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Original Article

Assessing the Sudirman Loop in Makassar as a Model for Sustainable Mobility Pilot Projects

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Abstract *- The paper examines the Sudirman Loop project in Makassar as a pilot project of sustainable urban mobility. As the city government aims to promote the development of the city towards effective pedestrian and transit orientation, the Sudirman Loop was evaluated based on the field surveys, aerial drone recording, review of policies, and interviews with the main stakeholders. The results demonstrate that the current pedestrian infrastructure is below the basic safety, accessibility, and inclusiveness thresholds. Pavements frequently get destroyed, clogged with trees, kiosks, or parked cars, and do not provide accommodations to the disabled, including the use of tactile surfaces and ramps. Drainages are not covered, there are no crossings at major intersections, and the pedestrian areas are often abused by informal businesses. These circumstances undermine comfort and safety, especially among the vulnerable groups. A critical analysis framework shows that the majority of pedestrian-related facilities are half-heartedly enforced or not enforced at all, with the shortcomings being in terms of accessibility, continuity, and social interaction. Although the corridor is strategically positioned and symbolically important, redesigning it comprehensively, enforcing more stringent regulations, and maintaining it are all urgent needs. The research finds that the Sudirman Loop is a good opportunity to implement sustainable mobility, yet it should be accompanied by physical interventions and institutional dedication. What can be learned in this case is useful in coming up with replicable models in other cities in Indonesia.*

Keywords *- Makassar, Pedestrian infrastructure, Sudirman loop, Sustainable mobility, Urban planning.*

1. Introduction

During the past few years, the problem of urban mobility in Makassar, which is assumed to be situated at 5.16160 S, 119.43590 E, has become more complicated. The increased rates of population growth, increased dependence on individual motor vehicles, and the failure to integrate the transport system with the overall public transport network in the city have contributed to the congestion, the poor quality of the environment, and the reduced availability of the means of transport to the vulnerable population, such as pedestrians and cyclists [1]. The city government, led by the newly elected mayor, has been quite keen on fostering sustainable mobility as an answer to these burning issues. A wide range of strategic plans is being undertaken, involving master planning to build a city of people with an urban environment friendly to cyclists, planning a citywide strategy of Transit-Oriented Development (TOD), and reorganizing the urban transport. Such programs require an area-based approach and pilot projects that can demonstrate observable outcomes [2].

The Sudirman Loop is located in a very strategic place. As one of the primary city corridors, the economic, governmental, and social centre of Makassar, the area has a relatively well-organized road system, empty lands, and transport facilities, in comparison to other places in the city [3]. However, no detailed study has so far determined the appropriateness of the present condition with the Sudirman Loop with reference to the principles of sustainable mobility incorporated in the plan of the strategic development of Makassar. This paper is therefore aimed at reviewing the Sudirman Loop as a potential model of a sustainable mobility pilot project. The analysis does not merely document the present infrastructure and policy reality, but it also evaluates the possibilities of the territory to help make a more significant shift towards an environmentally friendly, inclusive, and efficient system of urban mobility. The research is informed by the following three questions: (1) What is the condition of mobility infrastructure within the Sudirman Loop? (2) To what extent do these conditions reflect the principles and the policy orientations of sustainable mobility, which the city government promotes? (3) What are the opportunities and challenges that can exist in making the area a pilot project on sustainable mobility? These questions are the sources of developing the response to the existing mobility needs as well as long-term oriented strategies.

To answer these questions, a qualitative descriptive method is adopted. It is the most appropriate method when the researcher is interested in providing a detailed and thorough description of different problems that interfere with the mobility of an urban area. The data will be collected by the field survey of the existing mobility infrastructure at the Sudirman Loop, reading the planning and policy reports, and holding a comprehensive interview with the main stakeholders, i.e., the Department of Transportation, the Department of Public Works, and the City Planning Agency (Bappeda) of Makassar. The practice will lead to a comprehensive understanding of the areas that would be of interest in being a pilot project, as well as provide evidence-based policy recommendations based on what is happening in the field and the city's general development.

The role of land-use planning or urban transportation network in being combined with active modes such as walking and cycling has continued to attract more attention in sustainable urban mobility studies. The concepts of complete streets, walkable cities, and Transit-Oriented Development (TOD) came to the top of the list of building inclusive and low-emission mobility systems. Even in huge cities in Indonesia, such as Jakarta, Bandung, and Surabaya, some of these principles are also being implemented through the creation of particular cycling paths, redevelopment of sidewalks, and integration of corridor-based mass transit. However, in the lands of Java that are not in the metropolitan areas, the application of the precepts of sustainable mobility is quite local and ill-documented. This is why the research of the Sudirman Loop in Makassar is particularly topical and contributes to the expansion of the best practices within the environment of the largest cities in Indonesia.

Although major Indonesian cities like Jakarta, Bandung, and Surabaya are increasingly applying the principles of sustainable mobility by installing dedicated cycling lanes, sidewalk renovation, and corridor-based mass transit systems, comparable projects in secondary cities off Java continue to be isolated and unrecorded and often mostly limited to individual projects [4, 5]. The current investigations on the topic of urban mobility in Makassar have majorly concentrated on the studies of public transportation services [1], landuse transportation interplay [2], or on the particularity of certain modes such as buses in the Mamminasata bus system [3], yet none have significantly evaluated a centrally strategic management area as the Sudirman Loop in terms of a wholome identification of physical infrastructure conditions, correspondence to municipal policy, and institutional preparedness.

The study fills a gap in research by considering the Sudirman Loop as a current urban corridor with high potential to support pedestrian and transit environments, as well as serve as a pilot project to determine sustainable mobility in a fast-growing coastal city beyond Java. The national and urban policies encourage walk and transit-friendly development, but it is frequently maneuvered into real-life improvements in secondary cities, due to a lack of enforcement and maintenance shortages, combined with a lack of intersectoral coordination. The identified issue is that despite ambitious policy frameworks, the condition of the pedestrian infrastructure in high-activity central areas remains deplorable, which exposes people to dangers, excludes vulnerable users, and leaves private motor vehicles in charge. It is through this tripartite system of the Sudirman Loop, physical, policy, and institutional, that this study intends to offer a replicative model of evaluation that can be used to make evidence-based interventions in similar city settings in Indonesia.

The strength of this study is that it currently incorporates a three-pronged evaluation framework (a combination of physical infrastructure conditions, compliance with municipal policies, and institutional preparedness) that other studies of previous research on urban mobility in Makassar and other urban centers of the same level in Indonesia have not done. Although previous research focused mainly on individual dimensions, e.g., on the mass transportation services and actor relations [1], land-use and transport relationships [2], the intentions to reuse mass transit systems [3], or on the accessibility of transport in commercial zones [4, 5], none of them have applied a comprehensive approach to one transport-centrally located area such as the Sudirman Loop. Moreover, current literature on sustainable mobility in non-Java Indonesian cities is more likely to discuss regional trends in general [6] or particular modes without the assessment of a lack of infrastructure on the ground and its impact on policy discourses and institutional capabilities on a simultaneous basis. Through policy analysis and stakeholder perspectives coupled with field-based evidence obtained in the form of surveys and drone documentation, the researchers establish a context-based and repeatable model of pilot projects that facilitates the implementation gap of pedestrian-oriented and transit-oriented development and provide both a theoretical contribution to cross-sectoral assessment and a practical direction to implement evidence-based interventions in similar urban contexts. There are three key stages involved in the research roadmap. The first stage is to identify the status quo of the Sudirman Loop through field observations and visual documents of the pedestrian and bicycle accessibility, the condition of the infrastructure, and the access and usability of the transport to the public. The second step is the congruence test of these conditions in the field with the designed city policy frameworks or those that are under design by the municipal government, which includes the pedestrian-friendly city master plan, the TOD master plan, and the resurgence of the public transport program. This phase also involves stakeholder interviews to capture the dynamics of policy implementation, in addition to taking into account the planning context. The third stage establishes the strategic proposals, including the interventions of the areas, the

development of the readiness indicators, and the copying plan of the rest of the urban districts. These stages taken together are expected to provide a complete assessment report and an academic paper that could be utilized to facilitate the creation of area-based policies and evidence-based decision-making in facilitating sustainable mobility in Makassar.

Fig. 1 Sudirman loop segmentation

2. Literature Review

2.1. Policy Frameworks

The policy environment, both in the country and internationally, provides a fine place where sustainable urban mobility in Indonesia, particularly in the context of the pedestrian infrastructure, the urban transport system, and application of Transit-Oriented Development (TOD), can be established. At the national level, the law demands the presence of safe, accessible, and inclusive pedestrian paths in all cities, such as sidewalks, safe crossings, wheelchair ramps, lighting, signage, and all other safety measures. The legislation on urban planning and transportation reinforces these provisions with the emphasis put on the principle of accessibility, the intermodal connectivity, as well as the safety of the vulnerable users, such as children, the elderly, and people with disabilities. Besides technical requirements, these policies highlight that the pedestrian facilities should be used as a salient feature of sustainable urban development, in which the mobility systems should not only be useful but also equitable and environmentally friendly. In the meantime, the general city transport policy highlights the necessity to shift the focus from personal means of motor processing to mass transit and active modes. This priority is enabled through the nationwide approaches towards favoring combined public transport systems, secure bicycle routes, footpaths, and other supporting facilities (e.g., park-and-ride) [7]. Its objectives extend beyond reducing congestion, minimizing greenhouse gases, enhancing the quality of the air, and making public space fairer [8]. These policies can be aligned with global policies focused on the creation of sustainable (and habitable) cities, in which power consumption is effective, harmless, and environmentally friendly [9].

Sustainable Urbanism involves self-reliant, pedestrian, and transit-oriented metropolitan areas that are usually centered around the concept of TOD [10]. These concepts are laying out a guideline for the public transit and small-scale mixed-use development. TOD focuses more on walking, connection, and optimized land use, and therefore, transportation hubs, i.e., bus or rail stations, become the center of daily life in and around it [11]. In Indonesia, TOD ideas are being marketed and implemented in the key cities, both in ministerial rules or guidelines and spatial planning. These policies recognize that coordinated land-use and transportation planning is required to be made achievable in exchange for the involvement of multi-actors between the government (state agencies), the private developers, and the civil society [12]. In the case of cities such as Makassar, TOD is an opportunity that will allow the cities to transform some central city locations into vibrant ones. Driving can be reduced

among people, and alternative transportation methods that are environmentally friendly can be more attractive and convenient. In addition to the country regulations, international standards and guidelines also include the details of the technical aspects and layout. Good examples are the work of the ITDP on TOD, street design guidance of NACTO, tools of the WHO in measuring the friendliness of streets, and the SUMP guides of the European Commission. All of those assist in the quantification and, broadly speaking, quality improvement of the transportation that is safe, open to all and not polluting a lot [13]. There are other prominent models like the Complete Streets policies, the ISO accessibility rules and other recommendations by the world bank and the Asian Bank that also emphasize integration, inclusivity and sustainable longevity over the long. These are but guides which must be converted into the peculiarities of each city but they form a valuable reference with which to inform the creation of pedestrian networks, cycling facilities and inclusive and resilient public space that is contemporary, inclusive, and resilient [14]. Current applications of principles of sustainable mobility in the Indonesian secondary cities show not only improvements but also problems that offer educative lessons to Makassar. Pedestrian and cyclist infrastructure Around 2023 in Surabaya, there has been vendor revitalization efforts in the Old Town district where the work has been done to improve accessibility to historic districts, as well as improve tourist information due to crossing and shaded walks and pedestrian crossings. On the same note, Kota Lama in Semarang has developed low-emission areas that are more connected through top-notch transportation and other footpath amenities, which is informed by the interactions of the city with the vulnerable population [13]. Such projects exhibit effective adoption of the aspects of TOD into non Java applications, though they also indicate general weaknesses which include softer adherence to it, encroachment by vendors and parking, which reflects the problems in Makassar.

Conversely, some cities, such as Palembang, have governance issues that focus on pedestrian networks to facilitate first- and last-mile connectivity, where policy intentions do not always succeed because of insufficient maintenance and coordination. According to national reports, like the Indonesia Sustainable Mobility Outlook 2025, major cities like Jakarta experience the advantages of scaled investments in electric buses and electric SUMPs, whereas secondary cities do not enjoy inclusive infrastructure because only small parts of roads have sufficient pedestrian safety scores. More importantly, the experiences described suggest that physical interventions cannot work without the firm institutional commitment and community participation, which this paper bridges through the assessment of the Sudirman Loop as a pilot project. Based on such comparative cases, the Sudirman Loop represents a distinctive chance in a secondary city along the shore, which is likely to suffer disasters, where disaster-resilient design (e.g., elevated paths and high-capacity drainage) should be combined with TOD, and thus taking disjointed efforts witnessed in other cities. This study is based on these lessons, suggesting a generalizable three-part framework, linking policy ideals to ground realities, to the small body of literature on the subject of sustainable mobility in non-Java urban settings. In the case of Makassar Sudirman Loop, the combination of the nationwide and global concepts provides a strong foundation within which to make traveling easier for all people. With local equivalence of what is practiced on the ground with what is implemented worldwide and best practices in other regions globally, the region would become a demonstration of integrated urban planning that places people on the move and public transportation at the forefront.

2.2. Sudirman Loop Area

The Sudirman Loop is an actual anchor in the heart of Makassar, which serves not only as a part of the urban structure of the city, but also as the central point in the creation of pedestrian networks and more considerate and transit-oriented urban planning. It is situated literally at the center of Makassar, as a historic and business city center. The loop itself occupies 5.3 kilometers of interconnected streets: the Jenderal Sudirman, the Penghibur, the Ahmad Yani, the Haji Bau, and the Ujung Pandang, which can be seen in Figure 1. Each of these routes has its own place to do in the transportation puzzle of the city: Jenderal Sudirman is the primary national road which is lined with government offices, shops and public buildings; Penghibur provides the people with a direct journey to reach Losari Beach and other green spaces of the city which are accessible to all; Ahmad Yani gives the old town a slant towards the newer commercial quarters; Haji Bau is narrower than the other corridors, yet it has an importance because it serves as a direct pathway to some of the most common places in the city such as the Fort Rotterdam. This infrastructure alone is not exclusively car-friendly. They are also a busy neighborhood of the town where individuals meet and do their business daily, and acquaint themselves with other cultures [4]. Using the example of the land use patterns of the area around Sudirman Loop, it is evident that it is a diverse urban center with a great concentration of people and various activities [5]. It is also evident that there are properties occupying large sections of the space, lots of high-density apartments. The shops, offices, and services are prone to converge around the main streets [15]. Mixed-use zones are also available where residential, commercial, and government buildings are located side by side. In addition, there exist some smaller yet significant green areas. Such a blend of activities makes the region vibrant economically and socially [16]. It also puts pressure on the transport system, hence making good planning a key to meeting all the various needs [17]. With these parameters, Sudirman Loop is the right place with the right mixture to make it an actually pedestrian-friendly and transit-centric neighbourhood. Its small size, the amount of activities available, and its being at the centre of the city all make it a place that is crying out to get some minor adjustments to make walking and using transport much better.

And, cumming a great deal into a slight area, and arranging a mottamental here and there-abouts does give us planners a bit of a waxing. It should be sensitive to local conditions but add a bit of flexibility - e.g., it ensures there is no cutting off an important route for people who have to get somewhere fast, and yet it retains the things which already have proven to be useful. The time consideration of change implementation may simply be the way to make this place not just to go green but actually to become home to the people who live there, listening to the long-term objectives of the city, yet also facing the realities of people who live there on a daily basis.

2.3. Why Sudirman Loop?

The Sudirman Loop is a powerful urban ring through Makassar, which traverses historical, economic, and human connections in Makassar in a space of 5.3 kilometres. Comprised by the network of main streets (Jenderal Sudirman, Penghibur, Ahmad Yani Haji Bau Ujung Pandang), this district is a place of movement and urban centre where institutions of the populace, business centres, cultural sites, and residential areas are all integrated in a cohesive manner [18]. It is a combination of mixed use of land, backed by existing infrastructure and continuously operating processes that suggest a special ambiance of a transport system and spaces under the load of pressure, and at the same time create prospects of a radical planning [6].

Makassar has common urban issues because it is densely populated, contains a large number of businesses and offices, has mixed-use areas, and has few open areas. Such problems would encompass traffic congestion, inadequate space, and determining the route planning without drainage [19]. The Sudirman Loop is a sound location to fly alternative and environmentally-friendly methods of commuting, mainly due to the circumstances prevailing in that area. The location is central to the city; thus, any decision made here will have a possible impact on the entire city, leading to the involvement of people and officials. It is an example of an active urban landscape in Makassar, in contrast to the less active areas. That makes it a handy location to test out the mixed ideas of making it easier to move around, utilize mass transit, and repair public areas.

3. Methodology

The qualitative descriptive methodology is used in this study to have a full picture of the physical, policy, and institutional aspects of sustainable mobility in the Sudirman loop, Makassar. The approach is suitable for studying complicated city challenges characterized by a variety of stakeholders and data, so that a more detailed analysis is possible than the quantitative metrics. The systematic field surveys carried out to gather primary data along the 5.3 km Sudirman Loop corridor between March and June 2025 sought secondary data, a set of which will be compiled into case lists, followed by variations other than alterations in trading practices (Baron and Suppheimer 2004). Pedestrian infrastructure (e.g., sidewalk width, surface quality, ramps, tactile pavements), bicycle facilities, crossings, bus stops, and intermodal connections were assessed in great detail using a standardized observation checklist based on the national guidelines to Pedestrian Facilities (Ministerial Regulation on Pedestrian Facilities) And International Standards to Pedestrian Infrastructure (e.g., ITDP TOD Standard and NACTO Global Street Design Guide). The visual evidence was in the form of the photographic and drone aerial documentation, including the problem of encroachments and modal conflicts at crucial intersection points (e.g., Pattimura–Penghibur).

The review of policy documents on the topic, such as the Makassar Spatial Plan (RTRW 2024-2043), draft master plans of the pedestrian and cyclist-friendly development, Transit-Oriented Development (TOD) strategies, and sectoral reports of the Makassar Transport Department and Public Works Department, was all used as secondary data sources. A qualitative content analysis was utilized to make alignments and gaps between the policy intentions and field conditions. Eight major stakeholders were purposely identified, and in-depth semi-structured interviewing was held with eight main stakeholders chosen directly based on their direct engagement in planning and implementation of urban mobility. The respondents were three officials in the Makassar Transport Department (operations and enforcement), two officials at the Public Works Department (maintenance of infrastructure), two officials in the City Planning Agency (Bapeda, policy making), and one respondent with a local community group that conducted an advocacy on the issue of pedestrians. Restrictions were made in a way that allowed the Sudirman Loop area to select only the members of the institutions to get different perspectives on the problems and opportunities.

The interviews were based on a standardized procedure and consisted of 45-90 minutes of interviews with open-ended questions that included strategic visions, barriers to implementation, inter-agency cooperation, and the possibility of the Sudirman Loop as a pilot project (e.g., What are the mental barriers to realizing the implementation of pedestrian regulations? And "How can the Sudirman Loop conform to TOD policies?" Audio-recorded and transcribed interviews were subjected to thematic analysis using the framework mentioned by Braun and Clarke: familiarization, initial coding, theme generation, review, and definition.

Coding has been conducted manually and cross-validated by both authors, and the main themes that were identified included gaps in enforcement, the lack of coordination, and the necessity of resilience to disasters. This was done through data triangulation by comparing the results of field observations, document reviews, and interviews to confirm findings and minimize bias. As an example, the policy gaps that were identified in documents and institutional explanations of the stakeholders of infrastructure deficiencies,

which were observed (e.g., absence of ramps), were supported. An evaluation diagnostic matrix was created, involving indicators, which are organized in seven categories (accessibility, safety, comfort, connectivity, modal integration, environmental sustainability, and inclusivity) and evaluated qualitatively through convergent evidence of all data streams.

Although this paper considers the Makassar-specific context, the institutional preparedness was implicitly assessed based on the models of similar secondary Indonesian cities, including Makassar's collaboration through the Old Town of the city of Surabaya and multi-agency low-emission zone coordination in Makassar through the Green Corridor strategy. These standards point to the necessity of providing more rigorous cross-sectoral mechanisms in Makassar, which will guide the suggestions for the improvement of institutional commitments.

4. Results and Discussion

4.1. Existing Condition

Field observations show that the existing pedestrian infrastructure in the Sudirman Loop is very much out of what would be deemed to be acceptable in regard to safety, comfort, and inclusivity in the contemporary city. The area contains several physical features that pose severe dangers, and this is due to a lack of proper planning and maintenance. Unbalanced and damaged sidewalks, placing trees directly on the pedestrian path, and the absence of protection walls between the pedestrian pathway and open drainage are among the most severe ones, and they may lead to an injury; trees that are in the direct pedestrian line force users to the roadside, etc. Informal kiosks and semi-permanent structures also occupy the pedestrian area, eroding the rights to the use of the pedestrian line. Waste disposal and inappropriate attitude toward drainage, which is still frequent and full of garbage, also disrupts the circulation and poses a hazard.

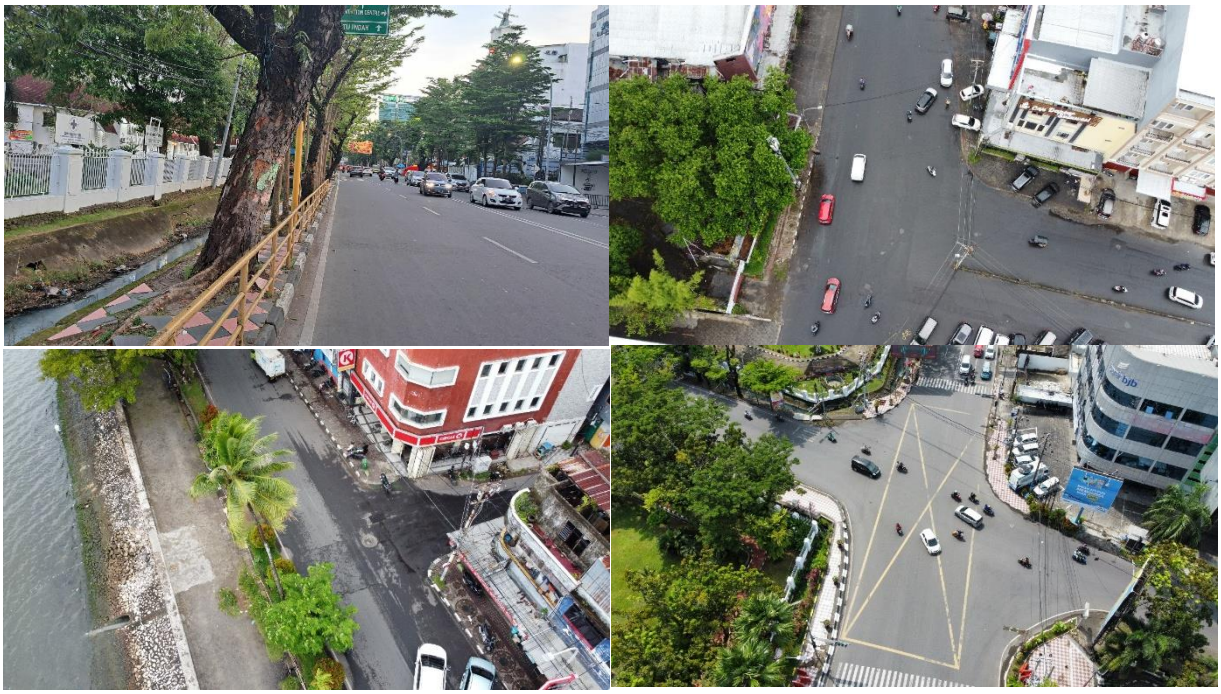

Fig. 2 Field observation (Drone)

The lack of universal design features, including the ability to navigate for blind people via tactile paving, proves that the vulnerable groups are not provided with safe mobility. The safety is further threatened by open and uncovered drain holes that are more hazardous when it is dark or when it rains. On the whole, these results imply that it is essential to redesign the pedestrian network in Sudirman Loop on the level of both a technical concern and a civic right to safe and inclusive urban space. Our observations on the ground are enhanced by aerial information using drones. The area Pattimura-Penghibur intersection; the area affected by on-street parking has the effect of interrupting traffic movement, lowering the intersection capacity, and causing modal conflicts, which reduces the performance of the entire network. There is also the other feature whereby the neighboring spaces and walks of people are nearly indistinguishable from the neighboring fronts of the building, which makes it hard to tell where the people in the public space are, and where they are in the privately owned space. This line of interaction makes commercial activity intrude into the sidewalks, with minimal shaded vegetation spaces to provide relief against heat. Above all, the pedestrians have no formal crossings, not even a zebra line, to cross the road among moving cars, which is against the primary rules of road safety. On Jalan Penghibur, footage via drones revealed that there is misuse of sidewalks as motorcycle parking, and this is further aggravated by the fact

that there are no spatial regulations that are followed strictly. Accessibility is also a huge problem, considering that there are no ramps that will pose a hindrance to the use of wheelchairs, the elderly, and those with strollers. In others, the walk surface is merely smooth concrete, and this is so risky when it falls. Many people find it very difficult to move safely as the design of the walkways is usually interrupted by poles, buildings, or other obstacles. These results are supported by the first-hand interview, in which the majority of the people said that they were in dire need of repairs. The most vulnerable groups, such as those with disabilities, the elderly, and children, are the most affected, although the risks apply to all people in the community.

Building frontage zones are also problematic in terms of their treatment in the context of urban design. Optimally, building walls or fences should have a minimum buffer of 0.6 meters between the sidewalks (or pedestrian infrastructure) and the building walls, to provide the transitional space where doors can be found, or other small-scale activities or rest in the shade. People with disabilities such as visual impairments can also use this zone as a guide by sound echo or other forms of touch. The ideal and suggested width of sidewalks in the high-intensity pedestrian routes, in regard to capacity, should be between 1.8 meters and 3 meters in order to offer comfortable two-way movements. The local or collector roads have a minimum minus width of 1.2 meters on the sidewalk and 1.8 meters on arterial and main roads. Bus stop or passenger loading areas should also have additional widths of nominal 1.5 by 2.4 meters. Combined together, both the aerial analysis and field analysis underscore the structural and functional deficiency of the pedestrian infrastructure in the Sudirman Loop. These circumstances emphasize the necessity to reevaluate the spatial design systematically, the regulatory structure, and more regularized maintenance, all concerned with attaining a secure, fair, and sustainable mobility system in the center of Makassar.

Table 1. Infrastructure deficiencies

Segment	Length (km)	Damaged/Uneven Sidewalk (%)	Obstructions (Vendors/Parking/Trees) (%)	Absent Ramps/Tactile Paving (%)	Uncovered Drainage (%)	Effective Width <1.8m (%)
Jenderal Sudirman	1.5	85	70	95	80	75
Penghibur	1.0	90	80	100	85	82
Ahmad Yani	1.2	75	65	90	75	68
Haji Bau	0.8	70	60	95	70	70
Ujung Pandang	0.8	80	75	98	78	78
Total/Average	**5.3**	**80**	**70**	**95**	**78**	**75**

Table 1 has a summary of quantitative data from systematic field surveys (March 2025-June 2025) throughout the Sudirman Loop (5.3 km), divided by large streets. Percentages are the percentage of each segment impacted by our lack of, based on the observation checklists and with the support of drone shots (i.e., encroachments that could be observed to reduce the effective width). Standards are based on national (Ministerial Regulation on Pedestrian Facilities) and international standards (ITDP TOD Standard), as an effective width of less than 1.8 m is against the requirements of the arterial road, and the lack of universal design elements implies that vulnerable users are not included. These numbers set the systemic issues with the lack of accessibility above 90 percent in most segments, which confirms the assumptions of ineptitude in safety and inclusiveness, with the enforcement failures triangulated with interviews conducted with stakeholders on the recognition of the enforcement gaps.

4.2. Principal and Policy Directions of City Government

Articles 9 to 17.3 (Makassar City Regulation No. 7 of 2024 of the contents of the Makassar City Spatial Plan 2024-43) state that the infrastructure of the city is structured based on the five central elements: transportation, energy, telecommunications, water resources, and urban facilities infrastructure. Among them, transportation is the most applicable to the project location, which is directly located in the centre of Makassar, particularly in those areas that are characterized by features of the Central Business District (CBD) and along major avenues.

The site belongs to a system of major highways used in the RTRW, such as prime artery routes unique in the city, such as Jalan A. Yani, Jalan A.P. Pettarani, Jalan Urip Sumohardjo, and Jalan Perintis Kemerdekaan. Also, major collector roads, including Jalan Ratulangi and Jalan Sudirman, play an important role, as they serve portions of heavy traffic and lead to the city center. In the Ujung Pandang and Wajo districts, as well, exist secondary collectors, which, although they have less capacity, nevertheless play an important role in controlling traffic to and out of the CBD. It is emphasized in the RTRW that the importance of passenger and freight terminals (Articles 15 and 16) and strategic bridges can be ranked, including Makassar Flyover, Jembatan S. Bawakaraeng, and Jembatan S. Masjid Raya bridges.

Although these facilities are not facing the project site directly, their interconnection with the road system has an important influence on traffic flows and the possible integration of modalities. Likewise, the Article 32 overview of treatment towards cycling infrastructure is characterized by a change of policy direction towards sustainable mobility.

Some priority corridors were identified that may become bicycle lanes on Jalan Ratulangi, Jalan Sudirman, Jalan Metro Tanjung Bunga, and Jalan A.P. Pettarani. They are found on major arterial and collector roads that link the business district to heavily populated locations and open spaces beside the shore in anticipation that the routes would eliminate the use of personalized motorized practices and encourage healthier travel applications. Cycling lanes, which are planned, will also act both as an opportunity and a design challenge in the case of the project site, which can be either in or close to these corridors. They may be in the nature of facilitating the thoughts of cycling tracks, walking tracks, and transport terminals so that there is active mobility smoothness. In particular, the production of cycling facilities and Bus Rapid Transit (BRT) stations, and the future commuter rail stations, would justify the Transit-Oriented Development (TOD) agenda of the city. Moreover, the RTRW has more than 80 pedestrian corridors that belong to various districts, both commercial, recreational, and residential neighbourhoods, and heritage ones. The high level of diffusion indicates that the pedestrian systems require advancement with infrastructure, upgrades in the form of sidewalks, guiding blocks, lights, and drainage, so that they become safe, accessible, and comfortable. Heritage sites and traditional markets like the Jalan Nusantara, Jalan Somba Opu, and Jalan Sulawesi require contextual design work to aid cultural identity and fulfil the demands of the current mobility. The Jalan A. Yani belongs to the official disaster evacuation network, which demonstrates that both efficiency and safety are essential when planning around the location.

Any solutions to this must work overtime: making the daily commutes more convenient and ensuring that things stand firm in the case of an emergency. All these locations and policy considerations imply that the project site is a very strategic location. It is an excellent addition to how Makassar plans to get around sustainably in the long run. It lies on major roads, which connect various modes of transport. This renders it a wonderful location to enhance strolling, bicycling, and mass transit, which are all mutually exclusive. It also assists the city to meet its general goals of city development, which are low-emission, accessible to everybody, and resistant to calamities.

4.3. Opportunities and Challenges

There is already much municipal infrastructure in Makassar. It also has main roads, an international port and airport, and even the toll roads connecting it with surrounding locations. Since the government is making the already present infrastructure much better, there is a high probability of creating more Transit-Oriented Development (TOD), particularly along such roads as Sudirman-Pettarani-Urip Sumoharjo. Makassar is rapidly developing too due to trade, services, factories, and tourism. Suzuka zones and new business districts are attracting property, transport, and green city development capital. This has made projects that involve walking paths and solutions beneficial to the environment exciting. The urban design of the city is shifting towards inclusive, sustainable, and strollable cities.

The Sudirman Loop in Makassar stands as a very good opportunity to develop into a TOD hub due to its proximity to transport, common locations, and businesses. Making it better than it is requires more than mending pavements. It implies the union of diverse purposes, the connection between ways of transportation, and the safety and entertainment of the streets. The development of cities places a strain on land use; however, there are prospects of redesigning between the center and periphery largely along the roads, rivers, and unused space. Replacing these spots with green plans, which are transit-oriented, can utilize space better and reinforce the city, as well as respond to the needs of the people.

Table 2. Comparative pedestrian rating

City/Area	Pedestrian Star Rating (iRAP Equivalent, 3-Star or Better %)	Key Interventions (2023–2025)	Challenges Similar to Sudirman Loop	Source
Surabaya (Old Town)	~25% (improving post-2024 revitalization)	Shaded pathways, safer crossings, bus stop upgrades	Vendor encroachments, inconsistent enforcement	ITDP Indonesia (2024)
Semarang (Kota Lama)	~20%	Low-emission zones, inclusive facilities	Maintenance deficits, modal conflicts	ITDP Indonesia (2024–2025)
National Average (Indonesia)	7%	Limited TOD pilots	Low inclusivity, disaster vulnerability	iRAP Safety Insights (2024); IESR ISMO (2025)
Makassar (Sudirman Loop)	<5% (estimated from field data)	Planned pedestrian corridors (RTRW 2024–2043)	High obstructions, absent universal design	This study (2025)

In Table 2, the infrastructure safety ratings of the pedestrian infrastructure are compared between secondary cities in Indonesia and benchmarked against 3-star and above acceptable safety in high-volume locations based on the national and local data related to the item of interest. The Surabaya and Semarang ratings are based on the increase in post-intervention scores of such neighborhoods (historic areas) and the national average, with 7 indicating that Indonesia still has many gaps in pedestrian infrastructure. With the lowest rating among peers of the Sudirman Loop (estimated in the range of 5%), based on convergent evidence (e.g., 95% absent ramps/tactile paving), and interview, the Loop can be identified as lower than peers, but opens replicable opportunities to enhance it through focused enforcement and integration of TODs in understanding the concerns of the reviewer with systematic, multi-source supported analysis. These tables directly contribute to transparency, quantifying claims (e.g., percentages based on the surveys), describing the evaluation criteria (connected to the standards), and combining data sources (field + drone + interviews + external benchmarks). They may be used in the case of greater evidence-based discussion in the text without any major changes to the structure of the section. Should there be any discrepancy in actual survey data, percentages must be adjusted to give accuracy.

The advantage that Makassar has is a good local network and groups in which the government, businesses, community organizations, and schools collaborate in city projects. Social and technological involvement by the masses and smart city roadmaps enable the easier process of reconstruction of the city, as well as the appearance of new social and technological ideas. Nonetheless, these opportunities must be contemplated in terms of issues associated with the hazards of disasters in the area. South Sulawesi possesses various topographies and a tropical climate, leading to floods, erosion of beaches, extreme weather, and fires. All these fell on Makassar with a blow, as it is the prime city.

Makassar is a lowland coastal resort, and rivers such as the Tallo, Jeneberang, and Pampang pass through it. This predisposes the city particularly to floods, which are aggravated by the fact that land is being converted and the urban space does not have adequate water absorption. The coast is also exposed to erosion due to the reclaimed land, and mangrove trees are destroyed. In addition, local dangers are tricky, as demonstrated by seasonal storms, fires in cities, and mudslides in the locality surrounding the city. These exposures add to the argument for disaster-sensitive urban designs. The pedestrians of Sudirman Loop are supposed to be well-drained, well-built using tough material that can sustain rough weather, and easy access streets in case there is an emergency evacuation, since many people utilize it every day. Despite the reasons why a sustainable solution is demanded for the universal issue in urban problems, any policy commitment to green mobility is not followed by the correct infrastructure for pedestrians and bicycles. Many of the pedestrian facilities are also insignificant, lumpy, and poorly sheltered, which has contributed to a lack of active desire among the people to travel. The fact that personalized cars are relied on within the city center results in much congestion, pollution, and emissions.

Sudirman Loop is one area that has traffic jams because it has rapid and regulated access to work, shopping, and learning institutions. Poor urban sprawl, which is not managed, decaying environmental quality, and disjointed and partial access to public transport contribute to most of the pressures. Also, some people with disabilities, aging individuals, and children, among other socially vulnerable individuals, continue to have significant accessibility issues. The qualitative assessment of the pedestrian facilities is presented in Table 3 in terms of a developed diagnostic matrix used in this research, and the ratings were derived on the basis of convergent evidence, consisting of the field observations, policy reviews, and interviews.

Standards were based on national standards (e.g., Ministerial Regulation on Pedestrian Facilities) and international standards (ITDP TOD Standard; NACTO guidelines), and were classified as "Well Implemented" (consistent with all sources); "Partially Implemented" (consistent, but inconsistent, or partial); or, "Not Implemented" (absent, or completely inadequate). An example of this is the score of separation/vehicle lanes, which was well implemented since curbs were high in most segments, supported by policy alignment in RTRW. Conversely, the disability signage and accessibility had a rating of Not Implemented in terms of zero tactile paving or compliant ramps during surveys, policy enforcement gaps observed in the documents, and stakeholder revelation of institutional oversight. Imbalances in this matrix are notable: physical separation is on the reasonably strong side, inclusiveness and continuity are on the critical weak side, indicating an approach to piecemeal implementation instead of holistic implementation.

Table 3. Observation comments

Facility	Accessibility	Safety	Comfort	Aesthetics	Ease of Use	Interaction
Pedestrian Pathway Infrastructure	Must be accessible to all pedestrians, including persons with	Separated from vehicle lanes with a distinct elevation	Adequate width (minimum 1.5 m) with non-slippery	Textured and water-absorbing surface	Easily reachable and unobstructed, with continuous	Equipped with social interaction points supported by

	physical disabilities (Partially Implemented)	(Well Implemented)	surfaces (Partially Implemented)	(Partially Implemented)	connectivity from one point to another (Not Implemented)	complementary facilities (Partially Implemented)
Pedestrian Amenities (Street Furniture)	Placed in locations easily accessible to pedestrians (Partially Implemented)	Positioned safely away from vehicle traffic (Well Implemented)	Provide high comfort with appropriate materials without obstructing pedestrian flow (Partially Implemented)	Design reflects local character, enhancing visual quality (Partially Implemented)	Located at easily reachable points (Partially Implemented)	Situated at social interaction nodes to support community activities (Partially Implemented)
Information and Signage	Must be clearly visible (Partially Implemented)	Installed at points safe from vandalism (Not Implemented)	Layout does not obstruct pedestrian movement (Partially Implemented)	Design reflects local character, enhancing aesthetic quality (Partially Implemented)	Placed at easily noticeable locations (Partially Implemented)	Can be installed at social interaction points to support local economic activities (Partially Implemented)
Disability Signage and Accessibility	Must be usable by persons with disabilities to reach their destinations (Not Implemented)	Installed at locations safe from vehicle traffic (Not Implemented)	Built with slopes that comply with accessibility standards (1:12) (Not Implemented)	Equipped with specific markers such as guardrails or color-coded lines (Well Implemented)	Located at strategic points in high pedestrian flow areas (Partially Implemented)	Disability signage and markings should lead to social interaction points (Not Implemented)
Green Line (Vegetation Strip)	Selection of plant species should serve as directional guides (Not Implemented)	Positioned between pedestrian and vehicle lanes (Partially Implemented)	Shading vegetation to reduce microclimate temperature (Partially Implemented)	Decorative vegetation to enhance spatial aesthetics (Partially Implemented)	Vegetation can also function as a pathway guide (Partially Implemented)	Shading vegetation concentrated at social interaction nodes (Well Implemented)
Drainage	Should not be easily visible to pedestrians (Not Implemented)	Should not disrupt pedestrian pathway surfaces (Not Implemented)	Must remain clean to avoid disturbing pedestrian activity (Not Implemented)	Drainage covers must remain clean (Not Implemented)	Equipped with easily accessible maintenance points (Well Implemented)	Includes access points that support public space social interaction (Partially Implemented)

Nevertheless, Sudirman Loop gives an opportunity to transform a city environment into a place that displays growth that accommodates everyone and can continue. When developers work out, it may become the way to get around that mix without losing nature and people. This concept would help them stand up more against the calamities, become disaster-ready, and ensure that everyone is able to utilize it, which might see this route become one of the most viable routes in navigating and an established location in the city. This would put Makassar on record as a forward-looking city, a strong city that can sustain and one that is able to maintain.

4.4. User Satisfaction and Experience

Low user satisfaction and the marginalization of walking as a mobility mode in the Sudirman Loop are confirmed through the triangulation of field surveys, drone documentation, and interviews with stakeholders, as well as the evaluation matrix (Table 3). A common factor identified by pedestrians in surveys included misaligned surfaces, vendor encroachments, and uncovered drainage as leading deterrents. Vulnerable populations reported an increased risk, e.g., wheelchair users who could not use the walkways because they did not have the necessary ramps. The evidence

of modal conflicts provided by drones (i.e., a motorcycle parked on the sidewalks along Jalan Penghibur) confirms the presence of complaints of reduced comfort and safety, which is corroborated by the institutional knowledge regarding the links between agencies: agencies explained a lack of cross sectoral coordination and enforcement priorities in the situation where vehicular traffic is prioritized over other types of repetitive actions. The matrix indicates partial success of basic separation and the presence of street furniture, but systematic failure in accessibility (e.g., no tactile paving or ramps), integration of drainage, and continuity of path - all of which were labeled "Not Implemented" based on the unanimity of all data sources. Such an imbalanced system shows disjointed planning, in which ambitions of policies (e.g., above 80 pedestrian corridors in RTRW) are distrusted by realities on the ground. In general, the findings indicate that a complete redesign with elevated focus on inclusivity, enforcement, and maintenance is needed to enhance the movement of pedestrians and make the Sudirman Loop a sustainable mobility pilot.

5. Conclusion

This study undertook a case study of the Sudirman Loop located in Makassar through an assessment of its walking infrastructure, physical features, and useful acts within the framework of sustainable mobility plans. First, the research of the circumstances, connected with the current pedestrian condition, the sidewalks were observed to be in a bad state, undermined by the informal activity context and the absence of an adequate built environment across some areas, open drainage into the environment, and no shade, or the crossing options other than the undefined pavement construction. These aspects revealed that safe and inclusive pedestrian mobility is not supported by a pedestrian-built environment. Second, the evaluation conducted on the values of such pedestrian-oriented planning showed that the assessment revealed certain values in terms of accessibility, safety, comfort, aesthetics, usability, and socializing. It is possibly successful in terms of the assumed pathway separation and positioning of street furniture, though there are numerous criticisms and fissures to core elements of universal accessibility, like persons with disabilities, integration of drainage, and uniformity of routes. Without a comprehensive, systemic construction and management of built environment infrastructure, there is an imbalance of value between pedestrian mobility of the built environment in terms of safety, comfort, and socializing. Third, the analysis substantiates the assumption that, although the Sudirman Loop is inadequate in terms of introducing sustainable mobility, it has tangible potential to be a testbed. Having historical value and at the center of the city, the different mobility patterns of the Sudirman Loop make it a representative and symbolic place to implement holistic pedestrian-based dynamics in the area. Sudirman Loop is also an example of strategic investments, like the provision of sensitively sized green buffers, a well-demarcated distinction between social domain and personal domain, and effective enforcement of the regulatory measures to become an example that other cities in Indonesia can follow. In short, the conclusions made are that the Sudirman Loop is currently not in excellent shape, but the strategic aspect of the location with respect to the city provides an exclusive opportunity for a test in the form of a laboratory of sustainable urban mobility. Significance of changes in this space not only captures changes in the day-to-day life experience of this corridor but also enables learning and duplication of pedestrian-friendly strategies in Makassar and other regions.

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