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Transformation of Conventional Bus Terminal Management Towards Smart Mobility in Manado City

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ABSTRACT

The purpose of this study is to evaluate how the Manado City Government supports Smart Mobility by managing and optimizing bus terminals. In contrast to the low use of public transportation, the prevalence of private vehicles, which reached 503,323 units in 2023, and the high levels of urban mobility serve as the driving forces behind this study. Using secondary data from Manado City Government policy documents, Transportation Agency reports, transportation statistics, scientific journals, and credible media outlets, a qualitative literature review was conducted. The Miles and Huberman interactive model was used to analyze the data through the stages of data reduction, presentation, and conclusion drawing. Source triangulation was used to validate the results. The results show that Manado City's bus terminal management remains traditional, with Terminal Paal 2's distribution restricted and supporting infrastructure insufficient. According to the Importance-Performance Analysis method, public transport user satisfaction has a negative gap value of -1.60, meaning that service quality is significantly below user expectations. Additionally, there is still little or no systemic integration of Smart Mobility indicators, such as public transportation, clean energy transportation, and real-time information access. To improve terminal efficiency as intelligent and sustainable urban mobility nodes, these findings highlight the need to reform urban transportation policies by integrating digital technologies and creating real-time information systems.

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KEYWORDS
Bus Terminal; Manado City; Smart Mobility.

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INTRODUCTION

The mobile population in urban areas continues to grow alongside population growth, encouraging people to engage in daily activities such as working, pursuing education, and fulfilling consumer needs. Indonesia has a large population and significant economic and religious activity, so its roads and transportation need to be good to support all these people moving around. The Indonesian Ministry of Transportation has data showing how many people are traveling across the country. During the holidays in 2024 and 2025, a total of 225.86 million people traveled somewhere in the country. Of these people, around 94.67 million traveled to parts of their province or to other provinces. This really shows how much people in Indonesia are moving around and how much we need a transportation system that can handle all these people, especially during long holidays (Dewi, 2025).

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During the Christmas and New Year period of 2024 to 2025, people moved around the country a lot with 225 million movements. The city of Manado is also seeing this trend in the way people get around. Manado is a city in North Sulawesi where the economy is doing well, but it is getting harder and harder to get around. We can see this because in 2023, there were 503,323 vehicles in Manado. The number of cars in Manado is going up, it increased by 8.4 percent over the last four years. This means that the number of cars in Manado is growing much faster than the number of buses and other public transportation options that are already available in Manado (Ayu et al., 2025). This condition directly impacts the operation of bus terminals as major transportation hubs. People tend to choose private vehicles over public transportation, which still has limited services.

Two leading indicators show the quantitative effect of private vehicle dominance on terminal performance. First, the number of people using public transportation at Terminal Paal 2, Manado's only active terminal, has been declining over the past five years. According to operational data from the Manado Transportation Agency (2025), the average occupancy rate of urban public transportation is only 45–50% of available capacity (Dishub Manado, 2025). The Ministry of Transportation wants bus service to be at 70%. It is much lower than that. Buses are arriving at the terminal 15% less often than in 2020. This is a change. The terminal fees are lower now. The terminal is not as important as it used to be. The bus terminal in Manado City is experiencing problems due to cars. Private cars are causing traffic jams. They are also hurting the bus terminal in Manado City. The bus terminal in Manado City is not doing well economically and socially because of cars.

Private cars are part of the problem at the bus terminal in Manado City. The disparity between the expansion of private vehicles and the utilization of public transportation indicates a structural misalignment in urban transportation policy. On the one hand, the government, through the Department of Transportation, is still trying to maintain conventional public transportation with 1,904 units on 17 routes. On the other hand, there are no significant policies limiting the use of private vehicles, so the public still has an incentive not to switch to public transportation. As a result, bus terminals have lost their function as mass transportation hubs and have become parking lots or temporary stops, rather than centers of interaction and efficient urban movement. Dano.Pa et al. (2025) revealed that all aspects of public transportation services in Manado, particularly on the Manado–Bitung route, still fall short of user expectations. Their study shows that urban residents don't think service indicators such as comfort, punctuality, information availability, and supporting facilities are sufficient to meet their mobility needs. These results show that the rise of private cars is not just a problem of traffic jams; it also directly affects the economic and social functions of bus terminals in Manado City, as people are less likely to switch to public transportation that isn't convenient.

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The problem of increasing numbers of motor vehicles also occurs in Manado. The main problem is that most people in the community get around by car, and public transportation isn't excellent in terms of service and infrastructure. Every year, the number of vehicles in Manado City goes up. The number is expected to rise from about 464,346 in 2019 to more than 503,323 in 2023. This number includes both two- and four-wheeled vehicles, which are the most common types. This not only reflects the community's need for mobility but also makes transportation management much more difficult (Fadhlurrahman, 2025). In addition, the use of conventional public transportation, such as minibuses, in Manado remains high, with 1,904 public transportation units operating in 2025 and 17 routes serving trips within the city. People are also less likely to want to use bus services because the Paal 2 Terminal in Manado doesn't have any facilities, and the quality of service is getting worse. This can make it hard for people to get around and for businesses to run smoothly in both cities. The ongoing debate over the introduction of local Bus Rapid Transit (BRT) services, such as Trans Manado, shows that public transportation is still evolving. As passenger demand for safety and comfort increases, evaluating service quality is essential to improve transportation user satisfaction (Dano, Pa et al., 2025).

Previous studies have shown that strategies for developing Manado's transportation network should consider mode integration, improved road user discipline, and balancing vehicle growth with road infrastructure development to make the network more efficient and sustainable. Ferdinand Akbar's research (2025) shows that public transportation performance has been declining because passengers are losing interest (Dano.Pa et al., 2025). Previous studies generally describe the condition of public transportation services or transportation network strategies, including road infrastructure development, traffic management, and improvements in public transportation service quality. However, none have specifically emphasized the government's role in optimizing terminal infrastructure as the foundation of Smart Mobility, especially in Manado.

Wijaya & Imran (2019) explain the existence of Bus Rapid Transit (BRT) policies in low-income Asian cities, emphasizing that “the unique political and institutional structures in low-income Asian cities (LIA) make implementation difficult.” This shows that the unique political and institutional frameworks in low-income Asian regions hinder the further implementation of public transportation systems. Therefore, this study is essential for bridging this knowledge gap by evaluating the Manado City Government's management and optimization of bus terminals to support the Smart Mobility system.

A Smart City is an urban concept that emphasizes a city's ability to optimize human resources, social capital, and modern telecommunications infrastructure to support sustainable economic growth and improve citizens' quality of life (Caragliu et al., 2009). Caragliu, Del Bo, and Nijkamp define Smart Cities as cities that use modern technology and infrastructure to manage their resources wisely, with a focus on governance based on community participation. Smart Cities have many parts, including smart governance, a

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smart economy, a smart environment, a smart society, a smart lifestyle, and smart mobility. Smart Mobility is one of the most important parts of life that affects people every day.

One of the most important parts of the Smart City idea is Smart Mobility. The main goal is to find new, effective, and long-lasting ways to manage transportation and mobility in cities. Giffinger & Gudrun (2010) stress that Smart Mobility is linked to the existence of safe, eco-friendly, and integrated transportation systems that are backed by information and communication technology. Smart Mobility initiatives seek to enhance accessibility and streamline human movement, concurrently lessening the adverse consequences of urban transit, including congestion and environmental degradation. Cohen (2014) and Carpentiere (2024) concur, positing that Smart Mobility fundamentally involves leveraging digital technologies to optimize the efficiency of public transportation systems. Their investigations into the determinants of Smart Mobility success across five international cities (New York, Copenhagen, Singapore, Bari, and Barcelona) corroborate the imperative for structured Smart Mobility policies. These policies are essential for promoting innovative urban development while simultaneously addressing resource inefficiencies and environmental issues. Consequently, a contextualized methodology, accounting for both institutional readiness and regional characteristics, is required. The study identified five key factors for success that go beyond simply using technology. These factors include governance, public participation, and policy integration.

Zapolskytė et al. (2020) developed a framework for evaluating innovative mobility systems by categorizing indicators into five main factors: measures to reduce motorized travel and congestion; measures to reduce pollution; measures to improve travel safety and reduce accidents; traffic management tools and services; and innovative infrastructure measures. This framework offers a more comprehensive approach than merely three indicators, as it takes into account safety and traffic management aspects pertinent to the context of a developing city.

The Smart Mobility Indicator assesses the degree to which a city's transportation infrastructure has implemented smart mobility principles. The National Medium-Term Development Plan (RPJMN) for 2020–2024 primarily emphasizes the integration of digital technologies into daily life and the enhancement of public transportation services. Second, Almassawa et al. (2024) studied the implementation of smart mobility in South Tangerang, Indonesia. They found that the most important policy recommendations were to “improve the availability, security, and comfort of public transportation, reorganize transit routes, provide real-time information access, adjust schedules, and promote bicycle use.” This finding shows that all three of Cohen's indicators are still important for the problems that Indonesian cities are facing right now.

Cohen (2014), proposed several key indicators of Smart Mobility, including:

1. Clean energy transportation

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Transportation that uses clean, green energy sources, like electric cars, low-emission fuels, or other long-lasting technologies, is called clean energy transportation. The goal of using clean energy transportation is to cut down on greenhouse gas emissions, lower air pollution, and keep cities green. In the context of Smart Mobility, using clean energy for transportation is an important step toward making the transportation system more efficient and better for the environment.

Even though clean energy transportation is good for the environment in many ways, it is hard to put into practice in medium-sized cities like Manado. There aren't many charging stations for electric cars in Indonesia, especially outside of Java. These include public charging stations (SPKLU). The Ministry of Energy and Mineral Resources (2024) says that only about 5% of the 1,200 SPKLUs in the country are in Eastern Indonesia, which includes North Sulawesi. This lack of infrastructure is the main reason why cities don't yet use electric cars for public transportation. This is because people who run transportation services don't know when they will be able to charge their cars. Because of this, most of the public transportation vehicles in Manado are still traditional fossil-fuel vehicles, which add to the city's carbon emissions and air pollution.

2. Use of Public Transportation

The use of public transportation indicates how often people rely on it in their daily lives. This indicator shows how effective and attractive public transportation services are in terms of ease of access, comfort, and affordability. It is hoped that high use of public transportation can reduce dependence on private vehicles, reduce traffic congestion, and make it easier for people to move around urban areas. The level of public transportation use by the community does not occur naturally; rather, it is influenced by several interrelated factors. The first factor is the availability and accessibility of services, which includes how close bus stops or terminals are to where people live, how often public transportation runs, and how far the available routes are. In Indonesia, including Manado, there is usually an access gap: public transportation does not reach suburban areas, forcing residents to use private vehicles.

3. Access to Real-Time Information

Access to real-time information allows people to obtain the latest available transportation information easily. This information includes departure schedules, traffic conditions, travel routes, and any changes to transportation services. Providing real-time information helps people plan their trips more effectively and efficiently, while improving the quality of transportation services in the Smart Mobility system.

Providing real-time access to information has significant strategic benefits for both transportation users and system operators and managers. Real-time information eliminates the uncertainty that has long been a considerable weakness in conventional public transportation. When potential passengers know exactly when the bus will arrive, how long the trip will take, and what alternative routes are available in case of traffic jams, they can plan their daily schedules with more certainty. This directly increases

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public confidence in using public transportation because they no longer have to wait in the dark, not knowing when their ride will arrive. People choose to drive private cars rather than use public transportation because they do not know how long they will have to wait. This gives them greater freedom and control over their travel time. With real-time information, the competitive advantage of private vehicles can be reduced because public transportation can provide an equivalent level of certainty. Real-time information systems enable operators to monitor fleet performance, allowing them to make dynamic schedule adjustments in the event of delays or disruptions in the field. Data collected from these systems can also be analyzed to identify passenger demand patterns, routine congestion points, and peak usage times, all of which are invaluable for future route planning and fleet allocation.

METHOD

This research is a library study using a qualitative approach. This approach was chosen because the purpose of the study is to analyze and interpret in depth the policies, strategies, and implementation of bus terminal management in Manado City in the context of urban transportation development based on Smart City principles. Craswell (2014) asserts that qualitative research is an approach to exploring and understanding the meanings individuals or groups give to a social or human issue, characterized by naturalistic data collection, inductive data analysis, and a focus on the researcher's meaning and interpretation. The emphasis on policy analysis and official documents makes literature study the most appropriate approach, as it allows researchers to examine phenomena through the textual traces of available policies and publications, without requiring direct interaction with the research subjects.

A qualitative approach was chosen because this study focuses on understanding the strategies and implementation of bus terminal management in the context of Smart City-based urban transportation development, allowing researchers to examine the phenomenon in depth and contextually. The data used in this study consist of secondary data obtained from diverse written sources relevant to the research focus. To make sure the data was helpful and accurate, the researcher used the following criteria to choose documents: (1) the document came from a trustworthy source, like an official government agency or a reliable journal or national media outlet; (2) The document has information that is only about public transportation, bus terminals, or transportation policy in Manado; (3) The document was published between 2018 and 2025 to make sure it is still useful. The analysis excludes papers that discuss transportation in general at the national level and lack a clear connection to Manado, or that come from unofficial or unverified sources.

The data analysis technique used follows the four steps of Miles and Huberman's interactive analysis model: data collection, data reduction, data presentation, and concluding (Miles et al., 2018). The data reduction process was carried out concretely through several stages. First, the researchers collected all documents containing the words

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"bus terminal," "Smart Mobility," and "Manado City." Second, the researchers read the abstracts, executive summaries, or headlines to assess their relevance to the research focus. Third, the chosen documents were sorted into three groups based on their themes: (a) statistics on vehicles and occupancy rates, (b) regional policies and rules, and (c) news and articles about terminal conditions and public transportation services. Fourth, the researchers chose the most essential information from each group to answer the research questions. They didn't include any general or unrelated information in the analysis.

RESULTS AND DISCUSSION

Bus Terminal Conditions in Manado City

Bus terminals are an essential part of the city's transportation system because they connect public transportation and make it easier for people to move around the city (Pojani & Stead, 2015). Effective bus terminal management contributes to improving the quality of public transportation services and regular movement between regions. The Smart Mobility concept is part of the Smart City project. This concept focuses on using technology to make transportation systems more efficient, sustainable, and accessible to everyone (Cohen, 2014). Smart Mobility integrates the use of clean energy, increased use of public transportation, and the provision of accurate, up-to-date service information into transportation system operations (Cohen, 2014). It is essential to analyze the Manado City Government's management of bus terminals to assess the extent of its efforts to optimize the implementation of the Smart Mobility system. The Smart Mobility indicators used for this analysis are summarized in Table 1.

Table 1. Smart Mobility Indicators

Dimension	*Working Area*	*Indicator*
Smart Mobility	*Efficient Transport*	*Clean-Energy Transport*
	Multi-Modal Access	*Public Transport Use*
	Technologic Infrastructure	*Access to Real-Time Information*

Sumber: Cohen dalam Arifia, 2015: 2

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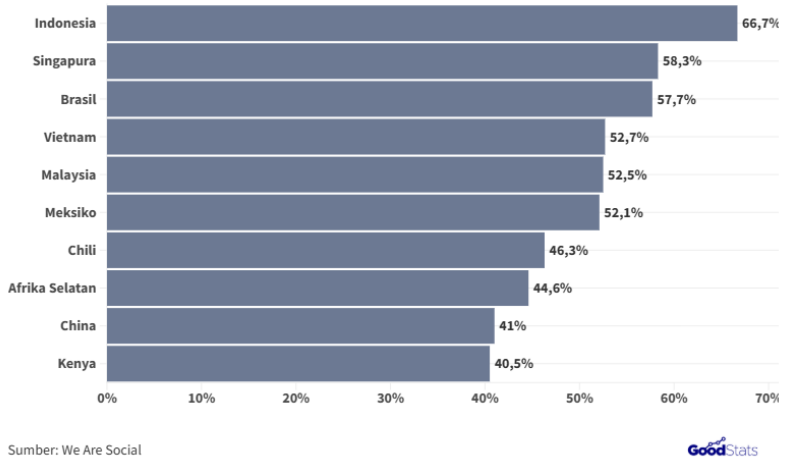


Figure 1. Indonesia will be the largest transportation user in 2024
Sumber: Goodstates

Figure 1 shows that Indonesia will become a transportation-using country by 2024. According to the report, 66.7% of users in Indonesia regularly use mobility services. The use of Smart Mobility in Indonesia continues to grow along with the implementation of the Smart City concept, which the central government drives through various digital transformation policies and sustainable transportation development (Ariok et al., 2020). Smart Mobility is understood as an effort to manage the transportation system by combining information technology, infrastructure efficiency, and intermodal connectivity to improve the quality of community mobility. In Indonesia, Smart Mobility is implemented through the development of Intelligent Transportation Systems (ITS), technology-based traffic management systems, mass transportation integration, and the use of digital data in transportation planning. However, the implementation of Smart Mobility remains uneven, with large cities receiving greater investment, while medium-sized cities face challenges with infrastructure, mode integration, and institutional readiness (Awusi et al., 2025).

The city government runs the city of Manado's bus terminal through the Dinas Perhubungan (Dishub) Kota Manado (Dinas Perhubungan Kota Manado, 2025). This agency is responsible for operating the terminal, regulating public transportation routes, and regulating other urban transportation. In the context of traditional public transportation services such as microlets, Dishub is responsible for setting routes and the number of units, and coordinating with microlet operators to manage local public transportation directly. This role includes regulatory, facilitative, and operational control functions, whereby Dishub not only formulates technical policies in the form of route and unit number determinations, but also supervises operators in terms of applicable service standards and regulations, as well as facilitating the preparation of route lists and travel schedules as part of the urban transportation system (Aksikata, 2025).

The management of the bus terminal in Manado shows that environmental sustainability is not yet a top priority in public transportation (Riogilang, 2016). The

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management of the bus terminal in Manado City shows that ecological sustainability is not yet the primary concern in public transportation operations. This condition can be understood by examining how bus terminals operate in the current urban transportation system (Awusi et al., 2025). Bus terminals in Manado City are spread across several locations and serve as support facilities for public transportation. The presence of the terminal creates a transportation service pattern that interacts with public transport and passenger movements across different parts of the city. This situation serves as a basis for analyzing the role of bus terminals in facilitating urban mobility and their relationship with the transportation service structure in Manado City (Ariok et al., 2020).

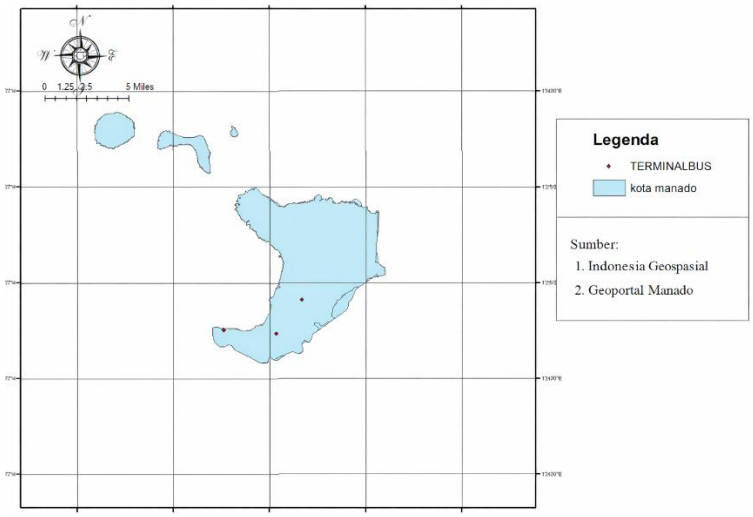


Figure 2. Map of Terminal Distribution in Manado City
Source: ArcGIS Map, 2025

Figure 2 shows the results of a geospatial analysis in ArcGIS of the distribution of bus terminals in Manado City, as part of an analysis of public transportation utilization in the city. From the map, it can be seen that there are few bus terminals in Manado City, and they are located only in certain areas. This condition indicates that the availability of public transportation hubs in Manado City remains uneven, potentially affecting public accessibility to public transportation services. The limited number of bus terminals shown on the ArcGIS distribution map shows that the role of terminals as the central hub for public transportation in Manado City has not been fully utilized (Pangalila et al., 2018). Terminals that only exist in a few places limit access to terminal-based public transportation services in some parts of the city (Mangowal, 2024).

This situation reflects unequal access, resulting in limited public transportation coverage across the city. Girma & Mulatu (2025) identified a similar phenomenon in their study on corridor development in Addis Ababa, Ethiopia, finding that "cities in developing countries face urban population growth accompanied by an increase in private vehicle ownership." These factors, coupled with limited resources, make it difficult for

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people to get around the city. Because transportation infrastructure is concentrated in one place, most urban areas are not well served, forcing people to rely on their private vehicles.

The low number and distribution of bus terminals in Manado are reflected in the low level of public transportation use. According to Antara News, the people of Manado are still not very interested in using public transportation because the supporting facilities are inadequate and the terminals do not yet function as public transportation hubs (Salim, 2025). The low number of visitors and users of bus terminals means that these terminals are not yet fully functioning as the main centers of urban mobility. The knock-on effect of this situation can be seen in the increase in the volume of private vehicles on the roads, which contributes to traffic congestion and reduces the efficiency of urban movement (Salim, 2025).

Table 2. Analysis of Passenger Satisfaction at the Paal Dua Manado Bus Terminal

Item	Rata - rata		GAP	Keterangan
	Performance	Importance		
A1	3.43	4.95	-1.52	Tidak Puas
A2	3.84	4.93	-1.09	Tidak Puas
A3	3.61	4.95	-1.34	Tidak Puas
A4	3.3	4.96	-1.66	Tidak Puas
B1	3.41	4.94	-1.53	Tidak Puas
B2	3.35	4.96	-1.61	Tidak Puas
B3	3.31	4.96	-1.65	Tidak Puas
C1	3.32	4.88	-1.56	Tidak Puas
C2	3.41	4.95	-1.54	Tidak Puas
D1	3.36	4.97	-1.61	Tidak Puas
D2	3.38	4.93	-1.55	Tidak Puas
E1	3.39	4.96	-1.57	Tidak Puas
E2	2.76	4.99	-2.23	Tidak Puas
E3	3.02	4.92	-1.9	Tidak Puas
	3.35	4.95		

Source: Jurnal Tekno, Sam Ratulangi University.

Table 2 shows passenger satisfaction data from bus terminals in Manado City, including Paal Dua Terminal and other terminals, indicating that the quality of public transportation services remains inadequate. This is reflected in the research findings by Dano.Pa et al. (2025) Regarding the satisfaction level of public transport users on the Manado–Bitung route, all service aspects received an average negative score of -1.60. The research employed IPA and SERVQUAL methods to assess satisfaction levels, using a questionnaire distributed to 100 respondents, along with validity and reliability testing and GAP analysis. Statistical data indicates a structural disparity between the number of private vehicles (503,323 units in 2023) and public transport vehicles (1,904 units in 2025). The low occupancy of public transportation at Terminal Paal 2, which is only 45–50% of its capacity, makes this ratio even worse. This is far below the Ministry of

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Transportation's ideal service level of 70%. The fact that bus visits have dropped by about 15% since 2020 also shows that the terminal is becoming less important as a place for people to do things.

The value indicates a gap between what users expect from the service and what they receive in the field. The negative average score suggests that users consider various aspects of the service, such as comfort, punctuality, availability of information, and supporting facilities, to be below the standards required to meet the mobility needs of urbancommunities (Dano.Pa et al., 2025). This condition shows that bus terminals are not yet functioning optimally as public transportation hubs, which should be the main centers of community movement. This low level of user satisfaction could make people less likely to use public transportation. Secondary data from the Transportation Agency does not provide exact figures on how many people come to the terminal every day. However, the triangulation method allows researchers to observe the situation from various perspectives. Fedujwar & Agarwal (2025) highlight the significance of a “composite scale” in evaluating public transportation routes, which enables data-driven optimization of resources by quantifying the trade-offs among different attributes. Within the Manado context, the observed low occupancy rates and infrequent visits suggest that the allocation of resources, specifically buses and terminals, is not being optimized effectively.

The absence of accurate information systems creates uncertainty for passengers, ultimately widening the service gap to a negative average of -1.60 (Nangoy et al., 2022). This condition confirms that without the integration of information technology at terminal nodes, the government's efforts to support an effective and transparent mobility system in Manado City have not been functionally achieved (Kamalina, 2025). The widespread dissatisfaction of users regarding comfort and punctuality stems primarily from the Manado City Government's management policies, which have yet to address the core aspects of Smart Mobility. The dynamics of local government policy exacerbate disparities in services through the Transportation Department, which remains entrenched in conventional transportation management practices, viewing terminal optimization solely as parking and revenue-collection areas rather than as mobility data hubs. This is evident from the terminal's operational system, which remains manual and has not yet been integrated with a digital platform that provides real-time information on vehicle schedules or positions (Sinambela, 2025). The relevance of these findings to the research focus lies in the fact that most journeys on the Manado–Bitung route begin or end at Terminal Paal 2. This means that the low level of passenger satisfaction directly reflects the poor quality of service at the terminal, which is the beginning and end of the trip. This is in line with the findings of Jafarzadeh Ghoushchi et al. (2024), who said that “road safety assessment and risks prioritization using an integrated approach” requires a deep understanding of how users see the existing infrastructure. User dissatisfaction is not just a statistic; it also indicates that the system cannot meet the community's basic mobility needs.

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The terminal's operational system is still manual and not connected to a digital platform that provides real-time information about vehicle schedules or locations (Dinas Perhubungan Kota Manado, 2025). The inability to access real-time information creates uncertainty for passengers, which directly contributes to a service gap value of -1.60 (Sinambela, 2025). Without digital integration of route and schedule information at the terminal, public transportation in Manado will find it increasingly difficult to compete with the convenience of online transit and private vehicles. Based on an analysis of clean energy transportation, public transportation usage, and access to real-time information, Manado City currently has minimal access that cannot reach all areas of community activity evenly (Dishub Manado, 2025). This limited accessibility, coupled with poor service quality, is a major driver for the community (Nangoy et al., 2022). This situation indicates that the government's implementation of the Smart City concept within the transportation sector is incomplete, particularly concerning the integration of bus terminals as the core of urban mobility. The Manado City Government, through its Transportation Agency, bears the responsibility for the management and enhancement of bus terminals. This agency functions as the principal regulatory body, overseeing operational procedures, route planning, and the integration of bus terminals into the broader urban transportation network.

The Role of the Manado City Government in Managing and Making the Most of the Bus Terminal

The government's role includes administrative tasks, such as issuing microlet operator licenses and managing type A/B terminals, such as the Malalayang and Karombasan bus terminals. Dinas Perhubungan is responsible for ensuring service standardsare met and that existing transportation systems are reformed to support sustainable mobility (Setijowarno, 2025). Dinas Perhubungan Kota Manado is accountable for setting the routes and the number of public transportation units. This includes working with operators to ensure the terminal is safe and efficient as a transportation hub. Optimization is achieved through the implementation of the push-pull policy, which limits the number of private vehicles and subsidizes the Buy The Service (BTS) Trans Manado system, which connects the main terminal to the airport and port via the Intelligent Transport System (ITS) (Nursyamsi, 2025). The Manado City Government is pushing for the terminal to shift from its usual role as a parking lot and toll booth to a mobility data hub by combining digital platforms for real-time tracking and complaint management, as seen in the two Trans Manado corridors, Malalayang-Kalimas and Kalimas-Bandara (Rarumangkay, 2025).

The findings of this study reveal ambiguity in the management focus of bus terminals in Manado. On the one hand, the terminal is still seen as a traditional piece of physical infrastructure that serves as a parking lot and a place for passengers to board and disembark. This is reflected in the Dishub policy, which is still focused on retribution and

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administrative route management. On the other hand, the demand for intelligent mobility requires terminals to become digital hubs that integrate with real-time information systems and the Mobility as a Service (MaaS) platform.

The City Government of Manado is strengthening its coordination with the Ministry of Transportation to implement national ITS standards at bus terminals. This includes developing an integrated application to monitor operators' compliance with low-emission vehicle standards (Dishub Manado, 2025). This strategy shows that the government is committed to making the terminal a key part of the Manado Regional Spatial Planning (RTRW) plan. To do this, Dishub is the central coordinator for synchronizing data between terminals to reduce urban traffic jams (Nursyamsi, 2025). The coordination included creating a special task force for Dishub to monitor, in real time, how well terminal operators were following digital safety protocols. Next, the Manado City Government introduced a progressive tax incentive for operators using low-emission technology. This will accelerate the transition to green mobility based terminals (Setijowarno, 2025). In the end, this approach made Manado's public transportation more competitive in supporting the long-term vision of a Smart City.

CONCLUSION

After conducting research and analysis, this study concludes that bus terminal management in Manado City to support the Smart Mobility system has not yet functioned effectively. Terminals are still managed conventionally and have not developed into digitally integrated transportation hubs. Public use of transportation remains low due to limited information technology utilization, poor service quality, and weak integration between transport modes. The core problem lies in the structural gap between existing physical infrastructure and the digital requirements of modern mobility systems. Terminal Paal 2, the only active terminal, still focuses primarily on administrative management and fee collection rather than operating as an integrated mobility data hub. The service gap value of -1.60 indicates that the system has not met the basic mobility needs of residents. The three main indicators of smart mobility clean energy transportation, public transport utilization, and access to real-time information remain significantly underdeveloped. In particular, the absence of a real-time information system creates uncertainty for passengers and widens service gaps. Without reliable information access and traffic management, public transportation systems struggle to compete with private vehicles. The most urgent recommendation is the development of an integrated real-time information system at Terminal Paal 2 that provides departure and arrival schedules accessible through digital boards or mobile applications, real-time vehicle location using GPS, and integration with Mobility as a Service platforms enabling multimodal trip planning, cashless payments, and user feedback. At the city level, the Intelligent Transport System should connect with real-time monitoring of public transport and traffic conditions to enable dynamic route and schedule adjustments based on actual demand.

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Accessibility inequality caused by the concentration of terminals in a single location also limits service coverage and encourages reliance on private vehicles. Therefore, the Manado City Government should improve terminal management by integrating digital information systems, enhancing terminal facilities and service quality, and promoting sustainable public transportation. This research proposes a three-pillar policy model consisting of service digitalization, physical revitalization, and institutional reform as a practical roadmap for smart mobility development. The study also contributes to urban transportation policy discussions in Indonesia, particularly for medium-sized cities, and provides a foundation for future research on the effectiveness of smart mobility in improving urban mobility and public transport satisfaction.

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