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TRANSFORMATION OF THE URBAN PUBLIC TRANSPORT SYSTEM IN KUPANG CITY

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Yefry Cornianto ADOE[1], Ajis Salim Adang DJAHA,[2], Hendrik TODA[3]
[1,2,3]Faculty of Social and Political Sciences, Nusa Cendana University, Indonesia
Corresponding author: Yefry Cornianto Adoe
Email: Adoejc73@gmail.com

Abstract:
The objective of this research is to analyze the existing condition of the urban transportation system in Kupang City, including its weaknesses, strengths, and development opportunities. It also identifies the key challenges faced in the transformation of the urban transportation system and formulates a transformation strategy tailored to the needs of the community and the conditions of Kupang City to support sustainable mobility. The research employed a qualitative approach, with informants selected purposively and incidentally. The results indicate that the urban transportation system in Kupang City is facing significant challenges in its transformation process. Although public transportation (angkot) remains available and operational, the dominance of online transportation services such as Grab and Maxim indicates a shift in public preference toward more flexible, faster, and technology-based modes. The quality of conventional public transportation services is considered low, with limitations in comfort, accessibility, and schedule certainty.

Furthermore, the absence of regional regulations specifically governing the operation of the urban transportation system hinders efforts to reform and integrate transportation. Other challenges stem from the social and cultural aspects of the community's continued reliance on private vehicles, as well as the lack of institutional support and visionary public policies. The success of this transformation depends heavily on active collaboration between the government, transportation operators, and the community to create a modern, inclusive, and sustainable urban transportation system.

Keywords: Transformation, System, Transportation, Urban

INTRODUCTION

Well-planned urban transportation development not only strengthens public mobility but is also a strategic element in creating a more inclusive, environmentally friendly, and competitive city. Examples include the development of mass transportation modes such as bus rapid transit (BRT), urban rail, and renewable energy-based electric vehicles.

The sustainability of urban transportation systems is also closely linked to government policies that support the integration of transportation modes, spatial planning, and regional planning. With proactive policies, public transportation can provide solutions to mobility challenges and encourage equitable economic growth across urban areas.

Furthermore, these policies must be accompanied by the development of environmentally friendly infrastructure, the use of smart technology, and active public participation in supporting a sustainable transportation system. These measures will not only reduce congestion and air pollution but also improve the quality of life for city residents, create a more inclusive city, and mitigate the impacts of future climate change (Karjalainen & Juhola, 2021; 660).

Transformation of the urban transportation system in Kupang City is an urgent need to create a more inclusive, efficient, and sustainable transportation system. This step will not only improve accessibility and mobility for the community, especially for those living in suburban areas or areas

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with limited access, but will also make a significant contribution to climate change mitigation efforts. The development of a better and more environmentally friendly public transportation system is expected to reduce dependence on private vehicles, which in turn will reduce greenhouse gas emissions and create a greener city. Furthermore, an efficient and integrated transportation system will strengthen Kupang City's economic competitiveness, encourage inclusive economic growth, and create new opportunities for the community in various sectors.

However, this situation is inconsistent with several existing facts regarding the public transportation system in Kupang City. One major issue requiring serious attention is that the average age of public vehicles operating in the city has exceeded the vehicle age set by the World Bank. Based on available data, almost the entire public transportation fleet in Kupang City is more than five years old, far exceeding the standards required to ensure vehicle operational quality and safety. This data reflects the reality that public vehicles serving the public, both on short and long-distance routes, do not meet the expected vehicle age standards, which can impact comfort, safety, and transportation efficiency.

The increasing age of these public vehicles can impact vehicle performance, often failing to operate optimally and even becoming more susceptible to breakdowns. Furthermore, older vehicles often consume more fuel, produce higher emissions, and potentially contribute to worsening air pollution. This situation indicates that the public transportation sector in Kupang City faces significant challenges in maintaining adequate service quality for the public, which in turn can impact public trust in public transportation. This situation also demonstrates a discrepancy between the actual condition of public transportation in Kupang City and the standards set by the World Bank, which should serve as guidelines for ensuring the sustainability and success of a safe, efficient, and environmentally friendly public transportation system.

Table 1. Average Vehicle Age in 2024

Route Code	Average Vehicle Age (Years)	World Bank Standards (Year)	Information
1	17	5	Does not meet the
2	15	5	Does not meet the
3	13	5	Does not meet the
5	16	5	Does not meet the
6	15	5	Does not meet the
7	11	5	Does not meet the
10	16	5	Does not meet the
27	18	5	Does not meet the

Source: Transportation Agency data, 2024

This condition indicates that the majority of public transportation in Kupang City does not meet ideal vehicle age standards, which can impact service quality and transportation safety. Improvements to the transportation system in Kupang City are urgently needed to increase operational efficiency and ensure the sustainability of better and safer public transportation services for the public. Efforts to replace the older fleet with newer, standard-compliant vehicles, as well as implementing stricter vehicle maintenance policies, will be important steps in realizing safer, more comfortable, and environmentally friendly transportation in Kupang City.

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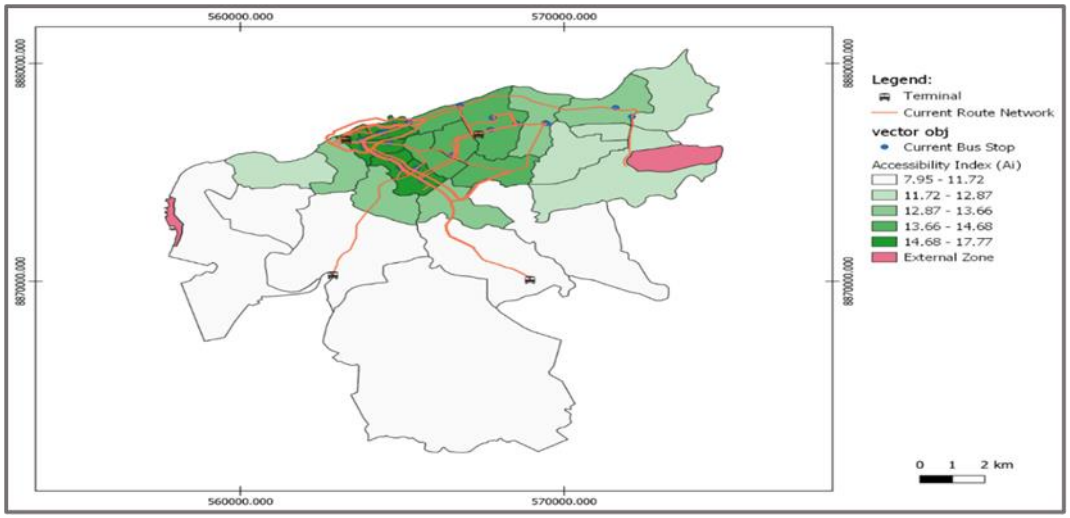

Figure 1. Urban transportation route network and accessibility index

The limited number of public transportation routes in Kupang City also reflects the lack of comprehensive planning and integration of the city's public transportation system, preventing public transportation from functioning optimally as the backbone of urban mobility. Consequently, public reliance on private vehicles continues to increase, which in turn increases pressure on the already limited road infrastructure. Addressing this issue requires more comprehensive planning and the development of broader, more integrated public transportation routes to effectively reach all areas of the city and support the community's mobility needs inclusively.

The limited number of public transportation routes reaching strategic areas, the deteriorating condition of vehicles, and the lack of professional management have created a significant gap between policy and reality on the ground. This situation not only neglects the interests of the wider community but also encourages greater reliance on private vehicles. Consequently, pressure on road infrastructure increases, air pollution increases, and the economic burden on the community increases.

In response to this problem, the government has begun encouraging the use of environmentally friendly vehicles and is working to improve transportation infrastructure. One concrete step taken is the launch of the "Bemo Digital" initiative, an innovation in digital payment systems (RRI, 2024; Bemo Digital: A New Era of Transportation in Kupang City). This program aims to simplify transactions between users and public transportation operators, as well as create more modern, efficient, and sustainable transportation services. However, for its benefits to be optimally felt by the public, a more comprehensive transportation integration policy is still needed. With the right policy support, Kupang City can build a more inclusive, efficient, and sustainable transportation system for all its citizens. Therefore, the transformation of urban public transportation in Kupang City requires a holistic and integrated approach. This step includes improving the quality of public transportation, developing more extensive routes, and integrating transportation modes to create a more efficient and sustainable mobility system.

METHODS

In this study, researchers used Qualitative research, Creswell (2009), qualitative research allows researchers to understand phenomena comprehensively and comprehensively, as well as explore the complex social context related to changes in urban transportation systems. A qualitative

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approach is very suitable for the purpose of the study, which is to explore the ongoing transformation process in a person's life. Data were obtained through informant interviews, observations and document research. Informants were selected purposively and incidentally from informants who have the ability and know information related to the research problem. Data sources consist of primary data (interview results and direct observation) and secondary data (documents, official reports, and academic literature). To ensure the validity of the findings, triangulation techniques were used, both against sources, techniques, and the time of data collection. Data analysis was carried out through a process of categorization, thematic interpretation, and inductive reasoning, in order to formulate collaborative patterns so that the results of this study are presented systematically and can be scientifically accounted for.

RESULT AND DISCUSSION

Existing Condition of the Urban Transportation System. The public transportation system in Kupang City is a crucial pillar in supporting public mobility and connecting activity centers, residential areas, and surrounding areas. The types of transportation modes available in Kupang City are quite diverse, including regular public transportation on routes and non-route transportation such as chartered and shuttle services. Although the public transportation system in Kupang City appears varied and covers many areas, the existing condition is still less than ideal from the perspective of public service, transportation system efficiency, and readiness to face future urban dynamics. Several fundamental issues require critical analysis and serious attention. These include: (1) limited coverage of transportation modes; (2) uneven distribution of routes and fleets; (3) redundancy and duplication of routes, where the route and starting and ending points are the same but the number of fleets differs; (4) public transportation capabilities are still heavily dependent on small-scale conventional operators, such as cooperatives or family businesses; (5) the public transportation system in Kupang City remains very conventional; and (6) the absence of adequate supporting policies. There are no regulations regarding route zoning, operational subsidy schemes, intermodal fare integration, or measures to control private vehicles that could encourage people to switch to public transportation.

Considering all these issues, the public transportation system in Kupang City remains traditional, fragmented, and unable to meet the challenges of urban modernization. Although the availability of modes and fleets is relatively sufficient, their effectiveness and efficiency remain low. Therefore, more systematic improvement measures are needed, starting with route and fleet restructuring, mass transit development, digital integration, and progressive, sustainable, and inclusive transportation policies.

Assessment of the dominant transportation modes in Kupang City (e.g., public transportation/angkot). Currently, transportation in Kupang is still dominated by public transportation (angkot) serving inner-city routes. However, technological developments and public needs have given rise to app-based transportation modes such as Grab and Maxim, both in two-wheeled and four-wheeled vehicles. The presence of these services is increasingly widespread and creates direct competition with public transportation for passengers. Unfortunately, existing regulations and systems do not fully regulate or integrate this online transportation mode into a legal and orderly city transportation system. This has the potential to create conflict between transportation operators, reduce the quality of public service, and complicate government oversight.

The lack of updates to route regulations and the minimal monitoring system have led to many public transportation services operating in an unstructured manner, often violating established routes. This irregularity has eroded public trust in public transportation and allowed online

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transportation to develop more rapidly, perceived as more reliable and responsive. This situation demonstrates that reform cannot be implemented solely at the operational level but must begin with policy and institutional aspects. Renewal of regional regulations regarding routes, zoning systems, and public transportation licensing mechanisms is needed, integrating and adapting to changing community mobility needs. Without concrete steps at the policy level, efforts to improve the city transportation system will continue to be hampered and left behind by the dynamics of modern transportation.

Accessibility and Quality of Current Urban Transportation Services. Accessibility and quality of urban transportation services in Kupang City are two crucial aspects that significantly influence public interest and comfort in using public transportation. Although public transportation (angkot) remains a common mode of transportation on main routes, various obstacles in terms of service, infrastructure, and coverage remain major challenges in creating an inclusive, safe, and efficient transportation system. Evaluation of this existing condition is crucial for formulating future improvement policies. This condition reflects that the city transportation system in Kupang is not yet fully adaptive to regional growth and changing settlement patterns. In the context of the city's continued expansion toward the outskirts, the absence of public transportation services in these areas could increase public dependence on private vehicles or encourage a shift to online transportation, which offers greater flexibility.

Operational efficiency of the existing transportation system, including sustainability and alignment with community needs. The operational efficiency of the public transportation system remains low, with fluctuating occupancy rates and frequent unhealthy competition among drivers seeking passengers. The deposit-based operating model causes drivers to focus more on passenger numbers than on service quality. From a sustainability perspective, this system is not environmentally friendly because it uses aging, fossil-fueled vehicles that produce high emissions. Furthermore, the current transportation system is unable to fully meet the community's mobility needs, particularly in terms of intermodal integration and inter-regional connectivity. In contrast, online transportation is more adaptive to user needs, but has not yet been fully integrated into a structured and sustainable urban transportation system.

The current state of the city's transportation system in Kupang City still faces various challenges, particularly in operational efficiency. The daily deposit-based system is at the root of various problems, as it encourages drivers to prioritize passenger numbers over providing safe and comfortable service. This contributes to unhealthy competition among drivers and has implications for route irregularities and a decline in overall service quality. The use of aging, fossil-fueled vehicles has also come under scrutiny due to their impact not only on comfort and safety but also on environmental sustainability. In the context of long-term planning, government awareness and commitment to improvements through the integration of transportation modes and fleet renewal are essential. This step is crucial to realizing a transportation system that is efficient, adaptive, and meets the evolving mobility needs of the community.

Challenges in Urban Transportation Transformation: Obstacles to the development of transportation infrastructure that supports the urban transportation system. Infrastructure issues are fundamental obstacles that directly impact efforts to modernize the transportation system. Infrastructure limitations include the limited number and quality of bus stops, inadequate terminals, and the lack of dedicated public transportation lanes that could improve travel efficiency. Furthermore, narrow and poorly maintained roads in some areas impede the smooth operation of public transportation, particularly public transportation and other feeder vehicles. These problems not only hamper user comfort and accessibility but also discourage public interest in using public

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transportation. As a result, dependence on private vehicles increases, resulting in congestion, high energy consumption, and environmental pollution.

Solving these problems cannot be done in isolation but requires integrated spatial and transportation planning. Medium- to long-term investment in infrastructure development and maintenance is needed, as well as inter-agency collaboration in designing transportation systems that support efficient and sustainable community movement. Furthermore, regulatory reforms that encourage the integration of transportation modes with appropriate infrastructure support are also crucial steps to accelerate the transformation of urban transportation systems.

Social, economic, and cultural factors influence the adoption of new transportation systems. Social and cultural factors also pose significant challenges. People tend to habitually use private vehicles because they are considered more practical and comfortable. Furthermore, some people still doubt the quality and comfort of public transportation, which generally does not meet minimum service standards. Economically, low-income communities find it difficult to access more modern transportation systems if the fares are perceived as higher than conventional public transportation (angkot). Rejection of new systems by existing transportation operators, such as public transportation drivers, is also common, as they feel economically threatened and lack security during the transition.

Thus, transforming urban transportation requires more than simply focusing on the provision of modes and infrastructure. A more holistic approach is needed, understanding user behavior patterns sociologically and psychologically. For example, comfort factors encompass not only the physical condition of the vehicle but also the sense of security, privacy, and speed of service. Ease of access also refers not only to the distance of stops or routes but also to the convenience of payment systems and real-time information. Therefore, planning a modern transportation system in Kupang City must be responsive to the expectations and mobility habits of the community, especially the younger generation and active users of online transportation. This approach includes digital service integration, minimum service quality assurance, and behavior change campaigns accompanied by incentives, such as affordable fares or intermodal connectivity. Without comprehensively changing public perception, public transportation will continue to be less desirable, even if the physical infrastructure is improved.

This culture of individualism in mobility presents a unique challenge for the development of public transportation that prioritizes the principles of shared space and collective efficiency. The discomfort of sharing space, coupled with the image of poorly maintained public transportation, strengthens public resistance to the use of shared transportation modes. This situation not only reflects limitations in operational management but also indicates weak regulation and oversight of public transportation service standards. When people perceive that public transportation does not guarantee comfort and safety, they will naturally turn to alternative modes such as private vehicles or online transportation services. Therefore, improving the physical quality of the fleet, including a vehicle rejuvenation program, must be a priority in the transformation of the urban transportation system in Kupang City. This program also needs to be accompanied by driver training, measurable minimum service standards, and a regular evaluation system to ensure the public receives decent, safe, and humane services. Public trust in public transportation can only be built through positive and consistent firsthand experiences.

The public transportation transformation strategy in Kupang City requires a deeper socio-cultural approach. Public education and the rebranding of public transportation as a modern, comfortable, and safe mode of transportation must be consistently pursued. Providing clean, air-conditioned facilities, along with friendly and safe service, can help change negative perceptions of

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public transportation. Furthermore, campaigns that tap into local cultural aspects—by involving community leaders or public figures—can accelerate public acceptance of a more collective and sustainable urban transportation system.

The role of public policy in supporting the transformation of the urban transportation system. The transformation of the urban transportation system depends heavily on the alignment and consistency of public policy. However, in Kupang City, the formulation and implementation of transportation policies have not fully supported the shift towards a more structured and sustainable system. Some policies are short-term and lack clear implementation mechanisms. Furthermore, regional regulations (perda) governing urban transportation operations have not been updated, thus failing to accommodate technological developments, the need for intermodal integration, or the existence of online transportation services. This regulatory gap hinders the development of inclusive long-term strategies based on local needs. Synergy between local governments, transportation operators, and the community is needed to realize a modern, inclusive, and sustainable urban transportation system.

One of the main obstacles to the transformation of the urban transportation system is the lack of up-to-date and comprehensive regional regulations. This regulatory gap results in transportation development programs lacking a strong legal basis, resulting in suboptimal implementation. Without strong policy support, transformation efforts such as vehicle rejuvenation, transportation system digitalization, or intermodal service integration will be difficult to realize due to the lack of a legal framework and adequate budget allocation. The synergy in question is not only between government institutions (such as the Transportation Agency, Regional Development Planning Agency (Bappeda), the Finance Agency, and the Regional People's Representative Council (DPRD), but also with the private sector, transportation operators, and civil society so that the resulting policies truly reflect needs on the ground and can be implemented realistically.

Urban Transportation Transformation Strategy: Strategy to Improve Service Quality and Sustainable Urban Transportation Operations. Efforts to transform the urban transportation system in Kupang City need to begin with improving the quality of public transportation services. This includes fleet rejuvenation, driver training to improve passenger service, and the provision of supporting facilities such as adequate bus stops and a route information system that is easily accessible to the public. Furthermore, a more efficient operational management system needs to be implemented, such as time-based scheduling, integrated fares, and the use of a cashless system. Operational sustainability must also be ensured through fair financing and subsidy schemes, particularly to maintain the competitiveness of public transportation modes against private and online transportation. System integration, regulatory improvements, and financial support are key to promoting sustainable public transportation that can compete with the increasingly popular online transportation.

Development and adoption of new technologies to support a more efficient and environmentally friendly transportation system. Technology plays a crucial role in creating an efficient, integrated, and environmentally friendly transportation system. Kupang City needs to develop an information technology-based transportation management system, such as a real-time vehicle tracking application, an electronic payment system, and a route and schedule information platform. The local government fully supports the development of digital payment systems as part of efforts to build a more modern, efficient, and transparent transportation system. One concrete step currently being explored is the implementation of a cashless payment system based on QRIS (Quick Response Code Indonesian Standard) in city transportation services.

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Currently, the Transportation Agency has collaborated with Maxim Cargo, a digital transportation service provider, to develop an app-based pickup service. This collaboration is considered an initial step in integrating digital technology into the urban transportation system to make it more responsive to the needs of the urban community. Technological innovation in the transportation sector is inseparable from the readiness of the implementing actors on the ground. Therefore, a phased approach and ongoing development programs are needed to enable city transportation drivers to keep up with technological developments and adapt to digital systems. With cross-sector collaboration and ongoing development, Kupang City's transportation system can provide better services, improve operational efficiency, and contribute to sustainable and technology-friendly transportation development.

Implement public policies that support changes in the urban transportation system in Kupang City. Transformation of the transportation system cannot occur without strong, consistent public policies that support the public interest. The Kupang City Government needs to immediately draft and update regional regulations (perda) that comprehensively govern the urban transportation system, including regulations on mode integration, minimum service standards, and the role of online transportation. Furthermore, it is crucial to create professional and independent transportation institutions to manage the transportation system, while increasing public participation in the planning and evaluation processes. Policy support can also include incentives for transportation operators that invest in environmentally friendly technology and digital-based service systems.

In an effort to encourage the transformation of the city transportation system to a more modern and adaptive one, both the Kupang City Transportation Agency and the Kupang City Regional Transportation Organization (Organda) agree that public policy is a key factor. Regulatory updates must be supported by institutions that are open to public and business participation, and create collaborative spaces between the government and the private sector. In a follow-up interview, the Head of the Transportation Agency also stated that with the revitalization of the Bimoku Type B Terminal, he hopes to create a more integrated, orderly, and feasible public transportation system. With the right regulations, strong institutions, and synergy between parties, Kupang City is expected to be able to present a modern, inclusive, and sustainable public transportation system in the next few years.

CONCLUSION

The urban transportation system in Kupang City is facing significant challenges in its transformation process. Although public transportation (angkot) remains available and operational, the dominance of online transportation services such as Grab and Maxim signals a shift in public preference toward more flexible, faster, and technology-based modes. The quality of conventional public transportation services is considered low, with limitations in comfort, accessibility, and schedule certainty. Furthermore, the absence of regional regulations specifically governing the operation of the urban transportation system hinders efforts to reform and integrate transportation.

Other challenges stem from the social and cultural aspects of the community's continued reliance on private vehicles, as well as the lack of institutional support and visionary public policies. Therefore, the transformation of urban transportation must be directed at improving service quality, utilizing environmentally friendly technology, and adapting regulatory updates to changing community needs. The success of this transformation depends heavily on active collaboration between the government, transportation operators, and the community to create a modern, inclusive, and sustainable urban transportation system.

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