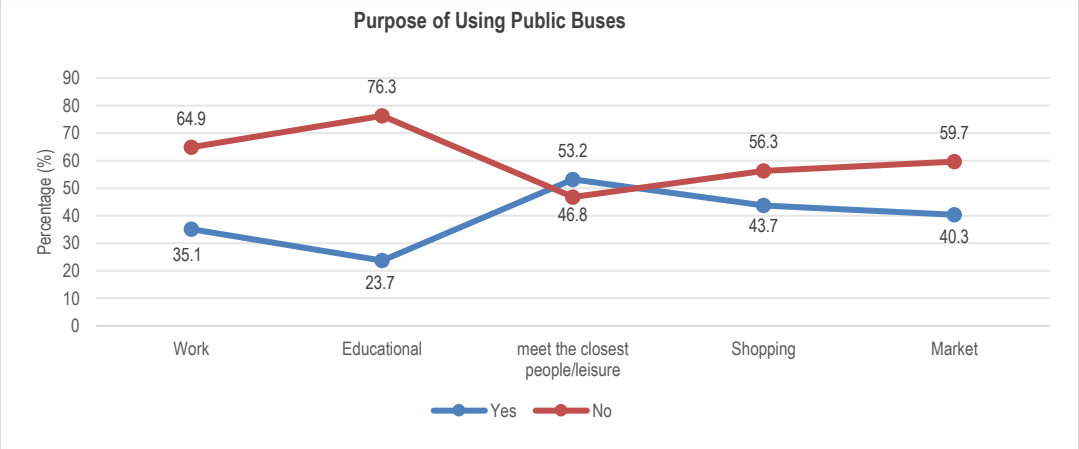

Fig. 1: Use of Public Buses

4.3 Users' Satisfaction with Public Transportation Accessibility

Table 2 explains the findings of user satisfaction with access to public transportation in Kota Kinabalu, Sabah. Based on the analysis, the factor of public transport facilities shows that there are three aspects that need to be emphasized because of the poor level of satisfaction among users. The lowest level in this factor is the footpath (mean score=2.30), second is the bus stop near the residential location (mean score=2.40), and bus stops near public facilities (mean score=2.80). These three aspects are barriers to user satisfaction with accessing public buses because bus stops and footpaths are important facilities for users to use.

The accessibility factor of public transport is the second factor that needs to be highlighted to increase user satisfaction because the findings show that three aspects that give less satisfaction to users to access public buses in this factor: waiting time (mean score=2.30), peak time bus access (mean score=2.30), and an efficient bus queuing system (mean score=2.20). Public bus users in Kota Kinabalu are not satisfied when they want to access public buses because the waiting time is between five and 30 minutes. In addition, the bus queuing system also leads to user dissatisfaction because this system takes a long time to fill passengers before a driver moves to the destination.

Table 2. Users' Satisfaction with Public Transportation Accessibility

Public Transport Facilities	**Mean**	**Average mean score**
Streetlights work well	3.60	
Well-paved roads make it easier for individuals to walk to the bus station.	3.60	
Bus stop near a residential area	2.40	
Bus stops near public facilities	2.80	
Good footpath to the bus stop	2.30	3.00
The air conditioner on the bus is in good condition.	3.40	
Comfortable space on the bus	3.30	
Luggage parking facility on bus	3.20	
Bus stairs that are easy to climb.	3.70	
The bell to stop the bus works well	3.50	
The bus is clean and fragrant.	3.30	
Accessibility of Public Transport Factor	**Mean**	**Average mean score**
Easy to change other bus transportation modes when reaching the destination	3.40	
Buses go to all public facility locations.	3.50	2.80
The waiting time for a bus is short	2.30	
Easy bus access at peak times	3.00	
Easy bus access during off-peak hours	2.30	
Efficient bus line system	2.20	
Safety Factor	**Mean**	**Average mean score**
The condition of the used bus	3.60	
Drivers obey road rules	3.40	3.50
Safe to use the bus at night	3.30	
Efficient bus drivers	3.60	
Individual (Personality) Factor	**Mean**	**Average mean score**
Good health when using the bus service	3.60	
Sufficient financial resources for bus transportation	3.70	3.80
It is important to have knowledge about bus operations.	4.00	
Fare Factor	**Mean**	**Average mean score**
The bus fare is reasonable for the distance	3.70	
Bus fares are displayed on the passenger side.	3.30	3.60
The fare method is easy and fast.	3.60	
Bus fares are cheap.	3.70	

5.0 Discussion

public transportation facilities can affect users' accessibility to public transport. In this study, users showed less satisfaction with the distance of a bus stop to a residential location, where the user explained that the provision of a bus stop is not suitable for a location that the user often needs. Due to the lack of bus stop facilities, users will wait for a bus on the side of the road without protection.

According to Litman (2015), if bus or train stations are close to residential areas or workplaces, then public transport accessibility will be better and provide satisfaction and less stress to individuals when traveling. This is parallel to the effectiveness model from Eboli and Mazulla (2011), that is, public bus facilities should be provided to increase user access to public transportation while increasing user satisfaction.

(a) (b)

Fig. 3: (a) Bus Users Waiting for a Bus on Side Roads; (b) Bus Users Waiting for a Bus on Side Roads

In addition, footpaths are also a cause of low accessibility for public transport users. Well-planned pedestrian facilities can increase the accessibility of pedestrians to the bus more quickly. Based on observations in the field, bridges were provided in some areas, but in other areas, such as the road between the Indah Permai and Sulaman locations, is still not comprehensive. In addition, the respondents also stated that there was no provision of alternative or temporary footpaths during the road development process in the Sepanggar area and Telipok Street, which made it difficult for users to cross the road safely. According to Boadi et al. (2024), public transportation providing better facilities for users is very important for safety and for promoting prosperous journeys. This point has been explained in the public-transport effectiveness model, that is, the provision of public transport infrastructure is crucial to make it easier for users to use public transportation (Zakaria et al, 2024).

(a) (b)

Fig. 4: (a) Passengers crossing a road without footpaths; (b) Passengers crossing a road without footpaths

Fig. 5: (a) Bus Queue System on the Side Road; (b) Bus Queue System on the Side Road;

According to De and Shaw (2023), user satisfaction with bus accessibility can be evaluated from the aspect of waiting for public transport to arrive in a short time. The study of Drabicki et al. (2023) explained that the willingness to wait for the arrival of the bus is

ideally between five and 10 minutes, while bus users in Kota Kinabalu wait for the bus between five and 30 minutes based on field observation and interviews. In addition, based on field observations, bus services in Kota Kinabalu usually use a bus queue system, where the bus queues in the line beside the road before it moves to deliver passengers to their destination. Because of this, many Kota Kinabalu users are not satisfied because they must wait longer on the bus until it is full of passengers. The bus waiting time is related to the accessibility model from Lin and Cui (2021) and Geurs and Wee (2014), where low bus accessibility causes user satisfaction to decrease due to the inefficiency of the bus in reaching the required location.

6.0 Conclusion and Recommendations

In conclusion, The effectiveness of public transport, including facilities and bus accessibility in Kota Kinabalu, has affected user accessibility to the bus. Users are less satisfied with long bus waiting times and bus stop distances that do not suit their residential location. In addition, insufficient footpath facilities also reduce access to the bus.

Therefore, this study provides suggestions for further improvements, such as providing an application that users can download on smartphones to obtain various forms of information about public transportation services in Kota Kinabalu. In addition, a comprehensive study by the authorities on the need for pedestrian paths and appropriate bus stops is essential in Kota Kinabalu, Sabah, to facilitate user access to buses and ensure the safety of users when crossing the road. A suggestion for future research is to conduct a study on the need for technology in public transportation and compare accessibility satisfaction between urban and rural users in Kota Kinabalu because this kind of study has not yet been implemented and needs to be given attention to prepare for a smart city in the future.

Paper Contributions to Related Fields of Study

This study contributes to improving public transportation services, especially in Kota Kinabalu, to increase user accessibility to buses.

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