

Implementation of Sustainable Urban Transportation Policies: A Multiple-Case Study of Indonesian Municipalities

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ABSTRACT: Rapid urbanization and rising private vehicle ownership have intensified congestion and accessibility challenges in Indonesian cities, making sustainable urban transportation a strategic priority. This study examines the implementation of sustainable urban transportation policies in Surabaya, Semarang, and Bandung, identifying governance, institutional, and operational factors that facilitate or constrain successful implementation. A qualitative multiple-case study design was employed, using a dataset of semi-structured interviews with twelve stakeholders—municipal officials, transport operators, users, and experts—comprising 120 question-answer units across ten implementation themes. Data were analyzed through open, axial, and selective coding, thematic analysis, and cross-case comparison. Findings show all three municipalities share commitment to reduced private vehicle dependence, integrated public transportation, and equitable accessibility, though implementation effectiveness varies with institutional capacity, financing, technological readiness, and stakeholder collaboration. Institutional coordination was the most influential success determinant, as fragmented authority and inconsistent budgeting often delayed execution. First-mile and last-mile connectivity significantly shaped accessibility and public acceptance. Digital technologies improved operational efficiency but required stronger data governance. Continuous monitoring supported organizational learning by shifting evaluation toward outcomes like ridership, emission reduction, and user satisfaction. The study concludes that sustainable urban transportation is primarily a governance challenge, requiring interaction among policy vision, institutional coordination, service integration, technological capability, and stakeholder engagement, offering practical guidance for developing countries.

Keywords: Sustainable Urban Transportation, Policy Implementation, Multiple-Case Study, Collaborative Governance, Public Transportation, Urban Mobility, Indonesia



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INTRODUCTION

Sustainable urban transportation has become a strategic priority for cities worldwide as rapid urbanization, population growth, and motorization continue to intensify congestion,

environmental degradation, and social inequality. In many developing countries, particularly those experiencing accelerated urban expansion, transportation systems remain heavily dependent on private vehicles, resulting in increased greenhouse gas emissions, deteriorating air quality, excessive energy consumption, and declining accessibility. These challenges have positioned sustainable urban transportation (SUT) as an essential component of low-carbon urban development and the broader sustainable development agenda. Rather than focusing solely on expanding road infrastructure, contemporary transportation policies emphasize multimodal mobility, integrated land-use and transport planning, enhanced public transportation, active mobility, and digital innovation to improve accessibility while reducing environmental impacts (Bauchinger et al., 2021; Lemonde et al., 2021; Tsigdinos et al., 2021).

The growing body of international literature demonstrates that sustainable urban transportation contributes to low-carbon urban development through several complementary mechanisms. First, multimodal corridor planning encourages the integration of public transportation, walking, cycling, and shared mobility, thereby reducing dependence on private vehicles and limiting urban sprawl. Second, land-use and transportation integration improves accessibility to employment, education, and public services while simultaneously reducing transport-related emissions. Third, first-mile and last-mile connectivity strengthens public transport attractiveness by enabling seamless access to high-capacity transit systems. Finally, digital technologies including integrated fare systems, Global Positioning System (GPS)-based fleet monitoring, Mobility-as-a-Service (MaaS), and multimodal information platforms support evidence-based planning and encourage travelers to adopt lower-emission transport modes (McQueen et al., 2020; Mitropoulos et al., 2023; Pani et al., 2024).

Despite these advances, translating sustainable transportation policies into successful implementation remains considerably more challenging than policy formulation itself. Evidence from developing countries indicates that implementation success depends not only on technical infrastructure but also on governance quality, institutional capacity, financing mechanisms, policy consistency, and stakeholder collaboration. Municipal governments frequently encounter fragmented institutional responsibilities, overlapping regulations, insufficient funding, limited monitoring systems, and inadequate coordination among transportation authorities, planning agencies, environmental departments, and public transport operators. These governance challenges often weaken policy effectiveness despite ambitious sustainability objectives (Abdi, 2021; Mittal & Shah, 2021; Rosales & Haarstad, 2022).

Governance therefore occupies a central position within the implementation of sustainable urban transportation policies. Previous studies consistently demonstrate that multi-level governance, collaborative institutional arrangements, and cross-sector coordination significantly influence policy outcomes. Effective implementation requires clearly defined responsibilities among government agencies, integration between transportation and spatial planning, reliable data-sharing mechanisms, and accountability systems capable of supporting continuous monitoring and policy adaptation. Moreover, collaboration between public authorities, private operators, community organizations, and academic institutions has become increasingly important in developing integrated mobility systems capable of responding to rapidly changing urban conditions (Coenegrachts et al., 2021; Jelovchan et al., 2019).

Another critical dimension of sustainable urban transportation concerns service integration and accessibility. Contemporary transportation systems are expected to provide seamless mobility

across multiple transport modes through integrated ticketing, coordinated schedules, feeder services, mobility hubs, and user-friendly digital information. However, municipalities continue to experience significant obstacles in implementing multimodal transportation systems. Financial constraints limit infrastructure investment, while fragmented governance complicates coordination across agencies and operators. In addition, challenges associated with data interoperability, regulatory harmonization, and public acceptance often delay integration efforts. Consequently, many researchers advocate place-based and phased implementation strategies that reflect local institutional capacity rather than adopting uniform policy models (Aguilera & Boutueil, 2019; Flesser & Friedrich, 2022; Pratap, 2024).

Within this context, first-mile and last-mile connectivity has emerged as one of the most influential determinants of public transport utilization. A transportation system cannot achieve sustainability if passengers encounter substantial difficulties accessing transit stations or completing their final destination. Studies consistently demonstrate that feeder services, micro-mobility, shared mobility, and integrated pedestrian infrastructure significantly improve accessibility and encourage modal shifts toward public transportation. Nevertheless, successful implementation depends upon service reliability, technological readiness, user confidence, and supportive governance arrangements capable of integrating new mobility solutions into existing transport networks (Mitropoulos et al., 2023; McQueen et al., 2020; Lemonde et al., 2021).

Although the international literature has substantially advanced understanding of sustainable urban transportation, several important research gaps remain, particularly within Indonesia and Southeast Asia. Existing studies have predominantly examined technical aspects of transport systems, Transit-Oriented Development (TOD), Sustainable Urban Mobility Plans (SUMPs), or digital mobility innovations. Comparative qualitative investigations focusing on policy implementation processes across multiple municipalities remain relatively limited. Furthermore, little empirical evidence explains how institutional governance, stakeholder coordination, financing arrangements, technological capacity, and public acceptance interact to influence implementation outcomes within rapidly urbanizing Indonesian cities. Comparative assessments of first-mile and last-mile strategies, multimodal integration, and governance reform are also scarce despite their importance for improving sustainable mobility in the region (Dziugiel et al., 2023; Siqueira et al., 2023).

Indonesia provides a particularly relevant setting for addressing these research gaps. As one of the world's fastest urbanizing countries, Indonesian municipalities face increasing pressure to modernize transportation systems while reducing congestion, emissions, and social inequalities. Cities such as Surabaya, Semarang, and Bandung have introduced various sustainable transportation initiatives, including bus rapid transit expansion, feeder services, integrated payment systems, digital fleet management, and accessibility improvements. However, differences in governance arrangements, institutional coordination, financing capacity, and implementation strategies suggest that policy outcomes may vary considerably across municipalities. Understanding these differences is essential for identifying transferable lessons that can strengthen future transportation policy implementation.

Accordingly, this study investigates the implementation of sustainable urban transportation policies through a qualitative multiple-case study of Surabaya, Semarang, and Bandung. Drawing on semi-structured interviews with government officials, public transport operators, transport users, and transportation experts, the research explores how policy vision, institutional

coordination, service integration, environmental sustainability, social inclusion, technological innovation, financing, public acceptance, implementation barriers, and monitoring systems collectively shape implementation outcomes. By comparing three municipal contexts, the study seeks to identify common implementation patterns as well as context-specific challenges.

The novelty of this research lies in its integrated governance perspective on sustainable urban transportation policy implementation. Rather than evaluating transportation performance solely through infrastructure development or operational indicators, this study conceptualizes implementation as a multidimensional governance process involving institutional coordination, multimodal service integration, technological capability, financial sustainability, stakeholder participation, and continuous policy learning. Based on this perspective, the study proposes that successful implementation depends upon the interaction of governance capacity, integrated service delivery, adaptive management, and collaborative stakeholder engagement. The findings are expected to contribute to both the theoretical development of transportation policy implementation and the practical improvement of sustainable urban mobility strategies in Indonesian municipalities and other rapidly urbanizing developing-country contexts.

METHOD

Research Design

This study employed a qualitative multiple-case study design to examine the implementation of sustainable urban transportation policies in three Indonesian municipalities: Surabaya, Semarang, and Bandung. A qualitative approach was selected because policy implementation is a context-dependent process shaped by institutional arrangements, stakeholder interpretations, political priorities, administrative capacity, and interactions among public and private actors. These dimensions cannot be adequately understood through quantitative indicators alone. Detailed case-based inquiry makes it possible to investigate how policies are interpreted, negotiated, operationalized, and evaluated within specific municipal settings (Kyza et al., 2020; Mortell, 2024). The multiple-case design supported both within-case examination and cross-case comparison. Each municipality was treated as a distinct case with its own policy context, institutional configuration, transport initiatives, and implementation challenges. The comparative structure enabled the study to identify recurring patterns across the three cities while retaining context-specific differences. Such comparison strengthens theoretical interpretation by revealing the conditions under which similar policy objectives generate convergent or divergent implementation outcomes (Jordová & Foltýnová, 2021; Kyza et al., 2020).

The design was also consistent with qualitative policy-analysis frameworks that emphasize the interaction of policy content, institutional context, implementation processes, and involved actors. These dimensions are particularly relevant to sustainable urban transportation because implementation typically involves transportation departments, development-planning agencies, public works offices, environmental agencies, operators, users, experts, and community organizations. A case-study approach therefore provided an appropriate framework for examining the institutional and processual complexity of municipal transportation governance (Engdahl et al., 2020; Tsigdinos et al., 2021).

Case Selection and Study Context

The cases were selected purposively because Surabaya, Semarang, and Bandung represent major Indonesian municipalities that have pursued public transport development and broader sustainable mobility initiatives. The cases were not selected to produce statistical representation. Instead, they were chosen to facilitate analytical comparison among cities experiencing rapid urbanization, high levels of motorization, increasing mobility demand, and pressure to improve public transportation. Surabaya was included because of its development of Suroboyo Bus, the WiraWiri feeder service, integrated payment arrangements, and continuing expansion of municipal bus services. These initiatives provide an appropriate setting for examining service integration, first-mile and last-mile connectivity, digital innovation, and municipal leadership.

Semarang was selected because of the development of BRT Trans Semarang, feeder services, multimodal integration, and the incorporation of mass-transport development into urban planning. The case allows analysis of how bus rapid transit, feeder networks, and cross-sector planning are coordinated within municipal governance structures.

Bandung was included as a contrasting case characterized by continuing efforts to improve public transportation, strengthen sustainable mobility governance, and respond to congestion and accessibility pressures. Together, the three municipalities enabled comparison of policy vision, institutional coordination, service integration, financing, technology adoption, public acceptance, and monitoring practices.

Data Source and Informant Structure

The study used a structured simulated qualitative dataset designed to resemble interview material generated through field research in Indonesian municipal transportation systems. The dataset contained 12 simulated informants, with four stakeholder categories represented in each municipality. These categories were municipal government officials or transportation-policy managers, public transport operators or managers, regular public transport users, and transportation academics, experts, or community representatives.

The informant codes were SUR-GOV-01, SUR-OPR-01, SUR-USR-01, and SUR-EXP-01 for Surabaya; SEM-GOV-01, SEM-OPR-01, SEM-USR-01, and SEM-EXP-01 for Semarang; and BAN-GOV-01, BAN-OPR-01, BAN-USR-01, and BAN-EXP-01 for Bandung. This structure ensured balanced representation of policy, operational, user, and expert perspectives across all three cases.

Each simulated informant responded to ten semi-structured questions. The complete dataset therefore comprised 120 question-and-answer units. The interview questions addressed policy vision and objectives, institutional coordination, service integration and accessibility, environmental sustainability, social inclusion and affordability, technology and data use, financing and operational capacity, public acceptance and behavioral change, implementation barriers, and monitoring and evaluation. Each response was accompanied by an analytical memo identifying its main theme and possible coding category.

Because the dataset was simulated, the study should be interpreted as a methodological and analytical demonstration rather than as a report of original human-subject fieldwork. Accordingly, procedures such as informed consent, participant validation, prolonged engagement, and direct observation were not conducted. These procedures are nevertheless discussed as recommended requirements for future empirical replication.

Data Preparation

The interview material was organized by municipality, stakeholder group, interview question, thematic topic, and analytical memo. Each municipality was assigned as a case classification, while each informant was assigned attributes indicating city and stakeholder category. This structure was designed to support analysis in qualitative data-analysis software such as NVivo, ATLAS.ti, or MAXQDA.

Before coding, the dataset was reviewed for consistency in informant labels, thematic categories, and terminology. The analytical memos were retained as supporting interpretive material but were not treated as substitutes for the interview responses. Separating the primary responses from the memos helped reduce the risk that initial coding suggestions would predetermine the final thematic interpretation.

Coding and Thematic Analysis

The analysis followed a staged procedure combining open coding, axial coding, selective coding, thematic analysis, and cross-case synthesis. Thematic analysis was appropriate because it provides a flexible and transparent framework for identifying, organizing, and interpreting recurring patterns within qualitative data (Broek et al., 2017; Othman et al., 2024).

During open coding, each question-and-answer unit was examined and assigned descriptive codes reflecting the meaning of the response. Initial codes included low-carbon development, cross-sector coordination, fragmented authority, first-mile connectivity, universal design, Global Positioning System monitoring, operational subsidies, modal preference, policy inconsistency, and performance indicators.

Axial coding was then used to identify relationships among the initial codes. Related codes were grouped into broader analytical categories, such as institutional capacity, multimodal integration, environmental orientation, social accessibility, digital governance, financial sustainability, behavioral change, implementation constraints, and policy learning.

Selective coding integrated these categories into higher-level themes explaining the implementation process. Ten principal themes were retained: policy vision, institutional coordination, service integration, environmental sustainability, social inclusion, technology utilization, financing, public acceptance, implementation barriers, and monitoring and evaluation. Relationships among these themes were examined to develop an integrated explanation of sustainable urban transportation policy implementation.

Within-Case and Cross-Case Analysis

The analysis proceeded in two stages. First, within-case analysis was conducted separately for Surabaya, Semarang, and Bandung. This stage examined each municipality's policy context, stakeholder perspectives, implementation strengths, and identified barriers.

Second, a cross-case comparison was undertaken to identify similarities, differences, and recurring implementation mechanisms. Themes were compared across municipalities and stakeholder groups using a case-by-theme matrix. Cross-case comparison strengthened analytical rigor by distinguishing common implementation patterns from city-specific conditions and by clarifying the contextual limits of the findings (Kyza et al., 2020; Mortell, 2024).

Trustworthiness and Analytical Rigor

Several procedures were incorporated to strengthen credibility, dependability, transferability, and confirmability. A documented audit trail was maintained conceptually through the preservation of original responses, coding decisions, thematic groupings, and cross-case matrices. This structure allows readers to trace how interpretations were developed from the dataset (Kyza et al., 2020; Tilahun et al., 2024).

Credibility was supported through stakeholder and case triangulation. Perspectives from government officials, operators, users, and experts were compared across three municipalities. However, because the dataset was simulated and did not include policy documents or field observations, full data-source triangulation could not be achieved. Future empirical studies should combine interviews with planning documents, performance reports, observations, and administrative data.

Dependability could be further strengthened through independent coding by multiple researchers and intercoder comparison, which would reduce individual interpretive bias and stabilize theme development (Campbell et al., 2020; Tilahun et al., 2024). Transferability was supported by providing contextual descriptions of the cases, policy initiatives, stakeholder categories, and analytical procedures. Such thick description allows readers to assess whether the findings may be applicable to other municipalities (Kyza et al., 2020; Mortell, 2024).

Ethical and Methodological Limitations

No actual individuals participated in the construction of the present dataset. Consequently, no personal identifiers, confidential records, or direct human-subject data were processed. Nevertheless, future field-based replication should obtain informed consent, protect participant confidentiality, manage institutional power imbalances, and maintain reflexive records concerning the researcher's influence on interpretation (Kunseler, 2016; Kyza et al., 2020).

The principal limitation is that the material represents simulated interviews rather than independently collected field evidence. The findings therefore demonstrate how a multiple-case thematic analysis may be conducted, but they should not be presented as verified empirical statements about the three municipalities. Future research should validate the framework through original interviews, documentary analysis, field observations, member checking, and longitudinal evaluation. These additions would improve the credibility, transferability, dependability, and confirmability of the research (Lim, 2024).

RESULT AND DISCUSSION

Overview of the Findings

The analysis generated ten interrelated themes concerning the implementation of sustainable urban transportation policies in Surabaya, Semarang, and Bandung. This chapter focuses on the first two themes: policy vision and strategic objectives, and institutional coordination. These themes emerged consistently across government, operator, user, and expert perspectives and formed the foundation for understanding subsequent issues of service integration, environmental sustainability, financing, technology, public acceptance, and policy evaluation.

Across the three cases, sustainable urban transportation was generally understood as a transition from road-oriented development toward a more integrated mobility system. The interview material emphasized improved public transport, reduced dependence on private vehicles, better pedestrian and cycling facilities, environmental protection, and equitable access. However, the findings also showed that a shared policy vision did not automatically produce consistent implementation. Differences in institutional understanding, authority, financing, and coordination affected how policy goals were translated into programs.

Because the dataset is simulated, the results should be interpreted as an analytical representation of possible implementation patterns rather than independently verified claims about the three municipalities. Nevertheless, the data provide a structured basis for examining how sustainable transportation policies may be interpreted and implemented across contrasting municipal contexts.

Policy Vision and Strategic Objectives

Sustainable Mobility as an Integrated Municipal Vision

The first major finding was that sustainable urban mobility was framed as a multidimensional policy objective rather than a narrowly technical transportation program. Government perspectives emphasized safety, environmental protection, accessibility, and reduced dependence on private vehicles. One recurring position was that transport planning should no longer be dominated by road construction but should include public transportation, pedestrian facilities, cycling infrastructure, and connections between transport and urban development.

This orientation was visible in the statement that the principal policy vision was to create a safe and environmentally responsible transportation system capable of reducing excessive reliance on private vehicles. The growth of motorcycles was described as significantly faster than the growth of road capacity, creating long-term concerns about congestion. Consequently, public transport improvement was positioned as a central policy response rather than a complementary service.

The three municipal cases reflected this general vision through different policy emphases. Surabaya's case highlighted bus service expansion, the Suroboyo Bus system, the WiraWiri feeder service, and integrated payment arrangements. Semarang's case emphasized BRT Trans Semarang, feeder development, multimodal integration, and the incorporation of mass transportation into city planning. Bandung's case reflected broader efforts to improve public transport governance, accessibility, and sustainable mobility.

These findings correspond with literature defining sustainable urban mobility as an integrated and multimodal policy framework centered on accessibility, equity, and reduced car dependence. Multimodal corridor planning, land-use and transport integration, and support for non-motorized and shared mobility are commonly identified as essential components of sustainable urban mobility (Tsigdinos et al., 2021; Jordová & Foltýnová, 2021). The findings therefore suggest that the policy visions represented in the dataset are broadly aligned with international approaches to sustainable mobility.

Low-Carbon Development as a Strategic Objective

A second pattern concerned the incorporation of low-carbon development principles into municipal policy objectives. Transportation was described as a major contributor to urban emissions, and policy responses included electric buses, greener road corridors, transit-oriented development, and efforts to increase public transport use. The findings indicated that environmental sustainability was not limited to vehicle technology. Expert and community perspectives emphasized that replacing conventional vehicles with electric vehicles would be insufficient unless cities also reduced private vehicle use.

This distinction is important because it differentiates technological substitution from structural mobility change. Electrification may reduce direct vehicle emissions, but the interview material suggested that sustainable transportation also requires modal shift, compact development, and greater use of public and non-motorized transport. In this sense, the environmental objective was connected to wider changes in urban form, travel behavior, and service accessibility.

The literature similarly shows that low-carbon transport policy is implemented through combinations of modal shift, vehicle electrification, efficiency improvements, and land-use restructuring. Low-carbon city initiatives frequently connect transportation targets with urban design, land-use planning, policy evaluation, and governance arrangements (Chen, 2022). The present findings reinforce the view that low-carbon urban transport should be treated as an integrated development strategy rather than as a stand-alone vehicle technology program.

Accessibility, Equity, and Public Service Improvement

Accessibility and social equity were also embedded in the policy vision. Interview responses indicated that public transport fares were generally considered affordable, but physical and geographic access remained uneven. Peripheral communities continued to experience limited connectivity, while passengers often required additional modes, such as motorcycle taxis, to complete their journeys.

The need for inclusive infrastructure was particularly visible in discussions of disability access. Not all stops were described as having adequate ramps, guiding blocks, accessible waiting spaces, or audio information. Municipal efforts to introduce universal design into new transport facilities represented an emerging commitment, but implementation appeared incomplete.

These findings suggest that affordability alone is not an adequate measure of transport accessibility. A service may be financially accessible but remain practically inaccessible because of limited route coverage, poor first-mile and last-mile connections, inadequate pedestrian facilities, or physical

barriers. The literature similarly associates sustainable mobility with broad accessibility, equitable service provision, and multimodal connectivity rather than fare policy alone (Tsigidinos et al., 2021; Lemonde et al., 2021; Jordová & Foltýnová, 2021).

Policy Objectives and Performance Indicators

The findings also demonstrated an effort to translate broad sustainability goals into measurable objectives. Sustainable transportation was described as being incorporated into municipal development planning, including low-carbon development frameworks. Relevant indicators extended beyond the length of roads constructed and included public transport ridership, emission reduction, access to transport services, punctuality, accident rates, customer satisfaction, and fleet condition.

This shift in indicators reflects a broader change from infrastructure output measurement toward mobility and sustainability outcomes. The interview material distinguished between outputs, such as the number of bus stops constructed, and outcomes, such as changes in travel behavior, lower emissions, and improved quality of life. This distinction emerged strongly in expert perspectives, which argued that monitoring should assess whether transportation policies change how residents travel rather than merely record physical investments.

The literature identifies similar indicators, including transport carbon intensity, total emissions, public transport mode share, accessibility, first-mile and last-mile coverage, land-use efficiency, and institutional performance (Mao et al., 2019). Governance-oriented evaluations also use implementation progress, stakeholder participation, and policy coverage as process indicators (Hu & Liu, 2023; Qian et al., 2023). The findings therefore indicate movement toward a more comprehensive evaluation framework, although the quality and consistency of measurement may differ across municipalities.

Institutional Coordination

Cross-Sector Collaboration as an Implementation Requirement

The second major theme showed that institutional coordination was widely regarded as one of the most important determinants of policy implementation. Sustainable transportation involved multiple agencies, including transportation departments, development-planning bodies, public works offices, environmental departments, enforcement authorities, police, and transport operators. Coordination forums were described as the primary mechanism for aligning these actors.

The findings indicated that collaboration was necessary because transportation problems crossed formal administrative boundaries. For example, the transportation department could propose a cycling route, but road space or infrastructure might fall under the authority of the public works agency. Traffic management could also require police approval, while environmental objectives depended on coordination with environmental agencies. Consequently, transportation implementation involved multiple approval processes and overlapping mandates.

Expert perspectives reinforced the importance of coordination by arguing that many cities already possess technically sound plans but struggle to implement them because transportation remains

weakly integrated with spatial planning and regional development. This finding suggests that implementation failure may result less from an absence of policy ideas than from institutional fragmentation.

The literature similarly identifies interagency collaboration, multi-level governance, role clarity, and shared planning platforms as prerequisites for effective sustainable urban mobility implementation (Jordová & Foltýnová, 2021; Jelovčan et al., 2019). When agencies coordinate around integrated land-use and transportation objectives, policy instruments are more likely to support multimodal networks, common information systems, and coherent investment.

Fragmented Responsibilities and Budget Misalignment

Although coordination mechanisms existed, they were not consistently effective. One frequently identified barrier was the separation of institutional responsibilities. Each agency operated according to its own performance targets, budget cycles, and legal mandate. This fragmentation created difficulties in synchronizing projects that required joint action.

Budget coordination was particularly problematic. Transport improvements such as cycling infrastructure, feeder routes, accessible stops, or integrated information systems often depended on funding from several departments. When budgets were not aligned, projects could be delayed, reduced in scope, or implemented without supporting infrastructure.

The findings also indicated that fragmented authority could make accountability unclear. When responsibilities were distributed across agencies, it became difficult to determine which institution was accountable for delays or poor outcomes. This issue was closely connected to the broader challenge of monitoring implementation.

These patterns are consistent with literature identifying fragmented mandates, pro-car policy legacies, limited data interoperability, and weak alignment among transport, land-use, and development authorities as major institutional barriers (Abdi, 2021; Jordová & Foltýnová, 2021). The results therefore suggest that interagency coordination must address not only communication but also budgets, authority, accountability, and performance incentives.

Leadership Continuity and Policy Consistency

A further institutional concern was the effect of leadership change on policy continuity. Interview responses identified changes in municipal leadership as a source of shifting development priorities. Sustainable transportation programs often require long-term investment, operational subsidies, infrastructure development, and gradual behavioral change. Frequent changes in direction can therefore interrupt implementation before outcomes become visible.

Policy inconsistency was described as particularly damaging when transport initiatives depended on continued institutional commitment. Operators require predictable contracts and subsidies, while users require reliable services before changing travel behavior. If route networks, funding priorities, or regulatory arrangements change frequently, public and private actors may become reluctant to invest in the system.

The literature notes similar variation in the effectiveness of centralized and decentralized governance arrangements. Although multi-level coordination is generally valuable, outcomes remain dependent on local institutional capacity, financing, and the ability to sustain policy

commitments over time (Chen et al., 2020; Yasmeen & Zameer, 2024). The findings support the conclusion that governance quality includes both coordination and continuity.

Collaborative Governance, Data Sharing, and Accountability

The analysis also identified several mechanisms that could improve coordination. Shared data platforms, integrated fleet information, regular evaluation forums, common performance indicators, and public reporting were presented as potential tools for strengthening accountability. Global Positioning System data, operator reports, customer surveys, and field observations already provided an information base for monitoring.

However, the main challenge was not always data availability. Expert perspectives emphasized that agencies often possessed separate datasets that were insufficiently integrated. This limited the ability of decision-makers to examine the transport system as a whole. Data fragmentation therefore mirrored institutional fragmentation.

The literature describes collaborative governance practices such as joint planning cycles, multimodal data platforms, integrated fare systems, public–private cooperation, and cross-agency performance monitoring as mechanisms for improving implementation (Lemonde et al., 2021; Jelovchan et al., 2019;). The findings suggest that integrated data should not be viewed purely as a technical innovation. It is also a governance instrument that can clarify responsibilities, support joint decisions, and enable transparent policy evaluation.

Cross-Theme Synthesis

The first two themes reveal a clear relationship between policy ambition and institutional capacity. Municipalities may define sustainable urban mobility through multimodality, environmental protection, accessibility, and reduced private vehicle dependence. However, these objectives become operational only when agencies coordinate their authority, budgets, data, and performance systems.

The results indicate that the transition from policy vision to implementation follows a sequence in which strategic goals must be converted into coordinated programs, measurable indicators, integrated services, and sustained institutional commitments. Fragmented governance weakens this sequence, while collaborative and place-based governance strengthens it.

Overall, the findings support the proposition that sustainable transportation implementation depends not only on the quality of the policy vision but also on the institutional arrangements through which that vision is delivered. Multimodal and low-carbon objectives require cross-sector planning, long-term financing, data interoperability, clear accountability, and stable political support. These relationships provide the analytical foundation for the remaining themes concerning service integration, technology, social inclusion, financing, public acceptance, barriers, and policy learning.

The findings of this multiple-case study indicate that the implementation of sustainable urban transportation policies is shaped by the interaction between policy vision, institutional capacity, cross-sector coordination, financing, technological readiness, service integration, and public acceptance. Across Surabaya, Semarang, and Bandung, municipal policy objectives generally converged around reducing dependence on private vehicles, improving public transport,

supporting low-carbon development, and expanding accessibility. However, the implementation of these objectives remained uneven because similar policy ambitions were translated through different institutional arrangements, administrative capacities, and operational conditions. This confirms the value of comparative multiple-case analysis for explaining why comparable policy goals produce varying implementation outcomes across municipalities. Such designs advance policy implementation theory by revealing how local context, governance structures, funding arrangements, and stakeholder coalitions mediate the translation of planning intentions into practice (Holzhacker et al., 2015; Rosales & Haarstad, 2022).

The results show that a clear sustainability vision is necessary but insufficient. Municipal governments may formally embrace multimodality, low-carbon development, inclusive mobility, and reduced car dependency, yet these goals depend on institutional arrangements capable of coordinating land use, public transport, road infrastructure, environmental policy, and service operations. This finding reinforces earlier studies that define sustainable urban mobility as an integrated rather than sectoral policy agenda (Tsigdinos et al., 2021; Lemonde et al., 2021; Jordová & Foltýnová, 2021). The practical implication is that sustainable transport cannot be delivered solely by transportation agencies. Its implementation requires planning bodies, public works departments, environmental agencies, police, operators, and community stakeholders to act within a shared policy framework.

Institutional coordination emerged as the most influential governance mechanism across the cases. Interview evidence suggested that fragmented authority, separate agency targets, incompatible budgeting processes, and unclear accountability delayed implementation. These findings are consistent with the wider literature on decentralization and urban governance, which shows that local autonomy may encourage policy experimentation but may also generate institutional fragmentation and uneven implementation capacity (Holzhacker et al., 2015). In the Indonesian context, this tension is particularly important because municipal transport policies operate within a multi-level system involving national, provincial, and local institutions. Effective implementation therefore depends on clearly defined responsibilities, stable funding relationships, and mechanisms that align local action with broader sustainability objectives.

Cross-agency collaboration must extend beyond periodic coordination meetings. The findings indicate that implementation improves when agencies share data, synchronize budgets, use common performance indicators, and coordinate planning cycles. This supports the literature identifying integrated information systems, multimodal data platforms, standardized protocols, and cross-agency monitoring as key enablers of sustainable mobility governance (Lemonde et al., 2021; Jelovčan et al., 2019; López-Carreiro et al., 2023; Coenegrachts et al., 2021). Data interoperability is therefore not merely a technical concern. It functions as a governance mechanism that supports accountability, identifies operational weaknesses, and enables joint decision-making. Where data remain institutionally fragmented, agencies may struggle to evaluate the transport system as an integrated network.

The comparison also highlights the importance of place-based governance. Although the three municipalities share common sustainability goals, their transport systems, urban forms, service histories, and administrative capacities differ. Surabaya's experience with Suroboyo Bus, WiraWiri feeders, and payment integration cannot be transferred directly to Semarang or Bandung without adapting the model to local settlement patterns, existing operators, financial resources, and

institutional relationships. This supports arguments that sustainable urban mobility policies should not rely on one-size-fits-all templates (Bauchinger et al., 2021; Dziugiel et al., 2023; Siqueira et al., 2023). Policy transfer is more likely to succeed when municipalities adopt common principles, such as integration and accessibility, while retaining flexibility in implementation design.

Service integration represents a practical expression of governance quality. The findings show that first-mile and last-mile connectivity, feeder services, pedestrian access, integrated fares, and reliable information significantly influence public transport attractiveness. Even affordable public transport may remain underused when users must rely on additional informal or private modes to complete their journeys. This confirms the argument that multimodal networks must be evaluated from the perspective of complete door-to-door travel rather than the performance of individual routes. The policy lesson is that investment in main corridors must be accompanied by feeder systems, walking infrastructure, universal design, and coordinated schedules.

The findings also demonstrate that policy continuity is essential. Sustainable transportation reforms require long-term investment, stable subsidies, institutional learning, and gradual behavioral change. Changes in political leadership may disrupt these processes by altering priorities, funding, or implementation models. This suggests that successful governance requires institutionalization beyond individual administrations. Embedding transportation objectives in formal development plans, performance systems, and long-term financing arrangements can reduce vulnerability to political change. Comparable lessons from Indonesian green-city initiatives and broader decentralization debates indicate that national-local alignment and durable institutional commitments are critical for sustaining urban sustainability programs (Rachmawati et al., 2024; Supriyadi et al., 2021).

The Indonesian municipal cases offer transferable lessons for other developing countries. First, decentralization should be accompanied by institutional capacity-building and mechanisms for cross-jurisdictional coordination. Second, public transport reform should integrate land-use planning, feeder services, digital systems, and social inclusion. Third, technological innovation should support public transport as the backbone of the mobility system rather than encourage fragmented competition among modes. Fourth, public-private collaboration requires regulatory clarity, standardized data-sharing arrangements, and alignment with public policy goals (Rosales & Haarstad, 2022; Coenegrachts et al., 2021).

Future studies should extend this analysis through original fieldwork, larger cross-city datasets, and mixed-method designs. Comparative research should combine stakeholder interviews with ridership data, emissions indicators, accessibility measures, budget information, and service-performance records. Longitudinal studies are also needed to determine whether institutional reforms produce durable changes in travel behavior and environmental outcomes. Additional attention should be given to mobility-as-a-service, urban logistics, shared mobility, rural-urban feeder networks, and cross-municipal integration. Methodologically, future research should strengthen triangulation, audit trails, intercoder comparison, and transparent reporting to improve credibility and transferability (Kyza et al., 2020; Mortell, 2024). Overall, the study confirms that sustainable urban transportation is fundamentally a governance challenge: infrastructure and technology matter, but their effectiveness depends on coordinated institutions, stable financing, integrated services, public legitimacy, and continuous policy learning.

CONCLUSION

This study examined the implementation of sustainable urban transportation policies through a qualitative multiple-case study of Surabaya, Semarang, and Bandung. Drawing upon perspectives from government officials, public transport operators, users, and transportation experts, the study explored how policy vision, institutional coordination, service integration, environmental sustainability, social inclusion, technology utilization, financing, public acceptance, implementation barriers, and monitoring systems collectively influence policy implementation. The comparative analysis demonstrates that while the three municipalities share similar sustainability aspirations, their implementation outcomes differ according to institutional capacity, governance arrangements, operational resources, and stakeholder collaboration.

The findings indicate that successful implementation extends beyond infrastructure provision. A clearly articulated policy vision provides strategic direction, but implementation effectiveness depends on the capacity of institutions to coordinate planning, financing, regulation, and service delivery across multiple sectors. Cross-sector collaboration, integrated decision-making, and clearly defined institutional responsibilities emerged as the most influential governance factors supporting sustainable transportation policies. Conversely, fragmented authority, budget misalignment, inconsistent political commitment, and limited interagency coordination remain significant barriers that constrain implementation.

The study further demonstrates that integrated public transportation systems require more than the expansion of bus services or transport infrastructure. First-mile and last-mile connectivity, multimodal integration, universal accessibility, affordable fares, digital information systems, and reliable service quality collectively determine whether residents are willing to shift from private vehicles to public transportation. Technology, including GPS-based fleet monitoring, integrated payment systems, and operational dashboards, improves management efficiency; however, technological innovation alone cannot achieve sustainable mobility without supportive governance, institutional interoperability, and long-term investment.

Another important finding concerns the relationship between policy evaluation and organizational learning. Municipal governments increasingly recognize that transportation performance should be measured not only through infrastructure outputs but also through broader outcomes such as public transport utilization, accessibility, emission reduction, user satisfaction, safety, and behavioral change. Continuous monitoring supported by integrated performance indicators enables adaptive policymaking and strengthens institutional learning, thereby improving the long-term effectiveness of sustainable transportation strategies.

From a theoretical perspective, this study contributes to the literature by extending understanding of sustainable urban transportation policy implementation through an integrated governance perspective. Rather than treating implementation as a purely technical or engineering process, the proposed framework conceptualizes implementation as the interaction among policy vision, institutional coordination, service integration, technological capability, financing, public acceptance, and continuous evaluation. This multidimensional perspective complements existing

policy implementation and collaborative governance theories by illustrating how these elements operate collectively within rapidly urbanizing municipalities.

The study also provides practical contributions for policymakers and local governments. The findings suggest that municipalities seeking to strengthen sustainable transportation systems should prioritize institutional collaboration, integrate transportation planning with land-use and environmental policies, establish interoperable data systems, secure long-term financing mechanisms, improve first-mile and last-mile accessibility, and promote continuous public engagement. These governance-oriented strategies are likely to produce more durable improvements than isolated infrastructure investments or short-term policy interventions.

Although the study offers valuable comparative insights, several limitations should be acknowledged. The analysis is based on a structured simulated qualitative dataset intended to demonstrate methodological and analytical procedures rather than independently verified field evidence. Consequently, the findings should be interpreted as an analytical framework that requires empirical validation. Future studies should employ original field interviews, documentary analysis, direct observation, and longitudinal evaluation to examine whether the identified implementation mechanisms remain consistent across different institutional and geographical contexts.

Future research should also expand comparative investigations beyond the three municipalities examined in this study by incorporating additional Indonesian cities and other Southeast Asian urban areas. Mixed-method approaches integrating qualitative evidence with operational performance indicators, accessibility measures, environmental outcomes, and travel behavior data would strengthen explanatory power and improve policy relevance. Furthermore, emerging issues such as Mobility-as-a-Service, shared mobility governance, urban logistics, electric public transport, and integrated metropolitan governance represent promising directions for future research on sustainable urban transportation.

In conclusion, sustainable urban transportation should be understood primarily as a governance challenge rather than solely an infrastructure challenge. The comparative evidence demonstrates that effective implementation depends upon coherent institutional arrangements, collaborative governance, integrated multimodal services, technological readiness, financial sustainability, stakeholder participation, and continuous policy learning. By identifying these interconnected implementation mechanisms, this study provides a conceptual framework that contributes to both academic knowledge and practical policymaking. The framework offers guidance for municipalities seeking to accelerate the transition toward more accessible, inclusive, resilient, and low-carbon urban transportation systems in Indonesia and other developing countries.

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