Navigating Mobility: Analysing User Perceptions of Sustainable Transportation in Comparison Kuala Lumpur, Malaysia and Bali, Indonesia

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Abstract

This research aims to explore user perceptions of sustainable transportation in Kuala Lumpur and Bali, focusing on factors that influence mobility choices, awareness of available sustainable options, and the barriers to adopting these solutions. A total of 200 respondents participated in this study, providing insights into key aspects of urban mobility. The study examines users' awareness and knowledge of sustainable transportation options, such as public transit, cycling, and electric vehicles, and investigates the role of factors like cost, convenience, and environmental impact in shaping mobility decisions. Additionally, the research assesses respondents' attitudes towards sustainable transportation solutions and identifies the primary barriers to their adoption, including infrastructural limitations, social norms, and policy-related challenges. The findings contribute to understanding the current landscape of sustainable transportation in Kuala Lumpur and Bali and to offer recommendations for enhancing public engagement and policy formulation to promote greener mobility practices.

Keywords: Sustainable transportation, Public perception, Kuala Lumpur, Bali, Bus Rapid Transit, Urban mobility

1.0 Introduction

Sustainable transportation is a critical component of addressing environmental, social, and economic challenges in urban development (UN-Habitat, 2022; Brohi et al., 2018). As cities around the world continue to grow, the need for transportation systems that reduce environmental impact, improve mobility, and enhance quality of life becomes increasingly urgent (IEA, 2022; McKinsey & Company, 2022). Kuala Lumpur (KL) and Bali, two prominent regions in Southeast Asia, are each grappling with their own unique transportation challenges. While KL has made considerable progress in developing an integrated public transport system (KL MRT, 2023), Bali, with its reliance on tourism and a more limited infrastructure, faces different issues (Bali Transport Association, 2022; Bali Transportation Department, 2023).

This paper explores the state of sustainable transportation in both KL and Bali, highlighting the challenges they face and the efforts being made to promote more environmentally friendly and efficient transportation systems. Kuala Lumpur, the capital of Malaysia, has undergone significant transformations in recent years to develop a more sustainable

transportation system (Yusoff et al., 2021). The city's rapid urbanization and population growth have resulted in increasing levels of traffic congestion, making sustainable transportation a key priority for the Malaysian government (Besar et al., 2020).

One of the most significant developments in KL's transportation infrastructure is the expansion of its public transit system. The city has made considerable investments in its Light Rail Transit (LRT), Mass Rapid Transit (MRT), and Monorail networks, which serve as the backbone of its urban mobility system. The MRT lines, for example, provide efficient connections between the city center and suburban areas, offering an alternative to private car usage and helping to alleviate traffic congestion (KL MRT, 2023). Additionally, KL's GoKL free bus service provides eco-friendly options for short-distance travel within the city center, further promoting the use of public transport and reducing reliance on private vehicles.

In addition to public transport, the development of cycling infrastructure is a growing focus in KL. Although cycling has not historically been a dominant mode of transport, recent initiatives have aimed to expand cycling lanes, particularly in central areas and parks, to encourage healthier, more sustainable mobility (Malaysia Cycling Association, 2022). However, KL still faces significant challenges in this area, as the city's traffic patterns remain dominated by private car use (Nasrudin et al., 2019). Another important aspect of sustainable transportation in KL is the promotion of electric vehicles (EVs). As part of Malaysia's efforts to reduce carbon emissions and improve air quality, the government has introduced incentives for EVs, such as tax exemptions and subsidies for EV charging stations (Energy Commission of Malaysia, 2023). However, despite these efforts, KL's adoption of EVs remains limited, and further investment in infrastructure, such as charging stations and policies to promote EV adoption, is required to fully transition to a low-carbon transportation system (Energy Commission of Malaysia, 2023).Despite these advancements, KL faces significant challenges, primarily in the form of traffic congestion and high car ownership rates (Harumain et al., 2023). While public transport infrastructure has expanded, a large portion of the population still relies on private vehicles, contributing to the city's air pollution and ongoing traffic jams (Besar et al., 2020; Ali et al., 2022). To mitigate these issues, KL will need to continue expanding and improving its public transport systems, as well as introduce more comprehensive policies that incentivize sustainable alternatives (Ariffin&Zahari, 2013).

In contrast to Kuala Lumpur, Bali, a renowned tourist destination, faces a different set of challenges when it comes to sustainable transportation. The island's transportation system is characterized by its reliance on private vehicles, motorcycles, and taxis, with limited public transport options available to locals and tourists alike (Bali Transport Association, 2022; Bali Transportation Department, 2023). Motorcycles are the dominant mode of transport in Bali, due to their affordability and ability to navigate through narrow and often congested roads (Bali Transport Association, 2022). However, the widespread use of motorbikes has resulted in significant air pollution and traffic safety concerns (Bali Green Tourism Council, 2023).

Bali's tourism sector exacerbates these issues, as millions of international visitors rely on taxis, private cars, and rented motorbikes to explore the island (Bali Transport Authority, 2023). The public transport infrastructure in Bali is relatively underdeveloped, with only a few bus services, such as the Trans Sarbagita and Trans Metro Dewata network, available to locals (Bali Transportation Department, 2023). This limited connectivity hampers the development of a more sustainable transportation system (Bali Eco-Tourism Association, 2023).

However, the government has made efforts to improve public transport in recent years, such as expanding the bus network, though these initiatives have not been enough to significantly reduce reliance on private vehicles and motorcycles (Bali Transport Authority, 2023). Tourism in Bali also presents unique challenges for promoting sustainable transport. Given the island's heavy dependence on tourism, there is a growing need to offer environmentally friendly transport options for visitors. As a result, several resorts, hotels, and tour operators have introduced electric vehicles (EVs) and electric scooters as alternatives to traditional fossil-fuel-powered transportation (Bali Eco-Tourism Association, 2023).

Moreover, Bali has begun encouraging cycling and walking as sustainable alternatives for tourists and locals alike (Bali Green Tourism Council, 2023). Several areas, particularly in Ubud and parts of the Badung southern region, are promoting bike tours and pedestrian-friendly paths to reduce reliance on motorized transport. These initiatives, along with the introduction of electric vehicles, are part of Bali's broader strategy to address environmental concerns while supporting the local economy (Bali Eco-Tourism Association, 2023).Despite these efforts, the lack of comprehensive pedestrian infrastructure and the dominance of motorbikes continue to pose significant barriers to achieving a fully sustainable transportation system (Bali Transportation Department, 2023). Furthermore, the island's rapid tourism-driven growth has placed immense pressure on its infrastructure, necessitating a more coordinated approach to sustainable transportation planning (Bali Green Tourism Council, 2023).

Both Kuala Lumpur and Bali are taking steps toward developing more sustainable transportation systems, though they face different challenges based on their unique contexts. KL has made notable progress in expanding its public transit network and promoting electric vehicles (KL MRT, 2023), but it must overcome traffic congestion and high car ownership rates to achieve a fully sustainable system (Besar et al., 2020; Harumain et al., 2023). On the other hand, Bali's dependence on tourism and motorbikes presents significant hurdles, though the introduction of electric vehicles, cycling infrastructure, and eco-friendly transport options for tourists are promising steps forward (Bali Eco-Tourism Association, 2023; Bali Green Tourism Council, 2023).

For both regions, the transition to sustainable transportation will require continued investment in infrastructure, public awareness campaigns, and policies that encourage the adoption of alternative transport modes (McKinsey & Company, 2022; Nasrudin et al., 2019). The integration of sustainable transport systems is not only vital for reducing emissions and promoting environmental sustainability but also for improving the quality of life for residents and enhancing the tourism experience (UN-Habitat, 2022). By focusing on innovative solutions and long-term planning, Kuala Lumpur and Bali can pave the way for a more sustainable future.This research paper aims to address this gap by examining and comparing the user perceptions of sustainable transportation in these two rapidly urbanizing cities.

2.0 Literature Review

The urban mobility landscape in Malaysia and Indonesia has been a topic of growing concern, as the reliance on private vehicles and the associated environmental and social implications have become increasingly pronounced. In Kuala Lumpur, the public transport system has undergone various initiatives to enhance the bus and rail network, transform the taxi system, and integrate urban public transport (Brohi et al., 2018). However, barriers such

as weather, safety, security, and inadequate infrastructure have hindered the implementation of smart and eco-friendly mobility practices like cycling and car-sharing. (Brohi et al., 2018) A study in Malaysia explored the readiness of urban residents to reduce car usage and their perceptions of non-motorized facilities. The findings suggested that the majority of the population was not ready to forgo car travel in favour of cycling or walking. Furthermore, the study highlighted that attitude, lifestyle, and a high dependence on cars are crucial determinants of travel behavior, which have prevented a shift towards sustainable transportation options. (Nasrudin et al., 2019)

In contrast, research on sustainable mobility in Bali, Indonesia, is relatively scarce. However, some studies have examined the broader challenges faced by Indonesian cities in developing sustainable urban transport systems. Globally, the shift towards sustainable transportation has gained momentum, with various cities implementing strategies to address the environmental and social impacts of urban mobility. (Brohi et al., 2018)(Ariffin & Zahari, 2013) These include promoting public transportation, improving infrastructure for walking and cycling, and incentivizing the use of low-emission vehicles. The existing literature provides insights into the user perceptions and barriers to sustainable transportation in Kuala Lumpur, Malaysia. However, a comparative analysis of user perceptions and barriers in Kuala Lumpur and Bali, Indonesia, is lacking.

2.1 Global trends in Sustainable Transportation

As the world grapples with the impacts of climate change, rising urban populations, and increasing environmental concerns, sustainable transportation has become a central focus for governments, organizations, and cities worldwide. These efforts are aimed at reducing the carbon footprint of transportation systems, improving air quality, and creating more equitable and efficient urban mobility. The following section explores some of the key global trends in sustainable transportation that are shaping the future of urban mobility.

2.1.1. Transition to Electric Vehicles (EVs)

One of the most significant trends in sustainable transportation is the transition from traditional internal combustion engine (ICE) vehicles to electric vehicles (EVs). This shift is driven by the need to reduce greenhouse gas emissions, decrease air pollution, and lower dependence on fossil fuels. According to the International Energy Agency (IEA), the global EV stock reached 16.5 million in 2021, a substantial increase from just 3 million in 2017 (IEA, 2022). Many countries are adopting policies to encourage EV adoption, such as subsidies, tax rebates, and investments in charging infrastructure.

The rise of electric vehicles is also supported by advancements in battery technology, which have led to longer driving ranges and shorter charging times. Major automotive manufacturers, such as Tesla, Nissan, and General Motors, have committed to producing only electric or hybrid vehicles in the near future, signalling a broader industry-wide transformation.In addition to passenger EVs, there is also a growing trend in electric buses and trucks, particularly in cities aiming to decarbonize their public transportation systems. For instance, cities like London, Shenzhen, and Los Angeles have begun investing heavily in electric buses, with Shenzhen being the first city to achieve a fully electric bus fleet (Shenzhen Bus Group, 2021).

2.1.2. Expansion of Public Transit Systems

Public transportation is central to reducing car dependency and fostering more sustainable cities. Globally, cities are expanding and modernizing their public transit networks to provide efficient, affordable, and low-carbon alternatives to private vehicle use. This includes the development of high-speed rail, subway, light rail, and bus rapid transit (BRT) systems.

In Europe, countries like France, Germany, and the Netherlands have been investing in high-speed rail networks that connect cities over long distances, reducing the need for air travel and car trips. Similarly, cities like Bogota (Colombia) and Quito (Ecuador) have successfully implemented BRT systems, which offer fast and reliable public transit with minimal infrastructure costs (UN-Habitat, 2022).In Asia, countries such as Japan and South Korea continue to expand their highly efficient and technologically advanced public transportation systems, including the development of driverless trains and smart-ticketing solutions. These systems are designed not only to reduce carbon emissions but also to alleviate traffic congestion and improve overall urban mobility.

2.1.3. Active Transportation: Walking and Cycling

There is a growing recognition of the need to design cities that are more conducive to active transportation primarily walking and cycling. As urban populations increase, the demand for walkable, bike, friendly cities has risen. According to the World Health Organization (WHO), promoting walking and cycling is one of the most effective strategies for improving public health, reducing traffic fatalities, and cutting carbon emissions.

Global initiatives such as the C40 Cities and Open Streets programs are encouraging cities to close off streets to car traffic and open them up for pedestrians and cyclists. Cities like Amsterdam, Copenhagen, and Bogota have long been pioneers in promoting cycling as a primary mode of transport, with extensive cycling lanes, bike-sharing systems, and policies that prioritize cyclists and pedestrians over cars.The COVID-19 pandemic accelerated this trend as cities worldwide created temporary cycling lanes and widened sidewalks to enable safer social distancing and encourage outdoor mobility. The concept of "15-minute cities", where residents can access most of their daily needs within a 15-minute walk or bike ride, has gained traction in cities like Paris, Melbourne, and Milan (BRT+ Alliance, 2021).

2.1.4. Autonomous and Shared Mobility

The development of autonomous vehicles (AVs) and shared mobility services is transforming urban transportation systems. AVs are seen as a potential solution to reduce traffic congestion, improve road safety, and lower emissions. In many cities, trials for autonomous buses, taxis, and freight vehicles are already underway. For instance, cities like Singapore and San Francisco have conducted successful trials of self-driving taxis (National Renewable Energy Laboratory, 2022).

Alongside AVs, shared mobility services such as car-sharing, ride-hailing, and bike-sharing platforms are growing rapidly. Companies like Uber, Lyft, and Didi have revolutionized urban transportation by providing on demand, flexible transportation services that reduce the need for private car ownership. According to McKinsey&Company (2022), shared mobility services are expected to grow significantly, with a projected market size of $1.2 trillion by 2030.The combination of AVs and shared mobility offers the potential to significantly reduce

car ownership, ease congestion, and lower the environmental impact of transportation. However, issues such as regulatory frameworks, safety, and public acceptance still need to be addressed.

2.1.5. Green Infrastructure and Mobility Hubs

In line with sustainable transportation, there is an increasing emphasis on developing green infrastructure and mobility hubs. These hubs integrate various modes of transport, including public transit, car-sharing, bike-sharing, and pedestrian pathways, into one seamless, efficient system. Mobility hubs often serve as central points where people can switch between different transport modes, encouraging the use of public transport and sustainable mobility options.

Green infrastructure, which includes the creation of green spaces, green roofs, and environmentally friendly street designs, also plays a key role in making transportation systems more sustainable. For example, green streetscapes help reduce the urban heat island effect, improve air quality, and enhance the experience of walking and cycling in cities.

2.1.6. Policy and Legislation

Governments worldwide are adopting policy measures to drive the transition toward sustainable transportation. These policies include implementing carbon taxes, low-emission zones, and vehicle emission standards. For example, several European cities, such as London and Paris, have introduced low-emission zones where only electric or low-emission vehicles are allowed to enter, incentivizing the adoption of cleaner vehicles.

In addition to regulations on vehicle emissions, many countries have pledged to phase out petrol and diesel cars by specific dates, further accelerating the shift to electric mobility. For instance, Norway plans to ban the sale of new gasoline and diesel cars by 2025, and the UK aims to do so by 2030 (Norwegian Ministry of Transport, 2020). These policies are complemented by investments in electric vehicle charging infrastructure, public transport networks, and clean energy initiatives.

2.2 User Perceptions of Sustainable Transportation in Bali

In Bali, perceptions of sustainable transportation are shaped by the island's tourism-driven economy, reliance on motorbikes, and limited public transport infrastructure. While there is growing interest in promoting sustainable transportation options, the shift in user attitudes is gradual and varies across different user groups. Motorcycles are the dominant mode of transportation, both for locals and tourists. Motorbikes are affordable, convenient, and flexible, allowing users to navigate narrow and often congested roads. However, while this mode of transport is highly popular, it is also a significant contributor to air pollution and traffic accidents (Bali Transport Association, 2022). Many Balinese residents and tourists view motorcycles as a practical solution to the island's traffic and geographical challenges, even though they acknowledge their environmental drawbacks.

Car ownership in Bali is also widespread, particularly among tourists who rent vehicles for short stays. However, the large number of rental cars and taxis has contributed to rising traffic congestion in popular tourist areas like Kuta and Ubud. While the environmental impact of cars is widely acknowledged, many locals and tourists still view them as a more

comfortable and efficient mode of transport compared to buses or walking.Public transport options in Bali are limited, with the Trans Sarbagitaand Trans Metro Dewatabus service being the most notable initiative. However, the bus system is underutilized due to its limited routes, low frequency, and lack of integration with other transport modes. Most residents and tourists perceive public transport as inconvenient, slow, and unreliable. A survey by the Bali Transport Authority (2023) found that only less than 20% of residents regularly use public buses, with most preferring private transportation due to the flexibility and convenience it offers.

Despite the challenges, some users are beginning to recognize the need for more sustainable transport options. There is growing interest in electric vehicles (EVs) and electric scooters as alternatives to conventional motorbikes and cars. Several hotels and tour operators have introduced EVs and electric scooters to reduce emissions and attract eco-conscious tourists. Although these alternatives are gaining attention, they are still seen as niche products, often perceived as too expensive or impractical for everyday use by locals.Environmental awareness in Bali is closely linked to the island's tourism industry. Tourists, particularly those from environmentally conscious countries, often seek out eco-friendly transport options, such as bike tours and electric scooters. This growing demand is helping to raise awareness about the environmental impacts of conventional transport. Locals, however, are still more focused on the immediate practical benefits of transport options, such as cost, convenience, and speed. While the environmental impact of transport is acknowledged, it is not always a top priority when it comes to transportation choices (Bali Eco-Tourism Association, 2023).

Shifting user perceptions in Bali is challenging due to the entrenched reliance on motorbikes and cars. The culture of convenience, combined with limited alternatives and a lack of comprehensive infrastructure for sustainable transport, makes it difficult for residents to adopt greener options. The government's efforts to improve public transport and introduce electric vehicles are promising but face barriers in terms of cost, infrastructure, and consumer habits.

2.3 Transportation Challenges in Kuala Lumpur

2.3.1 Traffic Congestion

Kuala Lumpur, the vibrant capital city of Malaysia, has long been grappling with the persistent issue of traffic congestion, which has become a significant obstacle to the city's infrastructure and economic growth. As the demand for transportation in the city has increased, the abundance of private vehicles on the roads has led to severe traffic congestion, which has hindered the overall efficiency of the transportation system. (Besar et al., 2020) This problem is further exacerbated by the weak and slow improvement of traffic facilities, which has failed to keep pace with the city's growing transportation needs. (Besar et al., 2020)

Traffic congestion is a pressing urban mobility issue that worsens traffic flow and ultimately hinders economic development. A well-planned, systematic, and safe transportation system must be developed to address this challenge. The government has recognized the need for a comprehensive and integrated approach to improving the public transportation system, which includes traffic management, public transport, a road network, and infrastructure. (Rahman & Abdullah, 2016)

2.3.2 Public Transit Accessibility

The ineffective public transport system in Kuala Lumpur has significantly contributed to the reliance on private vehicles, further exacerbating the traffic problems.(Harumain et al., 2023)(Ali et al., 2022) The lack of a methodically integrated public transportation network from one place to another has forced people to rely on private cars for their daily commute. A more integrated and comprehensive approach is required to improve the public's mobility and address the significant problem of urban public transportation in the city(Hipogrosso&Nesmachnow, 2020)(Qian et al., 2020). This approach should enhance the regulatory framework, planning structure, and level of services delivered, ensuring a seamless and efficient public transportation system that meets the needs of the city's residents.

Despite the government's efforts to expand and enhance the public transportation infrastructure, the public's understanding and expectations of transit-oriented development near designated stations remain crucial. Expanding public transport opportunities provides a chance to develop transit-oriented communities, which can promote sustainable mobility behaviours and improve the city's overall liveability. (Li et al., 2022)(Uddin & Hoque, 2023)(Wan et al., 2023)(Sari, 2023)

2.3.3 Parking Availability

Another factor contributing to transportation challenges in Kuala Lumpur is the limited availability of parking. The lack of adequate parking facilities, especially in the city centre, has led to a high demand for on-street parking, further exacerbating traffic congestion(Mardiana, 2022)(Harumain et al., 2023)(Idris, 2022). The government has recognized the need to address this issue and has implemented various strategies, such as constructing multi-story parking facilities and introducing paid parking zones, to manage the limited parking space.(Yahya et al., 2022)(Ghafelebashi et al., 2023)However, these measures have had limited success, as they have not adequately addressed the underlying problems of transportation infrastructure and urban planning.

2.3.4 Infrastructure Limitations

The city's infrastructure limitations also influence the transportation challenges in Kuala Lumpur. The existing road network and public transportation infrastructure have struggled to keep up with the city's rapid urbanization and population growth, resulting in bottlenecks, congestion, and a lack of connectivity between different modes of transportation. (Besar et al., 2020) (Rahman & Abdullah, 2016) (Yap et al., 2021) (Ariffin & Zahari, 2013)The government has made efforts to address these infrastructure limitations, such as expanding the rail-based transit system and constructing new roads and highway(Dahim, 2021)s(Akuh et al., 2022). However, these efforts have faced various challenges, including funding constraints, land acquisition issues, and the need for better coordination between different government agencies responsible for transportation planning and development.

Despite these challenges, Kuala Lumpur is progressing toward a more sustainable and efficient transportation system. (Ariffin et al., 2015)(Yusoff et al., 2021)(Bagde et al., 2021)The city's ongoing efforts to improve public transportation, enhance infrastructure, and promote transit-oriented development are crucial to addressing its complex transportation challenges.

2.3.5 Urban Planning Considerations

The transportation challenges in Kuala Lumpur are also closely linked to the city's urban planning and development strategies. The dispersed and unplanned urban sprawl in the Klang Valley region, which includes Kuala Lumpur, has contributed to high motorization usage and the subsequent need for a comprehensive and integrated public transportation system. (Yusoff et al., 2021)

The government has recognized the need to align urban planning with transportation infrastructure development to address this.(Ariffin & Zahari, 2013)(Rahman & Abdullah, 2016) Transit-oriented development has emerged as a promising approach, which seeks to integrate land use and transportation planning to create compact, mixed-use communities around public transportation hubs.However, implementing this approach requires a deeper understanding of the public's expectations and a focus on factors such as a conducive pedestrian environment, affordability, the quality of the public transport system, and a compact and mixed-development concept.

2.3.6 Pedestrian Connectivity

Another challenge hindering the effectiveness of the public transportation system in Kuala Lumpur is the lack of a seamless, pedestrian-friendly environment. (Bakhtiar et al., 2022)(Naharudin et al., 2017)(Rashid et al., 2018)The limited connectivity between different modes of transportation and the poor quality of pedestrian infrastructure, such as sidewalks and crossings, have discouraged people from using public transit and walking as viable transportation options.

2.3.7 Ride-Sharing Alternatives

The emergence of ride-sharing services, such as Uber and Grab, has provided an alternative transportation option in Kuala Lumpur. These services have the potential to complement the public transportation system by offering users more flexibility and convenience.(Zulkifli & Yunus, 2019)(Nor et al., 2021)(Loong et al., 2019)(Salim et al., 2020) However, integrating these services with the existing public transportation network remains a challenge that must be addressed to ensure a seamless and well-coordinated multimodal transportation system.

2.3.7 Commuter Behavior Changes

Addressing Kuala Lumpur's transportation challenges will require infrastructural improvements and changes in commuter behaviour and attitudes. As the sources highlight, the public's understanding and expectations of the transportation system are crucial factors that must be considered in developing sustainable mobility strategies. (Yap et al., 2021) (Rahman & Abdullah, 2016) (Bagde et al., 2021) (Ariffin & Zahari, 2013)

3.0 Methodology

The research design for this study is a cross-sectional survey, which allows for the collection of data from a sample population at a specific point in time (Yuliarti et al., 2021). The quantitative approach was chosen to enable the analysis of numerical data and the identification of patterns and relationships between variables. (Yuliarti et al., 2021) The data for this study was collected through a survey questionnaire administered to residents in Kuala

Lumpur, Malaysia, and Bali, Indonesia. The questionnaire consisted of both closed-ended and open-ended questions, covering topics such as transportation mode preferences, attitudes towards sustainable transportation, and perceptions of infrastructure and services. The study used a purposive sampling technique to select participants. Residents from Kuala Lumpur, Malaysia, and Bali, Indonesia, were invited to participate in the survey. Data was collected from a total of 200 respondents, with 100 from each city. The collected data was analysed using multiple regression techniques to identify the factors that influence user perceptions of sustainable transportation (Yuliarti et al., 2021). The analysis of the survey data revealed several key findings regarding user perceptions of sustainable transportation in Kuala Lumpur, Malaysia, and Bali, Indonesia.

4.0 **Analysis & Finding**

4.1   **Findings at Kuala Lumpur**

4.1.1   User Awareness and Knowledge of Sustainable Transportation Options

The findings indicate a moderate level of awareness regarding sustainable transportation options among the respondents. While most participants recognize public transportation and cycling as sustainable alternatives, fewer individuals are familiar with carpooling, electric vehicles, and shared mobility services. The lack of awareness about available incentives and policies promoting sustainable transport further limits user engagement. Educational campaigns and improved information dissemination could enhance awareness and encourage behavioral shifts.
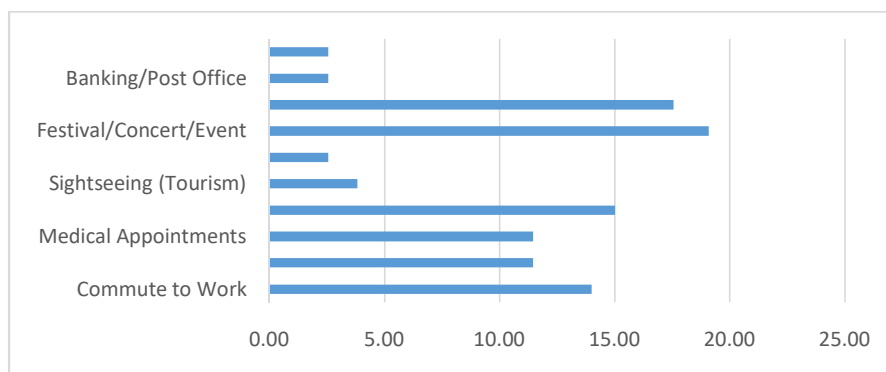

Figure 1. The purpose use bus for the trip

The findings indicate that 51.65% of respondents prefer using public transport during events, leisure activities and shopping(Figure 1). This suggests that such events encourage increased mobility for recreational and shopping purposes, leading individuals to opt for public transportationsuch as MRT, commuter trains, LRT, or monorailto mitigate traffic congestion. This is because the area usually has limited parking availability due to the crowd. Thus, taking public transport is more convenient and cost-effective than paying for vehicle parking fees.However, for activities related to social engagements, banking, postal services, or visiting family and friends, respondents tend to rely on private transportation, as it is perceived to be more convenient.This could be because the public transport infrastructure in KL and Bali does not fully cover all areas of the cities. In particular, residential areas are often difficult to access using public transport.
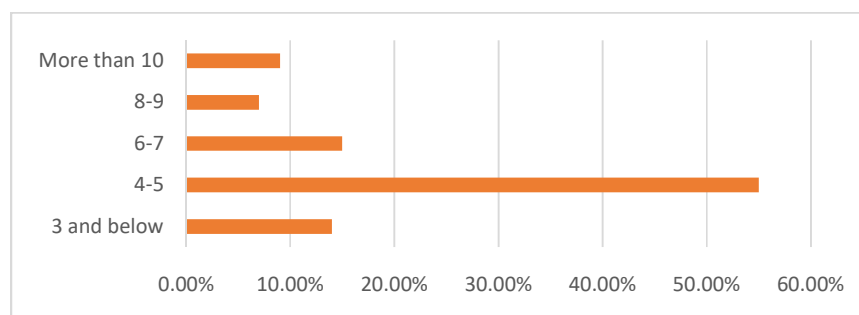
Figure 2. The frequently use the bus on a weekly basis

This finding aligns with the frequency of respondents using buses on a weekly basis, as the majority utilize public transport fewer than five times per week(Figure 2). This suggests the need for improvements in public transportation, including expanding coverage to a wider area to enhance accessibility and convenience for users. Additionally, increasing parking fees could serve as an incentive for respondents to opt for public transport in their daily activities.

4.1.2   Factors Influencing Mobility Choices

Several factors significantly influence transportation decisions among Kuala Lumpur residents. Cost remains the primary determinant, with many users opting for more affordable options such as public transport or motorcycles. Convenience also plays a critical role, as the availability, frequency, and reliability of transport services affect daily mobility choices. Environmental impact, while acknowledged by some respondents, is not a decisive factor for most. The preference for private vehicles stems from concerns over personal comfort, travel time, and safety, suggesting a need for policy interventions to make sustainable transport more attractive and practical.
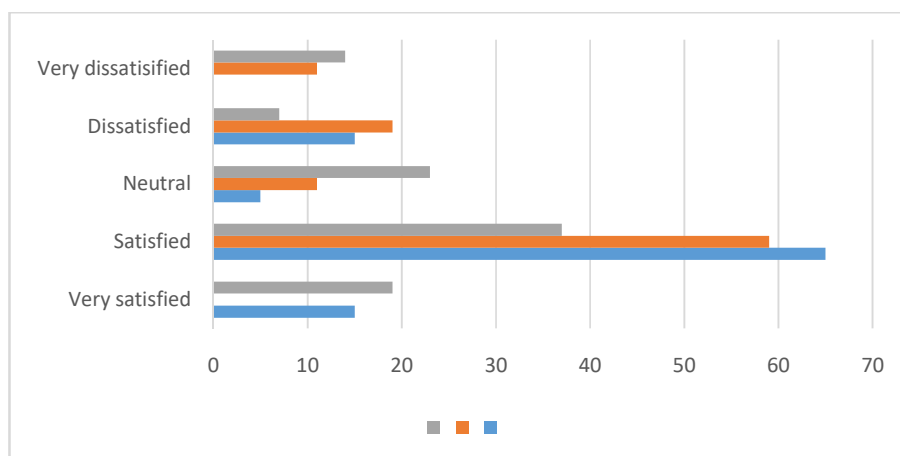

Figure 3. Routes Characteristics Satisfaction

The findings on Route Characteristics Satisfaction indicate that factors such as the location and distance between bus stops, the availability of buses based on passenger demand, and the alignment of travel routes with passenger needs significantly influence user satisfaction. As shown in Figure 3, more than 50% of respondents expressed satisfaction with these route characteristics, highlighting the adequacy of the current public transport network in meeting

user expectations. This may be because they understand the existing bus route plan, and the distance and location of bus stops are considered well-developed, making them accessible to main city area.
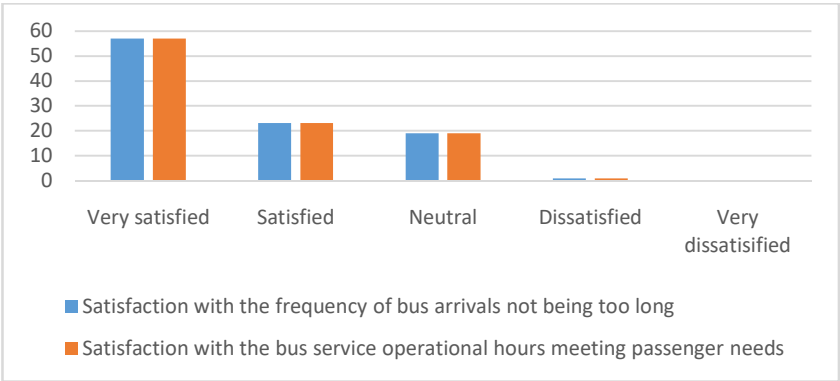

Figure 4. Service Reliability Satisfaction

Figure 4 shown that 57% of respondents are highly satisfied with the reliability of public transportation in Kuala Lumpur. This indicates that the current public transport system effectively meets user needs, likely due to the availability of multiple transit options, including MRT, LRT, Commuter, Monorail, and Bus Rapid Transit (BRT). The diversity of transport modes enhances accessibility and flexibility, allowing users to select the most suitable option based on their travel requirements.

The findings on passenger satisfaction of bus performance as public transport is confirmed based on comfort, cleanliness, fare, safety and security, and also environment with the description are as follows below
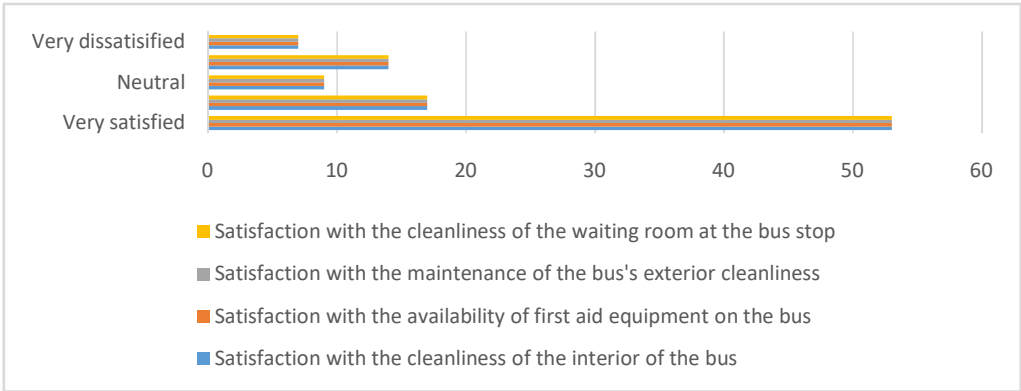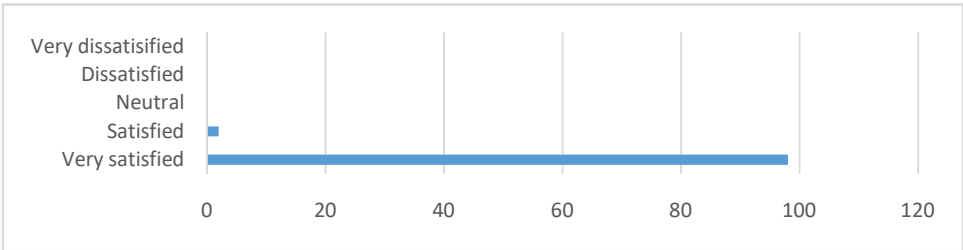
a. Comfort

Figure 5a. The Satisfaction with Bus Facilities

Figure 5(a) illustrates respondents' satisfaction with bus facilities, particularly in terms of passenger load capacity and air conditioning effectiveness, with 49% of respondents expressing high satisfaction. Additionally, 53% of respondents were very satisfied with the seating arrangement at bus stops. However, only 17% of respondents reported high

satisfaction with noise and vibration levels, indicating a need for improved bus maintenance and operational conditions to enhance passenger comfort

b.   Cleanliness
As shown in Figure 5(b), 53% of respondents were highly satisfied with the cleanliness of buses, including interior waiting areas and the provision of first aid equipment. This reflects the effective maintenance and hygiene standards upheld in public transportation

services.

Figure 5b.The satisfaction of Bus Cleanliness

c.   Fare
Figure 5(c) reveals that 98% of respondents were very satisfied with bus fare affordability. This suggests that government subsidies, particularly for Bus Rapid Transit (BRT), have successfully ensured cost-effective public transport, making buses an accessible mode of transportation for the public.
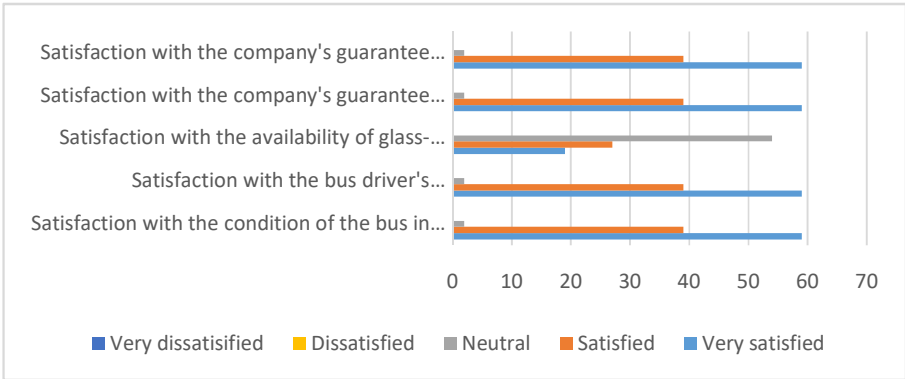
Figure 5c.The satisfaction of Bus Fare

d.   Safety and Security
According to Figure 5(d), 59% of respondents expressed high satisfaction with safety measures in public buses. This includes bus conditions, adherence to traffic regulations by drivers, orderly driving behavior, and security against criminal activities both on the

bus and at bus stops. These findings indicate that public transport operators prioritize passenger safety during both travel and waiting periods
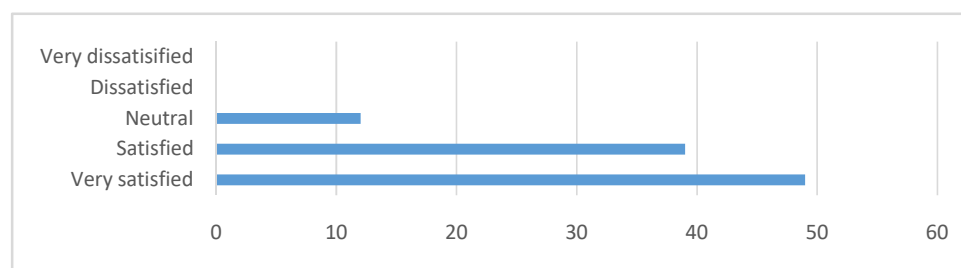

Figure 5d. The Satisfaction of Bus Safety and Security

e. Environment
As shown in Figure 5(e), 49% of respondents were very satisfied with the environmental performance of buses, particularly their minimal contribution to air pollution. This is largely attributed to the increasing use of battery-powered BRT systems, which aligns with efforts to enhance sustainability in public transportation. The integration of electric buses demonstrates a commitment toreducing carbon emissions and promoting eco-friendly urban mobility.

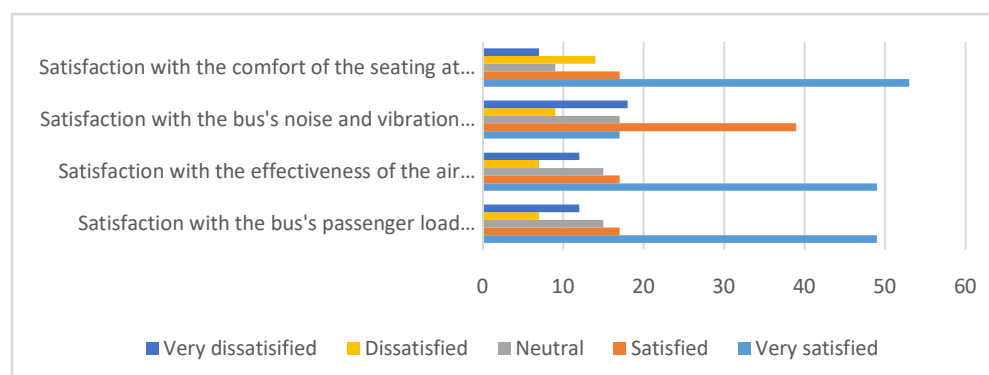Figure 5e. The Satisfaction of bus Environment

4.1.3   Attitudes towards Sustainable Transportation Solutions

The survey results suggest a generally positive attitude toward sustainable transportation, but a gap exists between intention and practice. Many respondents express support for environmentally friendly transport solutions; however, a significant portion remains hesitant to transition due to perceived inefficiencies in the current public transport system. There is also scepticism regarding the effectiveness of sustainability initiatives, with some users doubting the long-term impact of alternative mobility solutions. Enhancing public confidence in sustainable transport through infrastructure improvements and service reliability is essential.

The findings indicate a generally positive attitude towards sustainable transportation solutions in Kuala Lumpur. A significant portion of respondents expressed high satisfaction with affordability (98%), suggesting that government subsidies, particularly for Bus Rapid Transit (BRT), have successfully made public transport more accessible. Additionally, 59% of respondents were satisfied with safety, citing well-maintained buses, adherence to traffic

rules, and security at bus stops. Environmental sustainability also emerged as a key factor, with 49% of respondents appreciating the reduced air pollution from battery-powered BRT buses. The availability of multiple public transport modes, including MRT, LRT, Commuter, Monorail, and BRT, has enhanced accessibility and encouraged more sustainable travel choices.

4.1.4   Barriers to Adopting Sustainable Transportation in Kuala Lumpur

Key barriers hindering the adoption of sustainable transportation in Kuala Lumpur include infrastructure limitations, lack of integration among different transport modes, and societal preferences for private vehicles. The city's public transport network, while extensive, struggles with inefficiencies such as overcrowding, inconsistent service schedules, and limited last-mile connectivity. Additionally, cultural and habitual factors contribute to the reluctance to adopt alternative transport methods, with many residents accustomed to the convenience of private cars. Addressing these barriers requires a multi-faceted approach, including investment in multimodal transport systems, policy incentives, and behavioral change strategies.

Despite the positive perceptions, several barriers hinder the widespread adoption of sustainable transportation in Kuala Lumpur. One major challenge is limited route coverage and accessibility, as many respondents still rely on private vehicles for social engagements, banking, and visiting family due to the lack of convenient public transport connections. Additionally, only 17% of respondents were satisfied with noise and vibration levels, indicating the need for better vehicle maintenance and enhanced ride comfort. While public transport is perceived as environmentally friendly, further investments in eco-friendly technologies, such as expanding battery-powered bus fleets, are necessary to strengthen its sustainability benefits. Overcoming these challenges through improved route coverage, better maintenance practices, and enhanced user convenience could significantly increase public transport adoption and contribute to sustainable urban mobility.

4.2   Findings at Bali

4.2.1   User Awareness and Knowledge of Sustainable Transportation Options
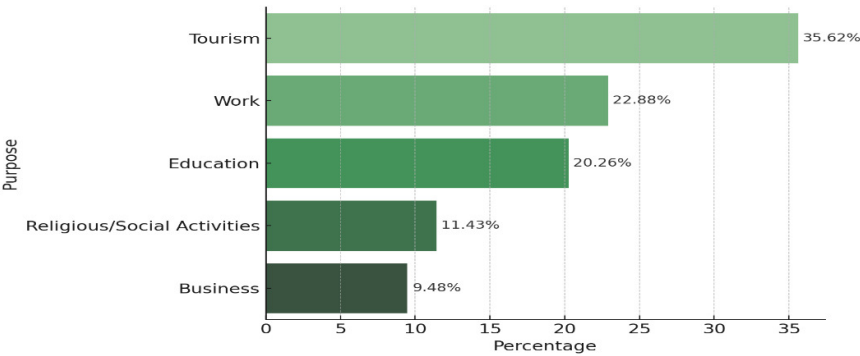
   a. The purpose use bus for the trip

Figure 6. Primary Purposes for Using Public Bus Transport

As shown on Figure 6, the predominant reason for using public transport in Bali is tourism related travel (35.62%), which aligns with the island's heavy reliance on the tourism industry. This indicates that not only local residents but also visitors are utilizing bus service, especially along high-traffic tourist corridors like Kuta, Sanur, Ubud, and Denpasar. The next largest groups include commuters (22.88%) and students (20.26%), reflecting the utility of public buses for daily activities such as work and school. Meanwhile, 11.43% use buses for religious or social purposes, consistent with Bali's strong cultural calendar and community-based practices. Only 9.48% cited business related travel as their primary reason, suggesting that the system is still less attractive to professional or commercial users. These findings emphasize that Bali's public transport system must support a multi-purpose user base: locals, students, workers, and tourists. Bus routes, schedules, and communication strategies should be adapted accordingly to serve diverse needs, especially during peak tourist seasons and school hours.

b. The frequently use the bus

The majority of respondents in Bali are frequent users of public buses, with over 64% using them at least 8 times per week. This indicates strong dependence on public transport among daily commuters, students, and lower-income populations. Only a small fraction (6.62%) reported using the bus fewer than three times per week (Figure 7), suggesting that occasional users make up a minority of the total ridership. The consistency of high-frequency usage supports the role of public transport as a primary mobility mode, rather than a supplementary one. The results emphasize the importance of maintaining service reliability and capacity to meet daily demand, especially during peak hours and to expand route coverage to ensure equitable access across different regions.
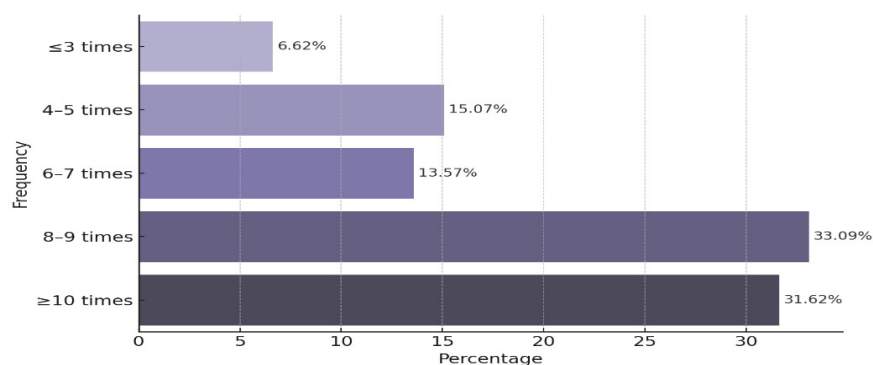

Figure 7. Weekly Frequency of Bus Usage

c. User Awareness of Sustainable Transportation Initiatives

This chart on Figure 8 presents the level of user awareness and understanding of key sustainable transport efforts in Bali, based on policy analysis and community response patterns. Public awareness of sustainable transportation options in Bali is developing alongside the rollout of key initiatives. The highest awareness levels are observed for established systems such as Trans Sarbagita (70%) and Trans Metro Dewata (65%), indicating that most users recognize Bali's operational bus rapid transit options. However, only 40% of respondents are aware of the BLEZI (Bali Low Emission Zone Initiative), a core regional program integrating e-mobility and clean transportation zones. Even fewer (30%) understand the broader

governmental green transport policies, suggesting a gap in public communication or education. Encouragingly, 55% of respondents understand the environmental benefits of using public transport, which aligns with Bali's goals to reduce carbon emissions and traffic congestion. These findings highlight the need for targeted outreach campaigns, especially around upcoming infrastructure projects like e-BRT corridors and BLEZI zones
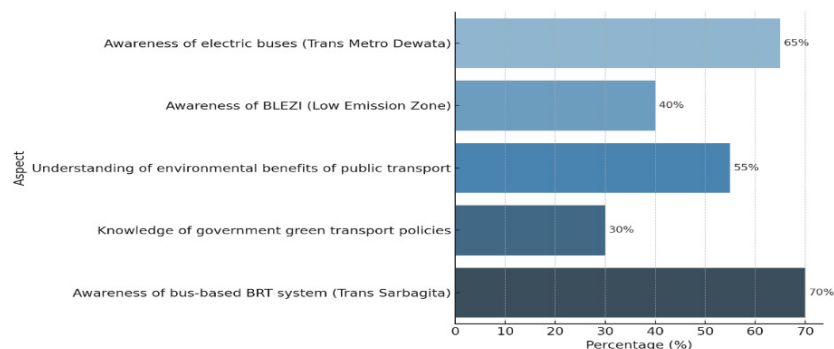

Figure 8. User Awareness of Sustainable Transportation Initiatives

4.2.2   Factors Influencing Mobility Choices (Route Characteristic, Cost, Convenience, Environmental Impact, etc.)

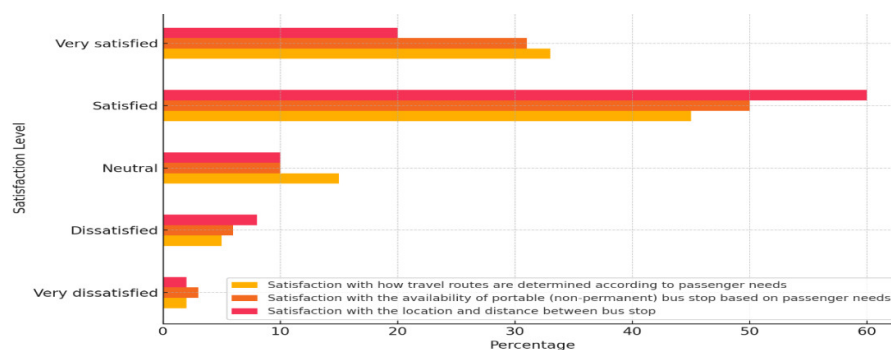a.   Route Characteristic Satisfaction

Figure 9a. Route Characteristic Satisfaction

The data suggests that most users are satisfied with the route characteristics of public transport in Bali as shown on Figure 9a.:
- The location and distance between bus stops receive the highest satisfaction, with 60% satisfied and 20% very satisfied, indicating effective stop placement in high-demand areas.
- Satisfaction with portable bus stops temporary or non-permanent facilities deployed based on demand, also scored positively (50% satisfied, 31% very satisfied), reflecting appreciation for flexibility and accessibility.
- The aspect of route determination based on passenger needs also showed strong results, with 45% satisfied and 33% very satisfied, though a slightly higher share of neutral and dissatisfied responses suggests room for improvement in aligning routes with actual travel patterns.

These findings reinforce that Bali's efforts in planning flexible, demand-responsive routes and stop infrastructure are being noticed by users. However, continued feedback mechanisms and adaptive planning, especially in rapidly changing areas could enhance user alignment and satisfaction further.
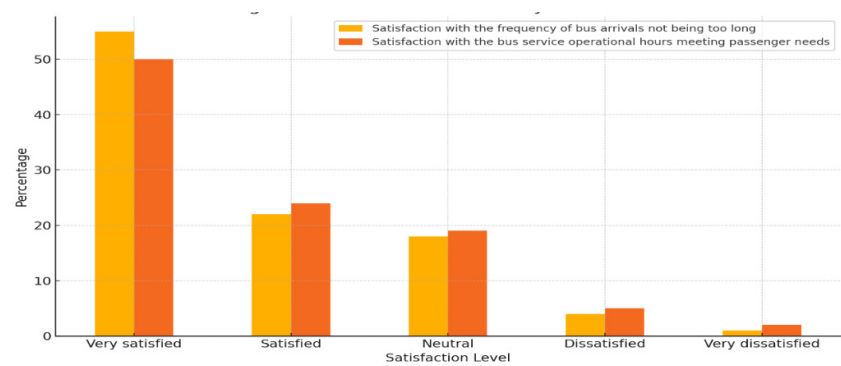
b. Service Reliability Satisfaction

Figure 9b. Service Reliability Satisfaction

A significant majority of respondents in Bali are very satisfied with the reliability of bus services (Figure 9b) :

- 55% of users reported being very satisfied with the frequency of bus arrivals, indicating short waiting times and consistent schedules.
- 50% are very satisfied with the bus operational hours, which implies that current schedules meet most user demands, especially for daily commuters and students.

Only a small percentage of users (5–6%) expressed dissatisfaction, suggesting that reliability is a strong point in Bali's BRT system performance. These results are similar to the Kuala Lumpur findings, where service reliability also received high ratings. This reliability is likely a result of operational improvements in the Trans Metro Dewata program. Maintaining punctuality and extending evening hours in tourist zones and education hubs could further increase user satisfaction and ridership.

c. Satisfaction with Fare, Comfort, Cleanliness, Safety & Security, and Environmental Performance
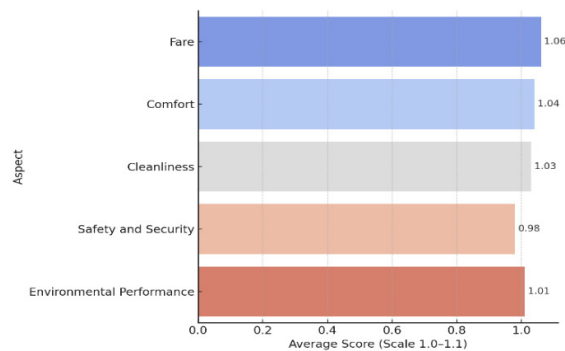

Figure 9c. Satisfaction with Comfort, Cleanliness, Fare, Safety & Security and Environmental Performance

Passengers in Bali expressed high satisfaction with the affordability of fares, scoring the highest at 1.06 (Figure 9c), which aligns with strong public support for the Trans Metro Dewata pricing model which is very cheap. Comfort (1.04) and Cleanliness (1.03) were also highly rated, reflecting the system's improvements in facilities and service standards. Environmental Performance (1.01)suggests that users appreciate Bali's move toward electric buses and sustainable transit. However, the score also implies that public awareness could still be improved. While still positive, Safety and Security received the lowest score (0.98), which may indicate perceived issues such as lighting at bus stops, road conditions, or a lack of enforcement presence, especially in less populated or evening routes. This result is comparable to Kuala Lumpur's findings, though Bali shows a slightly lower perception in safety, possibly due to different urban density and infrastructure readiness.

4.2.3   Attitudes towards Sustainable Transportation Solutions (Bali)

Survey responses in Bali indicate a generally positive attitude toward sustainable transportation, particularly among users who are familiar with public transport benefits and government led green initiatives. A majority of respondents expressed strong support for the use of public buses as a cleaner alternative to private motorcycles and cars, especially given the growing traffic congestion and air quality concerns in urban areas. Many passengers stated that they prefer environmentally friendly transport options, such as electric buses. The average satisfaction score for environmental performance (1.01) reflects this support, although it also highlights a need for better public education and communication about how the system contributes to reduced carbon emissions and improved air quality.

At the same time, some users still view traditional transport (e.g., motorcycles) as more practical or flexible, especially in less urbanized areas. This suggests that while support for sustainability is growing, it must be matched with service reliability, route coverage, and personal convenience to encourage long term behavioural change. Importantly, users also associate sustainable transport with affordable fares, comfort, and safety. These values are tightly linked to public perceptions of what makes a system "sustainable", not just environmentally, but also economically and socially. Bali's relatively high scores for fare affordability (1.06), comfort (1.04), and cleanliness (1.03) support the belief that sustainability must be user-cantered to be truly embraced. The attitudes in Bali demonstrate readiness for sustainable transport adoption, if the service continues to deliver practical, reliable, and affordable alternatives to private vehicles. Future policy and promotional efforts should focus on communicating the environmental impact of public transport.

4.2.4 Barriers to Adopting Sustainable Transportation in Bali

Despite growing awareness and favourable attitudes toward sustainable transportation, several structural and behavioural barriers still hinder its broader adoption in Bali.
a.   Limited route coverage remains a primary issue. While systems like Trans Metro Dewata and Trans Sarbagita operate in major urban zones, many residential and rural areas are not yet served, forcing residents to rely on private motorcycles or informal transport services. This "first-mile/last-mile" challenge makes public transport less practical for door-to-door travel, particularly in low-density regions.
b.   Schedule inflexibility and limited operational hours reduce public transport's appeal for shift workers, travellers in remote areas, or those with irregular travel needs. While

reliability scores were high regarding bus frequency, any inconsistency in early morning or evening services can discourage use, especially when compared to the convenience of private vehicles.

c. Cultural habits and social norms play a significant role. In Bali, motorcycles are deeply ingrained in daily life, valued for their speed, mobility, and affordability. For many families, owning a motorbike is seen as a basic necessity, especially for navigating narrow roads or balancing multiple personal errands. As a result, changing mode preferences requires not only infrastructure but also shifts in mind set and behaviour.

d. Infrastructure gaps, such as lack of shaded sidewalks, poor lighting at bus stops, or unclear signage make walking to or waiting at public transport points uncomfortable or unsafe. This particularly affects vulnerable groups such as women, the elderly, and people with disabilities.

e. Limited awareness of green policies also contributes. Although passengers are increasingly aware of electric buses, only 30–40% of respondents were familiar with BLEZI (Bali Low Emission Zone Initiative) or national sustainability targets. This information gap reduces the motivation to actively support and choose sustainable modes.

In summary, the barriers to adopting sustainable transport in Bali are both practical and perceptual. Addressing them requires an integrated approach in expanding coverage, improving accessibility, educating the public, and reshaping mobility culture toward long-term sustainability.

5.0   Discussions and Recommendation

Three key discussions emerge from the findings of this research.

5.1 Interpretation of Key Findings

The comparative analysis between Kuala Lumpur and Bali reveals that public attitudes toward sustainable transportation are generally favorable in both regions. In Kuala Lumpur, users appreciate the diversity of modes (MRT, LRT, Monorail, BRT) and the high level of service reliability (KL MRT, 2023; Yusoff et al., 2021). In contrast, users in Bali value affordability, comfort, and accessibility with particularly high satisfaction for fare and cleanliness (Bali Transportation Department, 2023; Bali Eco-Tourism Association, 2023). However, the frequency and intensity of public transport use are higher in Bali than in Kuala Lumpur. Over 64% of Bali respondents use buses more than 8 times per week (Bali Transport Authority, 2023), compared to more occasional usage patterns in KL.

Despite positive attitudes, both cities face barriers to wider adoption, including coverage gaps, safety concerns, and the dominance of private vehicles—motorcycles in Bali (Bali Transport Association, 2022) and cars in KL (Besar et al., 2020; Harumain et al., 2023). Environmental awareness is increasing, but it is not yet a primary motivator in mobility choices in either location (Nasrudin et al., 2019).

5.2 Comparison with Global and Regional Trends

Compared to global best practices in cities like Singapore, Seoul, or Amsterdam, both Kuala Lumpur and Bali are still in development stages in terms of fully integrated, sustainable mobility systems (UN-Habitat, 2022; IEA, 2022). Globally, successful systems emphasize multimodal integration, transit-oriented development (TOD), digital platforms, and strict

enforcement of low-emission policies (BRT+ Alliance, 2021; Norwegian Ministry of Transport, 2020).

Regionally, Kuala Lumpur is ahead in infrastructure investment, with an extensive rail network and multi-operator BRT services (KL MRT, 2023; Ariffin&Zahari, 2013). However, the modal shift to public transport remains modest, suggesting that behavioral and cultural barriers remain strong (Nasrudin et al., 2019). Bali, though smaller in scale, shows potential through public acceptance of buses, particularly Trans Metro Dewata and Trans Sarbagita (Bali Transportation Department, 2023; Bali Green Tourism Council, 2023).

5.3 Implications for Policy and Urban Planning

The findings suggest that policy and urban planning strategies must address both physical infrastructure and behavioral incentives. For both Kuala Lumpur and Bali, planners should prioritize multimodal integration with seamless transitions between buses, walking, cycling, and other modes (Li et al., 2022; Sari, 2023). Improving last-mile connectivity is crucial, especially in residential and peri-urban zones (Qian et al., 2020; Hipogrosso&Nesmachnow, 2020).

Moreover, environmental visibility should be enhanced through green branding of electric buses and public education campaigns (Energy Commission of Malaysia, 2023; Bali Eco-Tourism Association, 2023). Safety and inclusivity must also be strengthened to ensure accessibility for women, seniors, and people with disabilities (Bakhtiar et al., 2022; Rashid et al., 2018). Special attention should be paid to the dual role of transport systems in Bali, serving both tourism and local mobility needs (Bali Transport Authority, 2023).

5.4 Recommendations for Enhancing Sustainable Transportation Adoption

To enhance sustainable transportation adoption in Kuala Lumpur, several strategic measures should be implemented. Expanding public transport coverage by increasing bus and train network reach, particularly in underserved suburban areas, will improve accessibility. Enhancing last-mile connectivity through micro-mobility solutions such as e-scooters, bike-sharing, and feeder bus services can bridge gaps between transit stations and residential areas. Improving service quality and comfort by upgrading fleets with low-noise, energy-efficient vehicles and ensuring regular maintenance will enhance user satisfaction. To encourage public transport use, incentive programs such as discounted fares, congestion pricing for private vehicles, and higher parking fees in congested areas should be introduced. Additionally, promoting eco-friendly transport solutions, including battery-powered buses and renewable energy-powered transit systems, will contribute to environmental sustainability. Leveraging smart mobility technologies, such as real-time tracking, integrated ticketing, and digital applications, can optimize efficiency and ease of use. Lastly, public awareness campaigns should be intensified to educate residents on the economic, environmental, and social benefits of public transport, fostering a long-term shift toward sustainable mobility choices.

Despite efforts to enhance sustainable transportation, several challenges hinder its widespread adoption. Infrastructure and technological barriers remain significant, as inadequate public transport networks, limited last-mile connectivity, and outdated transit systems reduce efficiency and accessibility. The lack of smart mobility integration, such as real-time tracking and seamless ticketing, further discourages users from relying on public transport. Public

perceptions and cultural factors also play a crucial role, as many commuters still prefer private vehicles due to personal concerns about reliability, comfort, and convenience. Cultural habits and resistance to behavioural change make it difficult to shift toward more sustainable mobility choices. Additionally, economic constraints and accessibility issues limit adoption, particularly for lower-income populations who may find even subsidized transport costs burdensome. High vehicle ownership rates, coupled with relatively low fuel prices and affordable parking, make private transport a more attractive option. Addressing these challenges requires comprehensive urban planning, investment in modern infrastructure, and public awareness campaigns to encourage a shift toward sustainable transportation.

To promote sustainable transportation, government and institutional support is crucial in shaping policies, funding infrastructure, and enforcing regulations that encourage sustainable mobility. Authorities should invest in expanding and modernizing public transport networks, integrating smart mobility solutions, and implementing incentives such as congestion pricing and fuel taxation to discourage excessive private vehicle use. Strategies for enhancing public awareness and participation must focus on educating communities about the environmental, economic, and social benefits of sustainable transportation. Public engagement through campaigns, incentives for public transport users, and community-driven initiatives can foster long-term behavioural change. Additionally, urban planning and policy changes should prioritize transit-oriented development (TOD), improved pedestrian and cycling infrastructure, and mixed-use developments that reduce travel demand. Policies should also emphasize the adoption of green transport technologies, such as electric buses and renewable energy-powered transit systems, ensuring a sustainable and accessible transportation future.Shared Strategies for both cities:

a. Expand network coverage to underserved and suburban areas using data-driven demand forecasting.
b. Introduce unified payment and information systems across modes to simplify user experience.
c. Invest in cleaner fleets and smart transport technologies, including GPS-based tracking and electric vehicles.
d. Launch behavioural campaigns to shift social norms toward public transport, particularly among younger populations and working professionals.
e. Develop TOD hubs that combine transport, housing, commerce, and public space within walkable distances.

Bali-Specific Focus:
- Leverage tourism corridors to pilot green mobility initiatives.
- Strengthen BLEZI (Bali Low Emission Zone Initiative) visibility and community participation.
- Improve safety and infrastructure at stops and terminals, especially in rural areas.

Kuala Lumpur-Specific Focus:
- Address last-mile gaps in suburban districts with micro-mobility and feeder bus services.
- Strengthen policy enforcement on emissions and congestion pricing
- Promote integration of ride-sharing apps with public transport networks

6.0   Conclusion

This study examined user preferences, satisfaction, and perceptions toward sustainable public transportation in Bali, Indonesia, andKuala Lumpur, Malaysia, with a focus on bus-based systems. The findings reveal that both cities exhibit generally positive user attitudes toward sustainable transport, with public bus systems playing a critical role in supporting urban mobility.In Bali, users demonstrated high satisfaction with fare affordability, comfort, and cleanliness, and showed a strong dependency on buses for daily travel. Meanwhile, Kuala Lumpur users expressed greater appreciation for service diversity and reliability, supported by a more extensive multimodal transport infrastructure.

Despite these strengths, both locations face persistent challenges ranging from insufficient coverage and connectivity, to behavioural reliance on private vehicles, and limited awareness of environmentalbenefits. These factors underscore the need for more integrated, user-focused, and inclusive transport planning**.**Comparative analysis with global best practices highlights that Bali and Kuala Lumpur must go beyond infrastructure development by shifting mobility culture, promoting green technologies, and enhancing the policy and planning framework. Public satisfaction, while encouraging, must be supported by continuous improvement in service quality, accessibility, and environmental performance.

This research provides actionable insights for policymakers, planners, and operators aiming to improve the sustainability and attractiveness of public transportation in Southeast Asia. As urbanization and tourism continue to grow, cities like Bali and Kuala Lumpur must act decisively to build resilient, low-emission transport systems that serve both people and the planet

Acknowledgement

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