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Research Article

Governance Challenges in Prioritizing Walking for Sustainable First and Last Mile Connectivity: A Case Study of Palembang, Indonesia

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ABSTRACT

This study delves into significant obstacles and suggests solutions to improve urban infrastructure, with a specific focus on pedestrian networks and public transport in Palembang. It involves analysing documents related to urban design and transport policies. Additionally, semi-structures interviews with relevant stakeholders were conducted to gain insights from a governance perspective on the challenges and solutions relevant to the study. The results show that the primary obstacles consist of restricted land availability, an imbalanced emphasis on main roads, and inadequate funding, all of which impede the progress of pedestrian infrastructure, especially in suburban regions. Moreover, public transport encounters rivalry from unofficial services and operations; inefficiencies, worsened by financial limitations. Challenges in institutional coordination further complicate infrastructure advancement, with conflicting schedules and shifting political agendas impacting consistency. However, the study highlights the significance of thorough planning and early collaboration between institutions to promote cohesive development. Engaging the public through community outreach and involving stakeholders is essential for successful project implementation, ensuring that infrastructure initiatives align with community requirements and receive widespread backing. Ultimately, this research advocates for a strategic, inclusive urban planning framework that aligns with sustainable development goals (SDGs), aiming to create equitable, resilient, and efficient urban environments that serve all community members.

Keywords: First last mile, governances, pedestrian infrastructure, public transport.

INTRODUCTION

Palembang, the capital of South Sumatra Province, has a population of 1.77 million and spans 352.51 km². The city has advanced its public transport network, including Indonesia's first Light Rail Transit (LRT) system, four Bus Rapid Transit (BRT) corridors, 28 bus routes, and seven feeder routes. Despite this, public transport usage remains low, with the LRT and BRT operating below 50% and 30% capacity, respectively. Concurrently, private vehicle ownership has increased from 1.35 million in 2022 to 1.42 million in 2023 [1], exacerbating traffic congestion and environmental issues, particularly along the main LRT routes. In response to these challenges, the government seeks to establish the Light Rail Transit (LRT) as the primary mode of transportation for commuters in Palembang. Key initiatives include enhancing integration with the Bus Rapid Transit (BRT) system and the introduction of a modern LRT feeder fleet, scheduled for launch in 2022, resulting in a 30% rise in LRT ridership in 2023, averaging 11,185 to 11,950 daily passengers [2]. This increase is attributed to strategically placed feeder services near residential areas, enhancing accessibility. Despite these gains, the LRT remains primarily used for leisure, with higher usage on weekends,

indicating limited weekday adoption. Additionally, better coordination among LRT, BRT, and other transport modes is still needed.

The lack of effective first-last mile connectivity significantly contributes to Palembang residents favoring private vehicles over public transit. Insufficient links between transit hubs and residential or commercial areas push many to rely on cars for daily travel. This issue is worsened by inadequate infrastructure for walking, including poorly maintained sidewalks, insufficient lighting, and limited pedestrian-friendly facilities, making walking inconvenient and unsafe. According to Cervero [3], first-last mile infrastructure is crucial for public transit success. The absence of such amenities results in continued reliance on private vehicles, exacerbating traffic congestion and environmental issues [4]. Addressing these challenges is key to advancing sustainable urban mobility in Palembang. Extensive research in Palembang has focused on user perspectives regarding walking, yet studies from the governance angle are limited. Understanding governance challenges is vital for promoting walking as a primary last-mile solution to enhance public transport use. This study aims to fill that gap by exploring governance-related barriers and identifying solutions to prioritize walking and support a sustainable transport system. Key research questions include:

1. What are the primary governance barriers to prioritizing walking as a means to promote active travel and support the development of an efficient public transportation system?
2. What are the most effective potential solutions and policy recommendations for fostering walking as a mode of transportation, while also developing a sustainable and efficient public transit system that improves both the reliability and long-term sustainability of public transportation?

The study comprises five sections: literature review, methodology, results, and conclusion.

LITERATURE REVIEW

Walking is widely regarded as the most sustainable mode of transportation, providing significant environmental, health, and socio-economic advantages. In contrast to motorized transport, walking requires no fuel and generates no emissions, thereby contributing to the mitigation of issues such as climate change, pollution, and traffic congestion [5]. Encouraging walking helps alleviate vehicle traffic, thereby reducing urban air and noise pollution [6]. Furthermore, urban planning that prioritizes pedestrian mobility fosters sustainability by curbing urban sprawl and promoting compact, mixed-use developments, which in turn reduces the demand for extensive and costly transportation infrastructure [5]. Walkable cities enhance quality of life, foster social interaction, improve safety, and strengthen community bonds, contributing to social sustainability [4] [7]. This shift reflects a movement towards resilient and inclusive urban development.

The first and last-mile challenge is a key barrier to public transport use, as limited access to transit stations often leads people to favor private cars [8]. Studies show that better transit accessibility correlates with higher public transport use, while poor accessibility reduces it [9]. Factors like dense road networks and mixed land use increase walking, cycling, and public transit use for first and last-mile travel [10]. Elements such as well-maintained sidewalks and safe, walkable areas near transit stations encourage walking [8] [11]. Furthermore, safety is critical, particularly for women, impacting walking to transit stations [12] [13]. Integrating safety measures with transit planning can shift reliance from cars to public transport [14] [15]. Moreover, weather also plays a role, with conditions like rain and heat discouraging walking [16] [17]. Urban planning should prioritize the development of transit-oriented areas that include amenities such as bike racks, trees, and sheltered walkways to facilitate and encourage walking and cycling accessibility [18].

METHODOLOGY

The research process was structured into three main stages: Preliminary, Analysis, and Result, each building on the previous to ensure thorough examination. The preliminary stage involved problem identification and a literature review, essential for framing the research and understanding existing knowledge, supported by academic sources like books and journals. This phase produced research questions and a methodology [19]. The analysis stage included documentary reviews and stakeholder interviews, followed by framework analysis. Due to time and funding constraints, five interviewees were chosen, each from critical institutions: Interviewee 1 is a representative of the Department of Public Works and Spatial Planning of Palembang, Interviewee 2 represents the Department of Transportation of Palembang, Interviewee 3 represents the South Sumatra Light Rail Transit (LRT) Agency,

Interviewee 4 represents the Department of Transportation of South Sumatra, and Interviewee 5 represents the South Sumatra Land Transport Management Agency. This selection ensured a comprehensive perspective from key stakeholders within the study's scope despite limitations.

The analysis phase synthesizes collected data using framework analysis, a systematic method in qualitative research originally developed for policy research but now widely applied due to its structured approach [20]. This method involves key stages: familiarization, thematic framework identification, indexing, charting, mapping, and interpretation. Researchers start by immersing in the data to understand its content, identify themes (inductively or deductively), and index data segments accordingly. Charting organizes data for easy comparison, while mapping and interpretation synthesize findings to highlight key insights related to research objectives [21]. The final research phase focuses on synthesizing findings to answer research questions, concluding the study with a summary, limitations, future study suggestions, and policy recommendations. This structured, iterative approach ensures a coherent transition from problem identification to conclusions, aligning with research goals and contributing to academic and practical fields [22].

RESULT

This chapter outlines the findings from data analysis, synthesizing information from documentary and framework analysis to meet the study's objectives. The analysis revealed a main theme and specific subthemes that provide a detailed exploration of the topic. Each subtheme highlights key concepts or keywords that reflect participants' primary concerns and perspectives. The chapter is divided into two sections: one detailing identified challenges and the other discussing solutions. The first section examines obstacles within each subtheme, while the second suggests strategies to address them. This structure ensures a coherent presentation, aiding readers in comprehending the findings and their broader implications.

Identified Barriers

Urban Infrastructure

Pedestrian Network Provision

The findings indicate that limited land space is the primary challenge for establishing a pedestrian network. Interviewee 2 noted that densely populated areas often lack sufficient space, accommodating only cars, complicating land acquisition and potentially causing conflicts with small businesses reliant on loading and unloading goods. This underscores that current road infrastructure prioritizes motorized vehicles over pedestrian needs, especially in suburban areas. This reality contrasts with the goals of Presidential Regulation No. 18 of 2020 on the National Medium-Term Development Plan (RPJMN) 2020-2024, which emphasizes developing road capacity and quality to enhance public accessibility to transportation.

The second key challenge is the exclusive focus on primary arterial roads, which reflects an overemphasis on major routes at the expense of other areas. Interviewee 1 observed that improving pedestrian facilities on these main roads could enhance the city's image and help attract both visitors and investors. This perspective aligns with Minister of Public Works and Public Housing Regulation No. 5 of 2024, which states in Article 17, verse 8, that pedestrian infrastructure should connect activity centers and transit hubs, especially along primary arterial roads, as part of city development plans. The third challenge identified is limited funding. Interviewee 1 highlighted that budgetary constraints result in prioritizing pedestrian infrastructure improvements on primary arterial roads, while suburban areas, which require substantial land acquisition investments, receive less attention. This challenge is associated with both the limited availability of land and the prioritization of main roads over other urban areas.

Infrastructure Investment

Participants largely agreed that low public interest in using pedestrian facilities poses a major challenge to infrastructure investment. Due to limited pedestrian use, resources are often allocated toward motorized transport infrastructure, which has higher demand. Interviewee 2 noted that in some areas, pedestrian facilities were removed to widen roads for vehicles, addressing traffic congestion during peak hours. This practice contradicts Article 131 of the 2009 Regulation of Minister of Transportation, which ensures pedestrian rights to sidewalks and crossings. Additionally, Minister of Public Works Regulation No. 5 of 2024 highlights the focus on enhancing the city's road network, prioritizing motorized transport over pedestrian infrastructure.

The second challenge is the reactive approach to infrastructure development, where projects are initiated mainly in response to specific interventions or directives rather than proactive, comprehensive planning. These interventions often come from public pressure or influential figures, such as legislators. Interviewee 1 remarked, "*...We often rush to act when national legislators or viral public pressure highlight issues, particularly related to pedestrian infrastructure...*". This indicates that pedestrian infrastructure planning and maintenance are insufficiently proactive, relying instead on external prompts or reports.

Social inequality and limited funding were identified as secondary challenges. The allocation of funds for pedestrian infrastructure is largely determined by the priorities of the city mayor, which are influenced by their vision and regional development objectives. Due to low public interest in walking, pedestrian infrastructure often lacks priority, with funds redirected to perceived urgent motorized transport projects. Interviewee 2 mentioned, *"...the mayor's priorities ultimately dictate funding, and pedestrian infrastructure is not a top priority...*" This approach contrasts with the Regulation of Minister of Transportation Number 22 of 2009, Article 25, which mandates roads be equipped with facilities for pedestrians, cyclists, and individuals with disabilities. Despite this, improvements often focus solely on motorized transport.

Quality of pedestrian infrastructure provision

The primary challenge in providing quality pedestrian infrastructure is ensuring adequate facilities for pedestrians. Studies, including ITDP's Non-Motorized Transport Policy Guidelines for Mid-Size Cities in Indonesia, indicate widespread dissatisfaction due to poorly maintained sidewalks marked by hazards like potholes and uneven surfaces. Vandalism and theft, such as stolen gutter covers and signage, further degrade infrastructure. Interviewee 3 noted that potholes from such theft pose significant dangers, particularly at night. Additionally, bureaucratic delays prolong maintenance, exacerbating damage over time. Despite regulations like the Minister of Public Works and Public Housing Regulation 03/PRT/M/2014, which underscores the need for safe, comfortable, and well-maintained pedestrian pathways with amenities, practical implementation struggles persist.

A secondary issue is weather impacts, especially floods during rainy seasons, which damage pathways. Utilities such as drainage and cables beneath these paths require repairs after flooding, leading to pathway dismantling by various agencies. Coordination among these agencies is lacking, causing repair delays due to differing schedules. Interviewee 1 noted that when utility repairs occur outside the Department of Public Works' maintenance schedule, pathway deterioration worsens. This highlights the need for coordinated maintenance planning, though unpredictable weather complicates prevention efforts.

Guiding policies to implement efficient pedestrian infrastructure

The main challenge in pedestrian infrastructure policy lies in weak enforcement, despite well-conceived policies. This issue stems from the absence of detailed strategies, action plans, and timelines specifically for pedestrian infrastructure, and the lack of clear, quantitative targets for development. Interviewee 1 highlighted that without clear implementation targets and timelines, progress is difficult to evaluate and measure. While the Minister of Public Works Regulation No. 5 of 2024 states evaluations should occur every five years, it lacks detail on assessing pedestrian infrastructure, complicating progress tracking without clearer guidelines.

Public Transport Network

Public transport provision

The primary challenge in public transport provision in Palembang is limited funding, leading to fewer vehicles and reduced service coverage, especially in feeder routes. Interviewee 2 mentioned that while there was a plan to operate 17 feeder routes for better city connectivity, only 7 are currently active due to budget constraints. This falls short of the objectives in Presidential Regulation No. 18 of 2020 (RPJMN 2020-2024), which stresses the importance of subsidies to develop a modern mass transit system in Palembang.

The reduction in public transport routes has decreased coverage, affecting service convenience and reliability. Fewer routes mean less frequent connections and longer wait times, leaving many areas underserved and pushing residents toward alternative transport. The inefficiency of the Bus Rapid Transit (BRT) system is another issue. Although Presidential Regulation No. 18 of 2020 emphasizes developing modern public transport, Palembang's BRT faces challenges such as an inadequate fleet and poorly planned routes. Interviewee 3 noted that the BRT, operating in

mixed traffic without dedicated lanes, encounters congestion and delays. Additionally, the large buses struggle with Palembang's narrow, crowded roads, reducing operational efficiency.

Competition from informal public transport, such as ride hailing, poses a challenge to formal systems like BRT and feeder services in Palembang. Many residents prefer informal options due to their flexibility. Interviewee 5 noted that, unlike formal transit with fixed routes and schedules, informal services adapt to passengers' immediate needs, offering direct, door-to-door services that emphasize convenience and speed. This adaptability attracts commuters, reducing the use of formal public transport and hindering efforts to create a sustainable, well-organized urban transport network.

Public transport first mile last mile catchment areas

The primary challenge for first and last mile connectivity in Palembang is the inefficient distribution of feeder services. Interviewee 4 noted that these services should ideally be spread evenly to facilitate easy access to main public transit routes. However, current distribution is inadequate, leaving many areas underserved and hindering residents' access to public transport. This gap forces people to rely on less efficient transportation methods. The root issue is limited funding, which prevents full implementation of planned services. While low public interest and longer routes are also challenges, they are less critical by comparison.

Institutional Coordination

Formal power governance

The main challenge in formal governance is poor coordination among government agencies, each with its own schedule and priorities, leading to fragmented planning. Interviewee 2 highlighted that one agency may be prepared to implement new transport routes while another has not adjusted pedestrian pathways accordingly, causing delays and infrastructure gaps. This lack of collaboration results in disjointed development, where pedestrian and public transport systems do not align effectively. Such isolated planning prevents the creation of a cohesive, multimodal transport network that meets user needs.

The second key challenge is the shift in city leadership during mayoral changes, which often brings new agendas that may diverge from previous initiatives. Interviewee 1 noted that new mayors might deprioritize ongoing projects like pedestrian infrastructure and public transport, leading to reduced attention, funding, and potential project stagnation. This inconsistency in urban planning can result in inefficiencies and wasted resources. The issue is worsened by differing levels of concern among mayors, which significantly affects the development or neglect of pedestrian and transport infrastructure. Political stability and consistent planning strategies are crucial for sustained progress.

Public Involvement

The main challenge in public involvement is low public awareness and interest in walking and public transport. This disinterest reduces participation in consultations and feedback, affecting the planning process. Interviewee 2 noted that limited public input makes it harder to identify local needs and concerns. Without engagement, fostering community ownership and accountability for maintaining and using pedestrian and public transport infrastructure is challenging, leading to possible underutilization or neglect.

The second significant challenge is limited funding, which restricts the ability of governments or organizations to support extensive public engagement or address community concerns. This issue is often compounded by low prioritization from city leaders, especially when pedestrian issues are not seen as urgent. As Interviewee 2 noted, limited budgets lead to reduced or discontinued public involvement activities, impeding planners' efforts to engage the community. Without sufficient public input and support, pedestrian and public transport developments may not align with residents' needs, resulting in underutilization and inefficiency.

Identified Solutions

Urban Infrastructure

Pedestrian Network Provision

A key solution for enhancing pedestrian networks is to ensure pedestrians have equal rights to motorized transport, promoting walking as a safe and viable option. Interviewee 1 noted that Palembang's elevated pathways effectively prevent motorcyclists from encroaching but create crossing difficulties, particularly for vulnerable groups. Interviewee 2 suggested aligning pathway and road levels, especially at crossings, to improve safety and ease of movement. This change would emphasize pedestrian priority and support a cultural shift towards pedestrian-friendly urban design.

The implementation of Transit-Oriented Development (TOD) is a viable solution for enhancing urban transportation systems. Presidential Regulation No. 18 of 2020, as part of the National Medium-Term Development Plan 2020-2024, advocates for TOD as a means to integrate transportation and land use, thereby improving access to public transit. Additionally, Minister of Agrarian and Spatial Planning Regulation No. 5 of 2024 delineates transportation zones and a spatial framework for Transit-Oriented Development (TOD), although it does not provide comprehensive implementation guidelines. TOD in high-density areas has the potential to improve pedestrian infrastructure by creating seamless connections between transit hubs and major destinations.

Infrastructure Investment

A widely supported solution for infrastructure investment is the use of incentive-disincentive schemes. These approaches help direct resources toward improving pedestrian infrastructure, benefiting both the government and public by promoting safer, more accessible urban spaces. Newman and Kenworthy [23] highlight that such strategies can mitigate funding limitations, a common barrier to development. Interviewee 1 noted that incentives, such as tax breaks or expedited permits, can encourage private investment in pedestrian-friendly projects. Interviewee 2 emphasized that these schemes help overcome financial constraints and support pedestrian-focused projects. This approach not only addresses funding challenges but fosters sustainable, livable urban development [3].

Launching pilot projects and partnering with international organizations are also effective solutions. Pilot projects can act as models for broader city applications. Interviewee 1 noted that successful pilots showcase benefits like increased safety, foot traffic, and public satisfaction. They also engage the public, demonstrating improvements to urban life and helping secure support and funding for larger projects.

Quality of Pedestrian Infrastructure Provision

To improve pedestrian infrastructure, enhancing comfort and safety is the primary solution. This includes upgrading facilities, utilities, and maintenance. Interviewee 1 recommended the provision of high-quality pedestrian pathways, sufficient lighting, and universally accessible crossings, including for individuals with disabilities, as essential measures. Additionally, improvements in utilities, such as shaded walkways, seating areas, clear signage, and emergency call points, are also crucial for fostering a user-friendly environment. Holistic improvements can transform pedestrian networks into valuable assets that contribute to the enhancement of urban life and the promotion of sustainable, inclusive mobility [24].

An additional critical solution involves the effective management and regulation of street vendors. Although they contribute to the local economy and cultural vitality, their presence on pedestrian pathways can lead to congestion and pose safety hazards, particularly for individuals with mobility impairments [25]. Interviewee 2 suggested designating specific zones for vendors to minimize disruption while maintaining high pedestrian flow. Clear guidelines on vendor size and setup, along with regular monitoring and enforcement, are essential to keep pathways safe and navigable. These measures help preserve pedestrian infrastructure functionality while supporting street vendors' economic activities.

The establishment of a collaborative special maintenance unit, or rapid response team, is proposed as a solution. Comprising representatives from key departments like Transportation, Public Works, and Spatial Planning, this unit would address pedestrian facility issues promptly. Interviewee 1 highlighted that by uniting resources and expertise, the team could quickly assess and repair damaged sidewalks without typical interdepartmental delays. This coordinated approach speeds up responses, prioritizes tasks efficiently, and maintains pedestrian infrastructure

effectively [4]. Such measures demonstrate a commitment to pedestrian facilities, encouraging more people to choose walking as a transportation mode.

Guiding Policies to Implement Efficient Pedestrian

A key solution for effective pedestrian infrastructure is developing a comprehensive masterplan that includes detailed implementation steps, strategies, timelines, and action plans tailored to the city's needs. Regular evaluation mechanisms are vital for monitoring progress, assessing strategy effectiveness, and making adjustments. Interviewee 3 emphasized that a clearly defined master plan facilitates coordination among urban planners, government authorities, and community stakeholders by delineating roles and timelines, thereby minimizing delays and ensuring efficient implementation. Ongoing evaluation is essential to ensure that the infrastructure adheres to safety and usability standards while aligning with broader urban objectives, ultimately contributing to the development of a more connected and pedestrian-friendly city.

Proposed solutions include the implementation of effective traffic management strategies, such as park-and-ride facilities, parking restrictions, and road pricing. These measures create a "push-and-pull" dynamic that discourages the use of private vehicles while promoting the adoption of alternative transportation options [26]. Interviewee 3 noted that such strategies help balance the transportation system, prioritizing pedestrians and public transport, reducing congestion, and promoting healthier, sustainable urban living through walking and cycling. Ultimately, these strategies support pedestrian infrastructure development and promote a shift towards active, sustainable transportation.

Public Transport Network

Public Transport Provision

Improving the reliability and integration of public transport modes is a key solution for enhancing public transport. This approach ensures efficiency, convenience, and user satisfaction. Regular evaluations, such as monthly assessments, help monitor service performance. The 2024 regulation by the Minister of Agrarians and Spatial Planning emphasizes integrating transport with land use planning, though specific areas are not detailed. Interviewee 2 noted that using evaluation findings allows targeted improvements like increasing bus frequency, extending service hours, or upgrading infrastructure to boost reliability. Regular updates ensure transit systems adapt to population needs, promoting sustainable urban mobility [26].

A second solution involves enhancing coordination with informal public transport services. By harnessing their flexibility and local expertise, these services can help extend coverage, particularly in underserved areas. This approach requires the establishment of safety and efficiency standards, training programs, and the integration of informal services into the broader urban transport strategy [27]. Interviewee 2 noted that coordinating with informal operators can strengthen Palembang's transport network by incorporating them into formal planning. This integration facilitates smoother travel experiences, aligning schedules, complementary routes, and unified fare systems, making public transport more accessible and appealing.

Public transport first mile last mile catchment areas

A key solution to improving first- and last-mile access is strategically placing feeder service stops within walking distance, thereby enhancing convenience and encouraging public transport use. Interviewee 2 noted that locating stops near public activity centers like shopping areas, schools, and job hubs boosts their utility, attracting more foot traffic and reducing reliance on private vehicles. Strategically placed stops facilitate smoother transitions between transport modes, shorten travel time, and help reduce road congestion [3].

A second solution is establishing well-distributed feeder services across the city, especially in residential areas, to enhance the public transport network. This setup supports first-mile travel, allowing residents to easily reach main transit hubs. Interviewee 2 likened this to a "fishbone framework," where feeder routes extend into neighborhoods and direct passengers to main lines, like Palembang's LRT. Effective feeder routes reduce travel time and improve convenience, making public transport more user-friendly.

Institutional Coordination

Formal power governance

To improve formal governance, enhancing coordination among government agencies is crucial. While each agency has distinct responsibilities, collaborative support boosts the effectiveness of urban development projects. Interviewee 3 highlighted that even when an issue falls outside an institution's authority, it can still advocate for action and propose solutions to relevant bodies. Interviewee 2 noted that such cooperation allows agencies to pool resources, share expertise, and align efforts for cohesive urban infrastructure. For instance, collaboration between transport departments and urban planners can ensure the integration of public transport routes with pedestrian pathways, enhancing accessibility and usability.

The second key solution is early coordination in project planning, ensuring alignment among institutions and facilitating the seamless integration of urban infrastructure. Interviewee 4 emphasized that isolated actions by agencies like urban planning, transportation, and public works lead to misaligned priorities and inefficiencies. Enhanced communication improves decision-making and implementation, creating a more efficient and user-friendly urban transport network [3]. Therefore, coordinated efforts from the outset enable synchronized timelines and common objectives, helping identify challenges and address them collaboratively, reducing delays and cost overruns.

Public Involvement

Solutions for public involvement focus on enhancing engagement through community outreach and public discussions. These efforts increase transparency and understanding of planning processes, fostering community participation. Research shows that public involvement in transportation planning results in more equitable and effective outcomes [28] [29]. This is align with the Article 16 of the Regulation of the Minister of Public Works and Public Housing Number 03/PRT/M/2014 highlights the public's key role in planning, contributing input, formulating guidelines, and overseeing the use of pedestrian infrastructure.

Interviewee 3 highlighted that when individuals understand their role in project implementation, they are more likely to support and engage, reducing resistance and delays. Community events also facilitate dialogue between the public and policymakers, aligning projects with community needs and building trust. Innes and Booher [29] argue that meaningful public engagement leads to more successful and sustainable policies and infrastructure.

Although less frequently suggested, stakeholder involvement is essential. Local government agencies, urban planners, community groups, businesses, and residents bring diverse perspectives that contribute to comprehensive solutions [30]. Interviewee 5 highlighted that businesses can provide economic insights, while community organizations ensure marginalized voices are considered. Stakeholder involvement can also secure financial and logistical resources; as Interviewee 2 noted, private partnerships can provide funding, and local collaboration can facilitate land acquisition and reduce construction impacts. Engaging stakeholders ensures well-planned, supported, and effectively executed pedestrian and public transport projects, fostering sustainable and equitable urban spaces.

This chapter addresses the research questions regarding the barriers and solutions to promoting walking as a sustainable mode of first- and last-mile travel, aimed at enhancing public transport efficiency. The findings identify key obstacles and propose practical solutions, focusing on enhanced pedestrian infrastructure, integrated planning, and strategic policies. These insights form the foundation for the policy recommendations, which will be outlined in the conclusion.

CONCLUSION

Summary

My research examined why Palembang's current pedestrian infrastructure and public transport systems inadequately support and prioritize walking, especially for first and last-mile connectivity. The findings reveal a gap in the literature, which largely addresses user challenges but pays limited attention to the governance issues local authorities face in implementing pedestrian-friendly policies. Addressing this gap is crucial, as understanding governance issues can uncover systemic barriers to developing integrated and efficient pedestrian and public transport systems. Emphasizing the governance perspective can guide future research towards crafting policies that enhance sustainable urban mobility [31].

Limitation and areas of further study

All research has limitations, and this study is no exception. Time and budget constraints affected certain aspects, notably the small sample size, which excluded some relevant institutions. This limited scope may reduce the generalizability of the findings and fail to capture a comprehensive range of perspectives. Future research should aim to include a more diverse group of participants from various institutions to provide a more comprehensive view and strengthen the study's robustness and applicability by incorporating wider insights [22].

Further investigation into the technical aspects of the research findings is crucial, particularly in understanding the identified barriers and proposed solutions. Evaluating the technical feasibility of these solutions is crucial for assessing their practical implementation and guiding policy development, supporting evidence-based decision-making [32]. Additionally, calculating the relative importance of each solution is necessary for prioritizing actions based on effectiveness and feasibility, aiding in resource allocation and policy sequencing [33]. Prioritizing these measures ensures the most effective actions are implemented first, providing a clear roadmap for policymakers and enhancing the efficiency of interventions and resource allocation [34].

Policy Recommendations

Drawing from the identified challenges and proposed solutions, policy recommendations have been developed to effectively address the research questions. Analyzing the study results allowed for the creation of targeted policy recommendations that directly respond to the issues uncovered. These recommendations provide practical measures to address the identified challenges, enhancing the relevance of the research. The next section outlines these recommendations, offering a clear action plan based on the study's findings and supported by existing scientific knowledge.

Pedestrian Infrastructure Policies

- Expand and Integrate Pedestrian Networks. Policy initiatives should prioritize the development and connection of pedestrian networks, particularly in urban areas and around public transportation hubs [35]. Developing a comprehensive network of sidewalks, crosswalks, pedestrian zones, and pathways is crucial for enhancing walkability, particularly in first- and last-mile connections to feeder services. Such networks enhance access and safety, promoting walking as a practical mode of transport and supporting public transit use.
- Ensure safe pedestrian crossings and implement traffic-calming measures, such as raised crosswalks, speed bumps, and refuge islands, to enhance safety and accessibility. These measures underscore pedestrian priority on the roads and help to reduce vehicle speeds, thereby enhancing the safety and comfort of pedestrian movement [36]. Integrating these features within road infrastructure can create safer urban environments conducive to walking.
- Enhance Streetscape and Improve Environmental Quality. Investing in streetscape enhancements such as improved lighting, green spaces, street furniture, and shaded walkways is essential for improving the pedestrian experience and encouraging walking [37]. Green streetscapes offer additional environmental benefits, including the reduction of urban heat and better air quality, making walking more appealing, even during warmer weather. The strategic organization of street vendors can further support these enhancements by maintaining clear pedestrian pathways and contributing to a vibrant, walkable public space. These improvements collectively foster a pedestrian-friendly atmosphere that aligns with sustainable urban development goals.

Public Transport Network Provision Policies

- Enhance Public Transit Accessibility and Coverage. Prioritize expanding public transit to underserved residential areas to ensure equitable access, particularly for first- and last-mile travel. This includes expanding routes, increasing service frequency, and reducing wait times during peak periods [38]. These measures provide reliable, convenient transit options, encouraging greater usage and reducing dependence on private vehicles.
- Develop Comprehensive Multimodal Transport Systems. Integrating formal and informal public transit into a multimodal system can enhance efficiency and coverage, requiring synchronized schedules, unified ticketing, and strategically located transfer hubs [39]. Such integration enhances user convenience, promotes cohesive transit planning, and ensures coordinated city-wide mobility.
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Institutional Coordination

- Create Integrated Transportation Authorities. Creating integrated transportation authorities can enhance coordination among agencies managing pedestrian infrastructure, public transport, and roads. This centralized structure facilitates more efficient decision-making, cohesive policy execution, and optimal use of resources [40]. Such authorities provide a unified framework for managing complex transport systems, promoting streamlined and effective governance.
- Foster Collaborative Planning Among Agencies. Joint planning efforts and shared data platforms are essential for enhancing communication and aligning public transport and pedestrian infrastructure policies [41]. Effective transportation planning necessitates collaboration among governmental agencies, transit authorities, urban planners, and community organizations to coordinate efforts and ensure the efficient implementation of projects.
- Establishing shared performance metrics and accountability frameworks is essential for ensuring that stakeholders achieve aligned objectives [42]. Performance metrics, including pedestrian accessibility, transit service quality, and user satisfaction, enable continuous assessment of policy effectiveness and progress tracking, pinpointing areas that need improvement and fostering accountability.
- Involve Communities in Transport Planning. Community engagement is vital for developing and implementing transport policies, especially for planning feeder routes and pedestrian infrastructure. Consultations, surveys, and participatory workshops help align policies with local needs. Feedback identifies service gaps and areas for improvement, enhancing the effectiveness and inclusivity of transport solutions [43].

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