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Public Transportation Sector Improvement Policy Strategy in Jambi City Towards Net Zero Emissions

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Keywords

Judicial Accountability, *Culpa Lata*, Rational Choice Theory, White-Collar Crime, Artificial Intelligence, Judicial Reform.

Abstract

This research emphasizes the urgency of balancing judicial independence with accountability, given the persistent gaps within Indonesia's judicial system. Weak integrity, legal voids regarding judicial responsibility, and inadequate accountability mechanisms have fostered feudalism, inconsistency in rulings, and deteriorating decision quality, thereby creating accountability loopholes. The study reconceptualizes negligence (*culpa lata*) into two forms: negligence leading to corruption, collusion, and nepotism (KKN), and non-KKN negligence. The first category, analyzed through Rational Choice Theory, Opportunity Theory, and White-Collar Crime Theory, identifies common patterns of misconduct such as neglecting evidence, manipulating facts, and falsifying verdicts. The second category, non-KKN negligence, is divided into two phases: individual-level negligence assessed through Social Control Theory (F. Ivan Nye, supported by Jackson Toby), and institutional-level failures examined through Sociological Institutionalism and Neo-Institutional Rational Choice. Empirical validation is provided through the Ronald Tannur verdict (KKN-related negligence) and the Fikri et al. case (non-KKN negligence), which expose the inadequacy of current ethical and administrative supervisory mechanisms. To address these gaps and restore public trust, the study proposes the criminalization of *culpa lata* as a last resort. This concept integrates a merit-based system and Artificial Intelligence (AI) with Natural Language Processing (NLP) to evaluate rulings and detect negligence. Cases identified are processed through a specialized court named *Privilegiatum Termodifikasi*. This framework seeks to enforce judicial accountability without undermining judicial independence, applying strict sanctions to reduce legal errors and strengthen public confidence in Indonesia's judicial system.

INTRODUCTION

The transportation sector is one of the largest contributors to greenhouse gas emissions globally, accounting for approximately 16% of total global emissions and 24% of emissions related to energy use (International Energy Agency, 2023). The United Nations, through Sustainable Development Goal (SDG) 11, emphasizes the importance of creating inclusive, safe, resilient, and sustainable cities and settlements, including through the development of environmentally friendly transportation systems. In the context of global climate change, the transformation of the transportation sector is a priority agenda for achieving the Paris Agreement target of limiting global temperature rise to below 2°C.

At the national level, Indonesia has committed to achieving net zero emissions by 2060 or sooner through its Enhanced Nationally Determined Contribution (NDC) submitted at COP26 (Haryanto et al., 2024). The transportation sector in Indonesia contributes around 23% of total national emissions (Ministry of Environment and Forestry, 2021), making the transformation of this sector key to achieving national targets. The Indonesian government has issued various supporting regulations, including Presidential Regulation No. 55 of 2019 concerning the Acceleration of Battery-Based Electric Motor Vehicle Programs for Road Transportation, and Presidential Regulation No. 112 of 2022 concerning the Acceleration of Battery-Based Electric Motor Vehicle Development.

Public transportation plays a crucial role in urban mobility systems, including in Jambi City. However, this sector still faces several serious challenges, such as low public interest in public transportation, high private vehicle use, limited efficient public transportation networks, and high carbon emissions from fossil-fuel-based modes of transportation. In the context of global and national commitments toward net-zero emissions, transforming the transportation sector to a greener and more sustainable level is urgent (WRI Indonesia, 2024; ITF-OECD, 2023). Studies show that in Indonesian cities, the share of public transport is still below 20% of modal share, which contributes significantly to air pollution and GHG emissions (IISD, 2024). Moreover, limited infrastructure, safety concerns, fragmented networks and weak policies have constrained shifts from private to public transport modes (SEI, 2025). Also, ASEAN country-level climate policy reviews indicate that public transport is still under-emphasized in mitigation targets, undermining the potential for substantial emission reductions (ASEAN NDC analysis, 2025).

Some of the key issues identified in *Jambi City's* public transportation sector include: 1) high dependence on private vehicles (Jambi City Transportation Statistics, 2024); 2) low quality of public transportation services and accessibility (Jambi City Transportation Agency & Regional Development Planning Agency, 2023); 3) an unintegrated public transportation system (Jambi Province Development Planning Agency, 2025); 4) a limited number of environmentally friendly energy-based public transportation fleets (Jambi City Transportation Agency, 2025); 5) public awareness of the environmental impacts of transportation remains low (Jambi City Transportation Agency, 2024; YouGov Cambridge Globalism Project, 2019).

Previous studies have identified various challenges in developing sustainable transportation in Indonesia. Dewi and Sagala (2021), in their study on sustainable transportation in Jakarta, found that integration between modes of transportation and service quality are key factors in increasing the use of public transportation. Meanwhile, Putri et al. (2022), in their research in Surabaya, showed that the implementation of electric vehicles for public transportation can reduce carbon emissions by up to 35% compared to conventional vehicles. Furthermore, Rahman and Sari (2023) analyzed sustainable transportation policies in medium-sized cities in Indonesia and found that an integrated approach between infrastructure, technology, and tariff policies is key to successful transportation transformation.

However, previous studies have not specifically examined public transportation policy strategies for cities with characteristics such as *Jambi*, which has a moderate level of urbanization with specific challenges regarding dependence on private vehicles. In addition,

the integration of the Rational Choice Theory theoretical approach with USG analysis in the context of sustainable transportation policy is a novelty in this study.

The urgency of this research arises from the condition of the city of *Jambi*, which has experienced significant economic and population growth but does not yet have an adequate public transportation system to support sustainable mobility. Data from the Jambi City Central Statistics Agency (2024) shows that private vehicle use has increased by 15% in the last five years, while public transportation use has decreased by 8%. This condition has the potential to worsen air quality and contribute to increased greenhouse gas emissions at the local level.

From the five issues above, a selection and determination of key issues (prioritized for resolution) was conducted. The method for selecting key issues can be done using the USG (Urgency, Seriousness, Growth) scoring method, as follows:

Table 1. Selecting Key Issues

Problem	Urgency (U)	Seriousness (S)	Growth (G)	Total Score (U+S+G)
Dependence on private vehicles	4	4	3	**11**
Low quality of public transport services	3	4	3	10
The transportation system is not yet integrated	3	3	3	9
Lack of environmentally friendly fleet	2	3	4	9
Low environmental awareness	2	2	3	7

The USG scoring results show that dependence on private vehicles (Score 11) is the main issue that must be prioritized for resolution. The research question is: What policy strategies can the Jambi City Government implement to reduce public dependence on private vehicles through the improvement of an efficient, environmentally friendly public transportation sector that contributes to net zero emission targets?

Based on this identification of the problem, this study aims to analyze and formulate policy strategies that the Jambi City Government can implement to reduce public dependence on private vehicles by improving the public transportation sector to be more efficient, environmentally friendly, and contribute to the net zero emission target. Specifically, this study aims to: (1) identify factors that influence public preferences in choosing modes of transportation; (2) formulate alternative sustainable public transportation policies; (3) analyze the feasibility of implementing each policy alternative; and (4) provide recommendations for the most optimal policy strategies.

The benefits of this research include theoretical contributions to the development of sustainable transportation policy models using the Rational Choice Theory approach, as well as practical benefits for local governments in designing effective and sustainable transportation policies. The implications of this research also include the development of a policy framework that can be adapted to other cities with similar characteristics in Indonesia, as well as contributing to the achievement of national net zero emission targets through transportation transformation at the local level.

RESEARCH METHOD

This study used a qualitative approach with a policy study method to analyze and formulate sustainable public transportation policy strategies in Jambi City. Data collection involved (1) a literature review of previous research on sustainable transportation, public transportation policy, and net zero emission strategies; (2) analysis of transportation policy documents at national and regional levels, including laws, regulations, strategic plans, and program reports; (3) analysis of secondary data from relevant agencies such as the Jambi City Transportation Agency, Bappeda, and the Central Statistics Agency; and (4) a review of best practices in sustainable transportation from other cities in Indonesia and internationally.

A problem identification method using the USG (Urgency, Seriousness, Growth) approach was applied to determine the main priorities among five public transportation issues in Jambi City. The analysis revealed the highest priority was the community's high dependence on private vehicles (score 11). Following this, Rational Choice Theory was used to analyze community preferences in selecting transportation modes based on efficiency, cost, comfort, and accessibility.

The concept of sustainable transportation provided the framework for proposing solutions to make the public transportation system more environmentally friendly, efficient, and inclusive. Several policy alternatives were formulated, including developing integrated public transportation, implementing incentives and disincentives for transportation modes, converting fleets to electric and low-emission energy, and conducting public awareness campaigns. A feasibility analysis was conducted to evaluate these alternatives based on effectiveness, efficiency, political feasibility, and environmental impact, selecting the most optimal and sustainable policy.

Data analysis employed descriptive methods to outline the existing public transportation conditions in Jambi City, comparative analysis to evaluate policy alternatives, and feasibility analysis to assess technical, economic, social, and environmental factors. Research validity was ensured through triangulation of data sources and the use of multiple policy analysis methods.

RESULT AND DISCUSSION

A. Theoretical, Conceptual, and Policy Support

Rational Choice Theory explains that individuals make decisions based on rational analysis of the costs and benefits of various available alternatives (Coleman, 1990). In the context of transportation mode choice, this theory shows that people choose transportation based on considerations of time efficiency, operational costs, comfort levels, and service accessibility. Research by Beirão and Cabral (2007) confirms that factors such as reliability, frequency, comfort, and cost are the main determinants in people's decisions to use public transportation.

The concept of sustainable transportation emphasizes the integration of transportation systems that are environmentally friendly, inclusive, and economically efficient. According to the European Environment Agency (2021), sustainable transportation must meet three main criteria: (1) reduce negative impacts on the environment, including greenhouse gas emissions; (2) provide fair and affordable access for all levels of society; and (3) support sustainable economic growth. This approach is in line with the Transit-Oriented Development (TOD)

concept developed by Cervero and Kockelman (1997), which emphasizes the development of urban areas that are integrated with public transportation systems.

National regulations such as 1) Presidential Regulation No. 55 of 2019 concerning the Acceleration of Battery-Based Electric Vehicle Programs; 2) Presidential Regulation No. 112 of 2022 concerning the Acceleration of Battery-Based Electric Vehicle Development; 3) the National Energy General Plan (RUEN) and the National Action Plan for Greenhouse Gas Emission Reduction (RAN-GRK); and 4) the 2020-2024 National Medium-Term Development Plan (RPJMN), which is continued in the 2025-2029 RPJMN, support this transformation by strengthening infrastructure and reducing carbon emissions.

Sustainable transportation policies must also consider technology and innovation. According to the International Transport Forum (2023), the implementation of digital technologies such as smart mobility, mobile applications for payment integration, and real-time information systems are important components in increasing the attractiveness of public transportation. In addition, the use of electric vehicles for public transportation has proven to be effective in reducing emissions and long-term operating costs.

B. Formulating Alternative Policies

Based on the identification of root causes and theoretical foundations described above, several comprehensive policy alternatives have been formulated covering technological, infrastructural, regulatory, and socio-economic dimensions. These policy alternatives include:

1) Development of integrated and modern public transportation (smart public transport) which includes: (a) restructuring of transportation routes and corridors based on community movement patterns; (b) integration between modes of transportation through feeder and interchange systems; (c) implementation of an integrated payment system using cashless technology; (d) implementation of a real-time transportation information system based on mobile applications; and (e) development of environmentally friendly bus stops and terminals with adequate supporting facilities.
2) Implementation of transportation mode incentives and disincentives, including: (a) public transportation fare subsidies for certain community groups; (b) implementation of a progressive parking system in the city center; (c) implementation of odd-even or road pricing policies; (d) provision of tax incentives for the use of electric vehicles; and (e) development of car-free zones in strategic areas.
3) Conversion of fleets to electric and low-emission energy, including: (a) gradual replacement of conventional buses with electric buses; (b) development of charging station infrastructure for electric vehicles; (c) partnerships with the electric vehicle industry for procurement and maintenance; (d) pilot projects for the use of natural gas (CNG) vehicles as a transition; and (e) development of emission standards for public transportation fleets.
4) Public awareness and education campaigns, including: (a) outreach programs on the benefits of public transportation and the environmental impact of private vehicles; (b) digital campaigns through social media and online platforms; (c) expanded and regular car-free day programs; (d) collaboration with educational institutions on sustainable transportation education; and (e) rewards and recognition for public transportation users.

C. Feasibility Analysis and Implementation Recommendations

The feasibility analysis of the four policy alternatives was conducted using four main criteria: effectiveness in reducing dependence on private vehicles, efficiency of resource use, political and social feasibility, and environmental impact. The results of the analysis show that the development of integrated and modern public transportation has the highest feasibility score because it provides a comprehensive solution that targets the root of the main problem.

In terms of effectiveness, the development of an integrated public transportation system is estimated to increase ridership by 40-60% based on the experiences of other cities such as Jakarta (TransJakarta) and Semarang (Trans Semarang). Integrated payment systems and real-time information have proven to be key factors in increasing user comfort and trust in public transportation.

From an economic efficiency perspective, despite requiring large initial investments, integrated public transportation systems have a good return on investment through increased urban economic productivity, reduced health costs due to air pollution, and increased property values around transportation corridors. A study by the Asian Development Bank (2022) shows that every dollar invested in public transportation generates a return on investment of 3-5 dollars in the long term.

Political and social feasibility is quite high given strong national policy support for sustainable transportation development and growing public awareness of environmental issues. However, implementation requires intensive coordination among stakeholders and effective communication strategies to manage resistance from conventional transportation operators.

The environmental impact of implementing this policy is very positive, with projected CO2 emissions reductions of 25-35% from the transportation sector over the next 10 years. The use of electric vehicles for public transportation can reduce local pollutant emissions by up to 90% compared to conventional vehicles.

D. Implementation Strategy and Stages of Implementation

The implementation of sustainable public transportation policies in Jambi City requires a realistic and measurable step-by-step approach. The implementation stages are divided into three phases:

Phase I (Years 1-2): Preparation and Pilot Project

- Preparation of a master plan for public transportation in Jambi City
- Development of charging station infrastructure for electric vehicles
- Pilot project for 2-3 priority electric bus corridors
- Implementation of an integrated electronic payment system
- Intensive community outreach and education program

Phase II (Years 3-5): Expansion and Integration

- Expansion of the public transportation network to the entire city
- Full integration between modes of transportation
- Implementation of incentive and disincentive policies
- Development of a mobile application for transportation information
- Partnerships with the private sector for sustainability

Phase III (Years 6-10): Optimization and Evaluation

- Full conversion of the fleet to electric vehicles
- Implementation of a smart traffic management system
- Comprehensive evaluation and policy adjustments
- Replication of the model to other cities in Jambi Province
- Integration with regional transportation systems

The success of implementation also requires strict monitoring and evaluation mechanisms with clear performance indicators, such as public transportation usage rates, carbon emission reductions, user satisfaction levels, and economic impacts on the community.

CONCLUSION

The most appropriate policy strategy for Jambi City involves developing an integrated, environmentally friendly public transportation system that addresses infrastructure, technology, regulation, and socio-economic factors. Key measures include restructuring routes to improve connectivity, introducing electric-powered fleets with supporting charging infrastructure, digitizing information and payment systems, and fostering Public-Private Partnerships to enhance sustainability and efficiency. This strategy is expected to reduce private vehicle dependence by 30-40% within five years, improve service quality and ridership, cut transportation sector carbon emissions by 25-35%, and boost urban economic productivity. Successful implementation depends on strong political will, stakeholder coordination, sufficient funding, and community support. The study offers a practical framework adaptable to other local governments. Future research should focus on detailed technical and financial feasibility of policies, socio-economic impacts of electric transportation on communities and operators, development of emission and air quality prediction models, and comparative analyses of sustainable transportation in other Indonesian medium-sized cities to identify best practices.

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