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MANAGING MOBILITY FOR SUSTAINABLE TOURISM: EVIDENCE FROM INDONESIA

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Abstract

Losari Beach, a prominent tourist destination in Makassar City, faces various challenges in mobility management during major events such as the Makassar International Eight Festival & Forum (F8). The surge in tourist numbers often results in traffic congestion, increased carbon emissions, and pressure on public infrastructure. This study explores the application of sustainable transport concepts to address these issues, which have become a concern for both local communities and visiting tourists during large-scale events in Makassar. Through multimodal and intermodal approaches, transportation modes such as shuttle buses, cycling lanes, and pedicabs can be integrated to create environmentally friendly systems that enhance connectivity and improve the tourist experience. Experiential Tourism theory emphasizes that modern travel is not simply a physical visit, but a search for authentic, transformative, and meaningful experiences that engage emotions, senses, and deeply engage with the destination and local communities. In the context of "Managing Mobility for Sustainable Tourism: Evidence from Indonesia," this theory serves as an important foundation. Sustainable mobility through access management, environmentally friendly transportation, and equitable tourist distribution can reduce overtourism, preserve cultural and natural authenticity, and ensure meaningful interactions between tourists and communities. This ultimately creates a deeper experience for tourists while maintaining the ecological and socio-economic sustainability of the destination. The revitalization of traditional transportation, such as equipping pedicabs with electric motors, is proposed as a short-distance transportation solution that not only supports carbon emission reduction but also reinforces the cultural heritage of Makassar. Additionally, transportation demand management (TDM) measures, such as high parking fees and incentives for using eco-friendly modes, can help reduce reliance on private vehicles in the Losari Beach area. This approach also encourages local community participation in sustainable transport systems through the training of pedicab drivers as tourist guides. The findings of this study indicate that sustainable transportation management in Losari Beach requires the integration of policies, infrastructure, and technology, as well as collaboration among governments, event organizers, and local communities. Implementing this concept not only reduces the negative environmental impacts of transportation but also aims to enhance the tourism appeal of Losari Beach by providing authentic cultural experiences. Consequently, this area can serve as a successful example of a sustainable tourism destination that empowers local communities.

Keywords: Transportation, Sustainability, Stakeholder, Collaboration

A. Intoduction

Tourist mobility plays a crucial role in achieving sustainable tourism, as it directly impacts the visitor experience, infrastructure efficiency, and environmental effects. In high-traffic tourist areas such as Losari Beach in Makassar City, mobility management presents significant challenges, particularly during major events. Without proper management, congestion, air pollution, and environmental degradation could hinder the area's potential as a premier tourist destination. Hence, it is essential to understand how mobility can be effectively managed to support sustainable tourism goals.

Several studies have explored the relationship between tourist mobility and sustainable tourism. According to Hall (2020), efficient mobility management significantly reduces the carbon footprint of tourist destinations.Vujko et al. (2025) emphasize the importance of smart technology in supporting tourism transportation systems. The critical role of stakeholder collaboration in reducing conflicts over space usage in tourism areas (Fatema et al. 2024). Vujko et al. (2025) examine how tourist behavior in choosing transportation modes affects destination sustainability (Vujko et al., 2025). Coghlan et al. (2023) focuses on energy management in tourist mobility to reduce emissions. These studies underscore the importance of a holistic approach to managing mobility to support sustainable tourism.

Losari Beach in Makassar City is one of Indonesia's premier tourism areas, known for its cultural, natural, and culinary attractions. Over the past three years, the beach has hosted numerous major events, such as the Makassar International Eight Festival and Forum (F8) and the Maritime Festival. These events have drawn thousands of domestic and international tourists (Adhi Satria Mulya et al. 2024), leading to a surge in mobility activities in the area. However, the increased volume of mobility has caused several issues, including traffic congestion, insufficient parking, and elevated carbon emissions. Consequently, Losari Beach provides an ideal context for studying mobility management strategies that support sustainable tourism objectives.

Although numerous studies have addressed the management of tourist mobility, most have focused on tourist destinations in developed countries (Hall, 2020). Research in developing countries, particularly in the context of large-scale events in urban tourism areas, remains limited. Additionally, smart technology approaches, as discussed by Gössling and Peeters (2015), are rarely applied in studies conducted in regions with developing infrastructure. Another gap lies in the lack of research integrating perspectives from tourists, destination managers, and local communities in analyzing tourist mobility. This study aims to fill these gaps by focusing on the context of Losari Beach.

The objective of this research is to develop strategies for managing tourist mobility that support sustainable tourism at Losari Beach, Makassar City, using the case of major events held at this iconic tourism destination. By integrating analyses of tourist needs, infrastructure capacity, and environmental impact, this study contributes theoretically to the literature on mobility management in urban tourism destinations in developing countries. Furthermore, the study is expected to provide practical guidance for local governments and stakeholders to enhance the quality of tourist experiences while supporting the environmental and social sustainability of Losari Beach.

B. Literature Review

1. The Concept of Sustainable Mobility in Tourism

The concept of sustainable mobility in tourism, as detailed in the literature, encompasses not only technical principles such as multimodality, intermodality, and transport demand management but also reflects the complex terrain where power, knowledge, social norms, and human behavior interact. To deeply understand how this approach is adopted, implemented, and sometimes challenged, it is highly useful to position it within a broader academic conversation using the lens of critical social theory. Two highly relevant yet distinctively emphasized theories are Michel Foucault's power/knowledge theory and Antonio Gramsci's theory of hegemony. By comparing these two theories, we can uncover how contextual factors whether in the form of discourse, institutional structures, or everyday practices fundamentally shape tourist behavior, government policies, and the dynamics in destinations like Losari Beach. This analysis will explicitly demonstrate the application of these theories, explore their points of convergence and divergence, and position them within a wider dialogue concerning sustainability, governance, and social change.

Both Michel Foucault's theory of power/knowledge production and Antonio Gramsci's theory of hegemony emphasize the importance of contextual factors in influencing human behavior, albeit through different mechanisms and foci. Foucault rejects the conception of power as something hierarchically possessed and purely repressive. Instead, he views power as a productive, dispersed network that operates through discourse, institutions, and everyday practices that discipline the body and mind. For Foucault, context is constructed through the "regimes of truth" prevalent in a given period what can be said, thought, and done. In the context of sustainable mobility, a Foucauldian approach would examine how discourses about "sustainability," "carbon efficiency," and "ecological appropriateness" are produced (e.g., through the ITDP Indonesia 2024 report, academic works like Gössling & Peeters 2015, or public awareness campaigns). These discourses are not neutral; they create subject categories (e.g., "responsible tourist," "green transport user") and define what is considered "normal" and "rational" behavior. Technologies such as real-time navigation apps (Schippl & Puhe, 2012) or digital ticketing systems can be seen as modern "panoptic" tools, subtly steering mobility choices and internalizing norms of efficiency and sustainability into tourists' routines. Context, here, is the terrain of discourse and technology that shapes individual subjectivity and autonomy in travel decision-making.

On the other hand, Gramsci's theory of hegemony focuses on how the ruling class (or power bloc) maintains dominance not only through state coercion (police, law) but primarily through cultural and ideological consensus reproduced in civil society schools, media, religious institutions, associations. Hegemony involves negotiation and the incorporation of subordinate groups' interests into the ruling class's project, making domination feel natural, accepted, and part of "common sense." In analyzing tourism mobility, a Gramscian lens would examine how the sustainability agenda potentially driven by government elites, international NGOs, or the upper-class tourism industry is made into a consensus. This is achieved through collaborations noted by Riana & Edison (2022) and Dredge & Jamal (2015), where the government and private sector engage local communities and small businesses, not to grant full power, but to secure their consent for specific policies (e.g., car-free zones, environmental taxes). These "partnerships" can become hegemonic tools if they obscure underlying conflicts of interest for instance, between the local residents' need for daily accessibility and the authorities' desire to create a "green" and exclusive destination for tourists. Context for Gramsci is the terrain of ideological struggle where certain values (such as tourism economic growth versus environmental conservation) are contested, and where consensus must be continuously rebuilt.

Both theories acknowledge that human behavior such as a tourist's choice of transport mode is never free from broader social contexts. Foucault would argue that such behavior is conditioned by discursive regimes and disciplinary practices, while Gramsci would emphasize that the choice is shaped by a hegemonic "common sense" that normalizes certain ways of viewing tourism and mobility. However, their key difference lies in emphasis: Foucault on power as micro, capillary, and productive; Gramsci on hegemony as a strategic class project involving negotiation and co-optation. Foucault might see "tourist education" (Becken, 2016a) as a disciplinary technology producing obedient subjects, while Gramsci might view it as an effort to build a new cultural consensus around travel ethics

2. The Impact of Tourist Mobility on Tourism Destinations

Tourist mobility has complex effects on tourism destinations, encompassing environmental, social, and economic aspects. On the positive side, it contributes to local revenue through tourist spending and creates jobs in the transportation and tourism sectors (UNWTO, 2019). However, negative impacts such as air pollution, traffic congestion, and environmental degradation often pose significant challenges (Gössling, 2002). Socially, increased tourist mobility can foster cultural interactions but also risks triggering conflicts due to overtourism or inequalities in access for local communities (Weaver, 2010).

To minimize these negative impacts, effective mitigation strategies are essential. For instance, developing environmentally friendly transportation infrastructure, such as bicycle lanes and electric vehicles, can reduce the carbon footprint (Becken & Hay, 2007). Additionally, educating tourists about responsible travel practices is a critical step in curbing environmentally harmful behaviors (Hall, 2011). Policies like limiting the number of visitors and imposing environmental taxes can also support the preservation of tourism destinations.

Hall (2020) explains that effective mobility management involves not only efficient

transportation but also careful consideration of social and ecological impacts. For example, cities with popular tourist destinations must manage surges in tourist numbers during holiday seasons to alleviate pressure on local infrastructure. Cohen & Peeters (2018) highlight that smart technologies, such as real-time navigation apps, can assist tourists in selecting more efficient routes and transportation modes.

However, these technologies must be integrated with transportation policies oriented toward sustainability to ensure positive impacts. Gössling & Peeters (2015) emphasize that reducing carbon emissions from tourism-related transportation can only be achieved if tourists are provided with environmentally friendly transportation options. They recommend integrating public transportation systems with non-motorized infrastructure, such as bicycle lanes and pedestrian pathways, to improve accessibility without compromising sustainability. This approach can be applied in Losari Beach to alleviate the strain on conventional transportation systems.

Sihombing & Sulaiman (2020) state that appropriate public transportation policies can reduce reliance on private vehicles, thereby mitigating congestion and lowering carbon emissions. They highlight the significance of sustainable transportation policies in Medan City, where the introduction of bus-based electric public transit has successfully improved air quality and reduced traffic density. In selecting public transportation services, particularly those supporting tourism, three key components must be considered: the activity system, the network system, and the movement system. These elements are critical to ensuring that transportation infrastructure aligns with the needs of tourism while promoting efficiency and sustainability.

3. The Role of Technology in Managing Tourism Mobility

Technology plays a crucial role in supporting efficient and sustainable tourist mobility. Nowadays, equipping tourist mobility with GPS-based navigation applications such as Google Maps and Waze is essential, as these tools help tourists select the fastest or most energy-efficient routes to reach their destinations (Schippl & Puhe, 2012). Additionally, Intelligent Transportation Systems (ITS) enable real-time data integration to optimize the use of public transportation and reduce traffic congestion (Zhou et al. 2014). For instance, digital ticketing technology simplifies tourists' journeys while also reducing paper usage.

Real-time data from Internet of Things (IoT) devices further enhances transportation management in tourist areas. By monitoring tourist travel patterns, authorities can identify congestion points and design more effective solutions, such as providing additional shuttle buses or rerouting traffic (Feng et al. 2021). Electric vehicle technology and shared transportation services like Grab and Gojek, which are widely utilized by the public, also support the efficiency of tourist mobility while reducing carbon footprints (Wang & Fu, 2017). Gössling & Peeters (2015) reinforce the idea that tourist destinations should prioritize sustainable transportation modes such as public transit and electric vehicles.

Implementing these strategies not only reduces environmental impacts but also enhances the destination's image as a location committed to sustainability. By integrating advanced technologies into mobility management, tourist destinations can achieve greater efficiency, eco-friendliness, and appeal to environmentally conscious travelers. The implementation of these technologies requires investment in digital infrastructure and human resource training. Beyond technological support, the management of tourist mobility can be conducted in a more transparent, inclusive, and efficient manner, thereby supporting the overall sustainability of the tourism sector.

4. Sustainable Transportation Strategies in Tourist Areas

Significant increases in tourist numbers during major events can have both positive and negative impacts on tourism destinations. Hall (2020) explains that while large-scale events often boost economic revenue, they also carry the risk of environmental damage if not properly managed. For example, at Losari Beach, traffic congestion and increased air pollution are common during major festivals such as the Makassar International Eight Festival and Forum (F8). Wahyuni & Kurniawan (2018) note that similar events in destinations like Bali place significant pressure on existing transportation infrastructure, particularly when managers lack effective strategies to handle traffic flows.

Environmentally friendly transportation strategies are crucial in creating sustainable tourist areas. A primary strategy involves developing infrastructure for non-carbon transportation in tourist zones. Such infrastructure not only reduces carbon emissions but also enhances the tourist experience by providing direct access to natural and cultural attractions

(Litman, 2013). Public transportation also plays a vital role in these strategies. Improving the quality and accessibility of public transit, such as tourist buses or light rail systems, can reduce reliance on private vehicles (Rahmawati, 2019). Policies establishing car-free zones in certain tourist areas, such as Ubud in Bali, have demonstrated success in reducing air pollution while enhancing the destination's appeal (Handayani, 2022).

According to Becken (2016b), one effective way to manage the negative impacts of tourist mobility is to implement strategies that restrict private vehicles in designated zones during events. This approach has proven effective in other tourist destinations, such as Singapore, where car-free zones are utilized to improve air quality. Cohen & Peeters (2018) further emphasize the importance of monitoring mobility impacts through real-time data. At Losari Beach, for instance, this technology can be used to track traffic flow and provide tourists with information on faster alternative routes. Such measures also enable destination managers to respond more quickly and effectively to mobility issues.

Dredge and Jamal (2015) offer another perspective, identifying that managing the impacts of mobility requires a community-based approach. Local communities must be involved in the planning and implementation of mobility strategies to ensure that the policies align with their needs. This approach is particularly relevant in areas like Losari Beach, where major events often affect the daily activities of local residents. Dredge and Jamal (2015) also highlight the need for cross-sector collaboration involving governments, transportation operators, and local communities. Such collaboration is essential to creating inclusive transportation systems that support the sustainability of tourist destinations. At tourist sites like Losari Beach, this approach is crucial, as it engages multiple stakeholders in the management of the area.

Becken (2016a, 2016b) emphasizes the importance of educating tourists about the environmental impacts of mobility. Awareness campaigns, for instance, can encourage greater use of public transportation by tourists. This is a crucial strategy in areas like Losari Beach, which often experiences traffic congestion during major events. In this context, mobility management should align with the social and economic goals of the tourism destination.

Gössling & Peeters (2015) suggest that tourism destinations should adopt a systemic approach to mobility management. They recommend integrating public transportation systems with non-motorized infrastructure, such as bicycle lanes and pedestrian paths, to improve accessibility without compromising sustainability. This approach can be applied at Losari Beach to reduce the strain on conventional transportation systems.

Schwanen and Wang (2014) add that such strategies must consider spatial and temporal aspects to ensure optimal accessibility for both tourists and local residents. Moreover, incentives for users of green transportation, such as discounts for bicycle or electric vehicle users, can encourage the adoption of sustainable practices. Public education about the benefits of eco-friendly transportation is also an integral part of this strategy (Pratama, 2020). Government policies, such as imposing carbon taxes or providing subsidies for green transportation, play a critical role in promoting the widespread implementation of these strategies.

C. Methodology

1. Research Design

This research employs a qualitative descriptive design using a case study approach centered on the management of tourist mobility at Losari Beach, Makassar City. The qualitative design was chosen because it allows an in-depth exploration of social, infrastructural, and environmental interactions that occur during large-scale tourism events such as the Makassar International Eight Festival & Forum (F8).

The case study approach facilitates contextual analysis of the relationship between tourist transportation modes, sustainable mobility policies, and local community participation. It enables researchers to understand how sustainable transport concepts such as multimodality, intermodality, and transportation demand management (TDM) are implemented in a real-world tourism setting. Grounded in Experiential Tourism theory, which positions subjective, emotional, and transformational experiences as the core of tourist activities, travel is understood not merely as an act of movement but as a process of sensory, emotional, cognitive, and even spiritual engagement. From this perspective, transportation is no longer seen as just a technical utility but as an essential element that actively shapes the overall tourist experience.

The research design consists of three main stages:

1. Preparation Stage identifying stakeholders (tourists, transportation operators, local authorities, and community leaders) and formulating interview guidelines based on Sustainable Transportation and Experiential Tourism frameworks.

2. Data Collection Stage – conducting field observations, semi-structured interviews, and document reviews to obtain primary and secondary data.
3. Analysis and Interpretation Stage thematically analyzing collected data to identify patterns, validate findings through triangulation, and formulate recommendations for sustainable transportation management in the Losari Beach area.

This design ensures comprehensive understanding by integrating theoretical insights, stakeholder perspectives, and empirical field data, thereby enhancing the study's validity and practical contribution to sustainable tourism development.

In this study, Experiential Tourism theory serves not only as a theoretical foundation but as the unifying thread that integrates all research stages. Specifically, it: Guides the formulation of research questions and the selection of participants, Focuses data collection on qualitative dimensions and personal perceptions, and Provides an interpretive lens for understanding the meaning of the data and for developing holistic, human-experience-oriented recommendations.

Through this approach, the research aims to generate a profound understanding of how the transportation system can be managed not just to facilitate tourist mobility but also to foster emotional and cognitive engagement. Ultimately, it seeks to contribute to sustainable tourism by cultivating positive experiences, enhancing satisfaction, and encouraging more responsible tourist behavior.

2. Instruments

The instruments used in this research were developed in alignment with qualitative data collection methods and the study's objectives.

a) Interview Guidelines (Semi-Structured Interviews)

Designed to capture stakeholders' perceptions regarding tourist mobility, transportation infrastructure, and sustainable practices.

1. Key question themes include:
    1) Tourists' transportation preferences and experiences during events.
    2) Perceived environmental and social impacts of mobility.
    3) Effectiveness of public transportation and non-motorized modes.
    4) Community involvement in transportation management.
    5) Policy measures promoting eco-friendly transportation.
2. Respondents: tourists, pedicab drivers, transportation officials, local residents, and event organizers.

b) Observation Checklist

Used to systematically record on-site conditions at Losari Beach, including:

1) Traffic congestion levels during events.
2) Use of different transportation modes (pedicabs, shuttle buses, bicycles).
3) Availability and quality of pedestrian and cycling infrastructure.
4) Waste management and environmental cleanliness.
5) Compliance with vehicle-free zone policies.

1. Document Analysis Sheet
    1. Utilized to review secondary sources such as:
        1) Local government transportation policies and tourism development plans.
        2) Event reports and sustainability assessments.
        3) Statistical data on tourist arrivals and transportation volume.
    2. Each document is evaluated based on relevance, credibility, and contribution to the sustainable mobility framework.

3. Technique of Data Analysis

Data analysis in this study follows the thematic analysis technique, suitable for qualitative inquiry aiming to identify key patterns and meanings from textual data.

The analytical process involves several stages:

1. Data Reduction – Organizing raw data from interviews, observations, and documents into manageable categories. Irrelevant or repetitive data were filtered to retain only information directly related to sustainable mobility and tourist behavior.
2. Coding Process – Assigning codes to recurring ideas, such as *"traffic congestion," "eco-*

friendly transport," "tourist experience," "community participation," and *"policy implementation."* Coding was conducted manually and cross-checked for consistency.

3. Theme Development – Grouping similar codes to identify broader analytical themes. The main themes emerging from this process included:
    1) Effectiveness of transportation modes.
    2) Environmental and social impacts of tourist mobility.
    3) Stakeholder collaboration and community empowerment.
    4) Integration of cultural and technological innovations in mobility.
4. Triangulation – Data validity was ensured through methodological triangulation by cross-referencing interviews, field observations, and secondary documents. Divergent findings were discussed and reconciled to achieve interpretive depth.
5. Interpretation and Conclusion Drawing – The final stage synthesizes thematic findings into conceptual insights, linking empirical evidence with the theoretical frameworks of Sustainable Transportation (Schiller et al. 2010) and the Tourism Experiential Continuum (Hall, 2008). This integration enables the researcher to derive policy recommendations for sustainable mobility management in urban coastal destinations.

C. Findings and Discussion

1. Findings

The study conducted in the Losari Beach area of Makassar City provides several critical insights into mobility management and its interconnectedness with the principles of sustainable tourism. The findings reveal how environmental conditions, infrastructure limitations, transportation systems, stakeholder engagement, and cultural aspects collectively shape the mobility dynamics of one of Makassar's most iconic coastal destinations.

1). Environmental and Infrastructure Challenges

Losari Beach currently faces significant environmental degradation as a result of improper waste disposal, ongoing reclamation activities, and inadequate sanitation management. These environmental pressures have gradually reduced the ecological quality of the area, posing long-term risks to both the tourism appeal and the well-being of local communities.

Large-scale events such as the *Makassar International Eight Festival & Forum (F8)* further intensify these challenges. During such events, there is a noticeable increase in waste generation, air pollution, and noise levels. These factors place additional strain on the city's public infrastructure, including drainage systems, pedestrian spaces, and waste management facilities. The resulting environmental decline not only threatens the sustainability of the coastal ecosystem but also undermines the visitor experience and the area's reputation as a sustainable urban tourism destination.

Inadequate infrastructure, particularly in relation to waste management and sanitation facilities, exacerbates the environmental problem. Temporary infrastructure adjustments made during major events are often insufficient to accommodate the sudden surge in visitor numbers. As a result, pollution levels spike, and the long-term environmental carrying capacity of the Losari area continues to diminish.

2). Transportation Inefficiency and Congestion

Traffic congestion remains a persistent and complex issue, especially during large-scale events or peak tourism seasons. The city's heavy reliance on private vehicles—cars and motorcycles reates a severe imbalance in mobility modes, as public transport options remain limited and poorly coordinated. The lack of reliable, affordable, and accessible public transportation significantly affects the movement of both tourists and residents. In addition, the scarcity of designated parking areas, combined with the absence of effective intermodal integration, leads to severe bottlenecks around key tourism nodes. These problems result in longer travel times, increased fuel consumption, and reduced visitor comfort, ultimately diminishing the overall efficiency of tourist mobility in the area.

Furthermore, congestion near the main access points of Losari Beach disrupts pedestrian and cycling movement, which should ideally form part of a sustainable and visitor-friendly mobility ecosystem. The absence of clear traffic management policies and limited enforcement of

parking regulations contribute to recurring inefficiencies that hinder the area's potential to develop a well-structured sustainable mobility system.

3). Stakeholder Perspectives and Mobility Patterns

Interviews and field observations reveal that various stakeholder groups—tourists, local vendors, transportation operators, and community leaders—perceive mobility constraints as a major factor affecting both the quality of the tourism experience and the local economy.
Tourists often express frustration with the lack of accessible public transport and pedestrian infrastructure, while local vendors and transport operators note that inefficient mobility systems reduce visitor turnover and limit business opportunities. The overreliance on private transportation not only creates congestion but also restricts the equitable distribution of tourism benefits among local communities.

While major tourism events such as F8 stimulate economic activity by attracting large visitor numbers, these benefits are often offset by logistical challenges, including traffic delays and restricted movement of goods and people. Vendors report losses due to reduced accessibility during peak congestion hours, and tourists often experience fatigue and dissatisfaction stemming from long travel times and disorganized traffic flow. Thus, the imbalance between economic gain and logistical strain highlights the urgent need for integrated mobility planning that aligns economic growth with sustainability principles.

4). Cultural and Experiential Potential of Local Transport

One of the unique features of Losari Beach's mobility landscape is the presence of traditional pedicabs (*becaks*), which hold significant cultural and experiential value. These locally operated vehicles offer tourists a distinctive means of exploring the area while engaging directly with local heritage and community identity. However, the current use of pedicabs remains largely informal and economically unsustainable due to limited modernization and lack of institutional support.

The study highlights the potential of revitalizing pedicabs through the introduction of electric-powered models and digital integration, such as app-based booking systems. Such innovation not only reduces carbon emissions but also enhances the appeal of local transport as a form of sustainable cultural experience. Electrified pedicabs could serve as an eco-friendly, low-impact mobility option, reinforcing the authenticity of Losari as both a cultural and environmentally conscious destination.

This approach could also attract younger demographics and environmentally aware tourists seeking immersive and sustainable forms of travel. By transforming traditional transport into a symbol of modern sustainability, Makassar can preserve cultural heritage while meeting contemporary mobility demands.

5). Proposed Sustainable Transport Model

Based on the analysis, the study proposes an integrated *multimodal transport system* for the Losari Beach area. This system would combine electric pedicabs, shuttle buses, dedicated cycling lanes, and pedestrian pathways to create a balanced, inclusive, and environmentally responsible mobility network.

To effectively manage visitor flow and reduce congestion, a *zoning system* is recommended, consisting of three key areas:

a) Core Zone: the central tourism area, designated primarily for pedestrians and non-motorized vehicles.
b) Buffer Zone: a transitional area accommodating shuttle buses, e-pedicabs, and limited access for service vehicles.
c) Accessibility Zone: the outer area serving as an entry point for private vehicles and parking facilities.

In addition, the implementation of *Transportation Demand Management (TDM)* strategies is crucial. These may include the introduction of higher parking fees to discourage excessive car

use, the provision of subsidies for eco-friendly transport modes, and the establishment of car-free days or areas during major events. Collectively, these measures can help balance demand, enhance accessibility, and support the city's transition toward sustainable urban mobility.

6). Community Empowerment and Technological Integration

Community participation is identified as a cornerstone of sustainable transport management. The study emphasizes that empowering local actors—particularly pedicab drivers—through training and certification programs can significantly enhance service quality. Training these drivers to act as cultural ambassadors or local guides would not only improve tourist interaction but also generate new livelihood opportunities rooted in local identity and pride.

The integration of digital technologies plays an equally important role in this transformation. The development of mobile applications for ride-hailing, route information, and digital payment can modernize traditional transport modes, making them more efficient and user-friendly. Moreover, a digital mobility platform could serve as a coordination tool connecting tourists, operators, and local authorities, ensuring transparency and reliability within the system. Supporting infrastructure is essential for the effective operation of this model. This includes establishing charging stations for electric vehicles, installing clear wayfinding signage, and developing green corridors that link major attractions. Such infrastructure not only improves functional connectivity but also enhances the aesthetic and ecological quality of the tourism environment.

2. Discussion

Sustainable transportation in the Losari Beach area should prioritize accessibility, efficient travel, and minimizing environmental impacts. This aligns with the principles of sustainable transportation, which emphasize intermodality, multimodality, and transportation demand management (Schiller et al., 2010). One example of a suitable mode of transportation is the use of **becaks** (pedicabs). These are not only environmentally friendly but also offer cultural value and a unique experience for tourists. Integrating such transport options can enhance both the sustainability of the area and the quality of the visitor experience.

a) Revitalization and Modernization of Local Becaks

Conventional transportation modes, such as **becaks** (pedicabs), can be modernized to become part of a green transportation system. Revitalizing becaks involves installing electric motors to reduce manual effort, enhance travel efficiency, and lower carbon emissions. Additionally, the design of becaks can be upgraded to improve customer comfort and safety by incorporating features such as ergonomic seating, night lighting, and heat-resistant roofs. To achieve this, the principles of multimodality and intermodality which emphasize the use of diverse transportation modes and seamless connections between them are essential.

Becaks can be integrated into an intermodal transportation system, connecting passengers to integrated parking areas or public transportation terminals such as shuttle buses or park-and-ride facilities on the city outskirts. As the final leg of the journey to Losari Beach, becaks provide a culturally unique way for tourists to experience Makassar. Visitors can use digital booking applications to reserve becaks in real-time, similar to modern ride-sharing services. This approach enhances convenience and travel efficiency while preserving a distinctive cultural element of Makassar's heritage.

b) Motorized Vehicle-Free Zone

Establishing a motorized vehicle-free zone around Losari Beach would position **becaks** (pedicabs) as the primary mode of transportation in the area. The goal of this policy is to reduce the negative impacts of transportation, such as air pollution and traffic congestion, in alignment with principles of sustainable transportation planning. For short-distance travel within this zone, becaks are an ideal option. Additionally, concepts from the Experiential Continuum related to tourism offer further possibilities. According

to Hall (2008), becaks can be transformed into a symbol of tourist transportation, providing an authentic travel experience. They can be used for thematic tours focusing on local history, culture, and cuisine, adding educational and experiential value for visitors. This approach not only enhances the tourist experience but also strengthens the identity of Losari Beach as a sustainable and culturally rich destination.

c) Transportation Demand Management (TDM)

To reduce the number of private vehicles entering the Losari Beach area, strategies for managing transportation demand are essential. Incentives such as high parking fees for motorized vehicles and low fares for **becaks** (pedicabs) can provide viable solutions. By emphasizing transportation demand management, this approach aims to alleviate traffic congestion and minimize environmental impact, encouraging visitors to opt for more environmentally friendly modes of transportation. Additionally, transportation options that offer a high experiential value, such as becaks, can attract tourists as a sustainable and culturally enriching choice. Policies that restrict motorized vehicles, particularly during major events or activities at Losari Beach, are also necessary to reduce reliance on private vehicles. These measures contribute to creating a more sustainable and accessible transportation system while enhancing the overall visitor experience.

d) Education and Empowerment of Becak Drivers

Becak drivers can become reliable tour guides with proper training. This training should cover communication skills, knowledge of local history and culture, and the ability to use digital booking technology. By empowering drivers to take ownership of their vehicles, local transportation not only serves as a means of mobility but also as a tool for promoting local culture. This approach enhances the value of becak services, transforming them into a unique and informative experience for tourists while providing drivers with additional skills and opportunities.

e) Supporting Infrastructure for Sustainable Transportation

As part of the infrastructure support for sustainable transportation, the government should establish dedicated lanes for **becaks** (pedicabs) in the Losari Beach area to ensure comfort and safety for both drivers and passengers. Additionally, electric charging stations should be installed at strategic locations to support the use of electric-powered becaks. This infrastructure not only enhances the efficiency and sustainability of transportation in the area but also encourages the adoption of environmentally friendly mobility solutions.

f) Social, Economic, and Environmental Impacts

This concept will not only reduce environmental impacts but also enhance the economic well-being of the community. Becak drivers will benefit financially from increased demand for their services, while tourists will gain a more authentic and memorable experience. By integrating sustainable transportation, the approach supports environmental conservation, provides economic opportunities for local drivers, and enriches the overall visitor experience at Losari Beach.

Integrated transportation management can combine the principles of sustainable transportation with the benefits of tourism. Local governments can introduce sustainable tourist bus tours during events at Losari Beach, environmentally friendly pedestrian pathways, and appealing transportation options such as tourist **becaks** or local ferry boats that attract visitors. This approach enables tourists not only to enjoy convenient access but also to gain a more immersive, unique, and eco-friendly travel experience. Additionally, supporting becaks as part of a sustainable transportation system helps preserve cultural heritage and local wisdom. By incorporating becaks into the broader transportation network, destinations like Losari Beach can balance environmental sustainability with the promotion of traditional values, offering both functional and cultural benefits to visitors and the local community.

A Sustainable Transportation Design for the Losari Beach Area that integrates the concepts of sustainable transport and experiential tourism, utilizing **becaks** as the main mode of eco-friendly transportation with significant cultural value.

Table 1. *Sustainable Transportation Design for Losari Beach Area*

Design	Mapping	Informtion
Zoning Plan	Core Zone (Motorized Vehicle-Free Zone)	• Main area (Anjungan Pantai Losari) designated as a motorized vehicle-free zone. • Only eco-friendly transportation like electric becaks, bicycles, and pedestrians are allowed. • Dedicated pedestrian and becak lanes with green pathways for added comfort.
	Buffer Zone (Transit and Intermodality)	• Integrated parking areas (park-and-ride) located 1-2 km from Losari Beach. • Shuttle buses and becaks connect the buffer zone to the core zone. • Dedicated lanes for shuttle buses and becaks to ensure smooth transit.
	Accessibility Zone (Main Entrance)	• Main entry points near public transport hubs like intercity bus terminals and airports. • Centralized integration of various transportation modes, including public buses, bicycles, and becaks.
Design Components	Dedicated Local Transport Lanes	• Special lanes for electric becaks and bicycles along Losari Beach. • Equipped with dedicated signs and becak stops.
	Integrated Parking Areas	• Parking facilities in the buffer zone for private vehicles with adequate capacity. • Electric vehicle charging stations provided
	Becak and Shuttle Bus Terminals	• Terminals in the buffer and core zones for smooth intermodal transitions. • Facilities include seating, route information, and digital ticketing services.
	Electric Becak Charging Stations	Strategically located charging stations at terminals, parking areas, and near Anjungan Pantai Losari.
	Information Center and Digital Transport Application	Visitors can book becaks or shuttle buses via a digital app providing real-time information on routes, fares, and waiting times.
	Supporting Facilities	• Green pathways and city parks offering rest areas for pedestrians and becak users. • Culinary zones and vending areas to support the local economy.
Operational Mechanism	Multimodal Transportation System	• Shuttle buses and electric becaks operate alternately with minimal waiting times to reduce queues. • Electric becaks focus on short trips within the core zone, while shuttle buses serve routes from the buffer zone.
	Transportation Demand Management	• High parking fees for private vehicles in the buffer zone to encourage public transport or becak use. • Government subsidies for becak and shuttle bus services to keep fares affordable
	Education and Promotion Programs	• Tourists introduced to the cultural value of becaks through thematic tour packages. • Becak drivers trained to serve as skilled tour guides.

Visualization of Transportation Patterns	Core Area (Motorized Vehicle-Free Zone)	• Dedicated pedestrian and becak lanes along Anjungan Pantai Losari. • Becaks provide thematic tour services like "Makassar History Trail."
	Buffer Zone	• Shuttle buses connect the integrated parking area to the core zone. • Shuttle bus stops are close to becak terminals for seamless transport transitions
	Green Pathways	• Green pathways along transport routes to enhance comfort and aesthetics. • These areas act as buffers to reduce noise and pollution.
Impacts and Benefits	Economic	Increased income for becak drivers and local businesses.
	Environmental	Reduced carbon emissions and pollution in the Losari Beach area.
	Social	Enhanced tourist experiences through culturally-based transportation modes.
	Sustainability	Establishing Losari Beach as a model of sustainable tourism that empowers local communities.

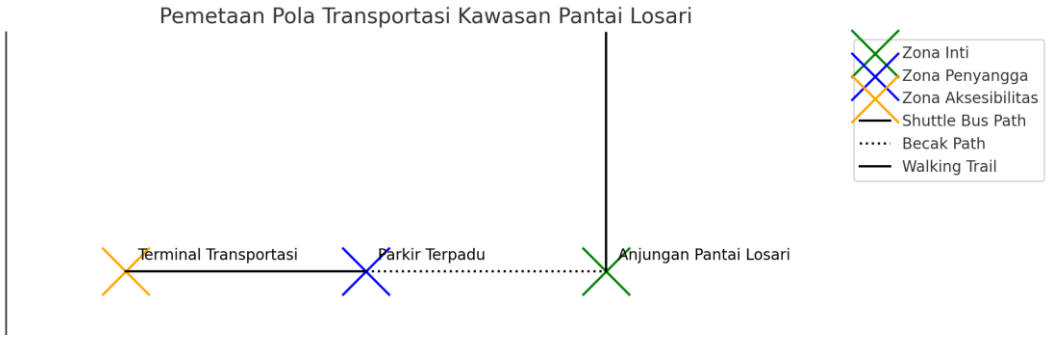

***Figure 1**: Sustainable Transportation Mapping*

The image above illustrates the mapping of a sustainable transportation system for the Losari Beach area. Below are the details of the design:

1. Core Zone (Green):
   - The main Losari Beach area (Anjungan Pantai Losari) designated as a motorized vehicle-free zone.
   - Accessible only to pedestrians and becaks.
2. Buffer Zone (Blue):
   - Integrated parking area connecting visitors to the core zone via becaks and shuttle buses.
3. Accessibility Zone (Orange):
   - Public transportation terminal serving as the integration hub for modes such as intercity buses and shuttle buses.
4. Transportation Routes:
   - Shuttle Bus Path: Connects the accessibility zone to the buffer zone.
   - Becak Path: Links the buffer zone to the core zone.
   - Walking Trail: Dedicated pedestrian pathways within the core zone.

D. Conclusion

The concept of sustainable transportation is highly relevant to Losari Beach and can be implemented to address the key challenges faced during large-scale events in Makassar City. Issues such as traffic congestion, increased carbon emissions, and pressure on public infrastructure are among the most pressing concerns. This concept emphasizes a multimodal and intermodal approach to effectively connect various transportation modes, such as shuttle buses, cycling lanes, and local options like becaks, in a more conventional yet efficient manner. By integrating these transportation modes, visitor experiences can be enhanced while minimizing

negative environmental impacts. Eco-friendly transportation methods for Losari Beach can prioritize the revitalization of conventional transportation, such as becaks equipped with electric motors. This not only reduces carbon emissions but also enhances cultural value and provides an authentic, natural experience. To improve accessibility for tourists and local residents, becaks can be integrated into app-based transportation systems, offering a convenient solution for short-distance travel within the vehicle-free core zone of Losari Beach.

In addition, the concept of Transportation Demand Management (TDM) can help reduce the number of cars used during major events at Losari Beach. Policies such as high parking fees for motorized vehicles, promoting the use of public transportation, and encouraging environmentally friendly modes of transport can be implemented. As a result, the increase in visitor numbers, which typically causes congestion, can be managed more effectively through well-planned and sustainable transportation solutions. The implementation of sustainable transportation at Losari Beach requires close collaboration between the government, destination managers, transportation operators, and the local community. Educating the public about the importance of environmental conservation, developing supporting infrastructure such as bicycle lanes and charging stations, and providing training for becak drivers to act as tour guides are strategic steps toward creating a tourist destination that is not only culturally appealing but also environmentally friendly and comfortable for all stakeholders involved. However, this study has several limitations. The analysis presented is conceptual and has not been empirically tested in the field, so the actual impact of implementing this concept requires further study. The assumptions made regarding infrastructure readiness, public acceptance, and the effectiveness of TDM policies may not fully reflect the actual conditions and social dynamics in Makassar. Furthermore, this study does not address the financing and economic sustainability aspects of the proposed transportation system transformation in detail.

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