

Dynamics of Urban Transport Arrangement Policies to Support the Achievement of Sustainable Transportation

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Received: 14 May 2023; Revised: 21 October 2023; Accepted: 24 October 2023

Abstract

This article analyses the dynamics of the transport policy of the government of Yogyakarta, Indonesia, and the administration's efforts to organise transportation for sustainability. A qualitative method with a case study approach is used in the research. For data analysis, an interactive model and NVivo 12 Plus qualitative data analysis software were used. The results suggested several initiatives that the government of Yogyakarta must undertake to implement sustainable transportation, including transportation policies, infrastructure development and public awareness. The Yogyakarta government does not yet have regulations that form the basis for the implementation of sustainable transportation in the region. Sustainable transport has only recently become a developmental priority in the 2020–2024 regional mid-term development plan, which reflects the Indonesian government's lagging in promoting sustainable transport on a national and regional scale. For sustainable transport infrastructure, the government of Yogyakarta has operated the rapid bus system Trans Jogja for public transport. However, the implementation of Trans Jogja has been suboptimal because it is considered unable to meet the needs of the community and forces the people of Yogyakarta to use private vehicles for daily mobility. Therefore, The Yogyakarta government is currently working on electric energy-based public transportation (electromobility), which is more environmentally friendly as it does not use fuel oil and has low emissions.

Keywords: Policy Dynamics; Sustainable Transportation; Urban Transportation

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How to Cite: Atmojo, M. E., Darumurti, A., Hanif, N. A., & Agani, M. W. (2024). Dynamics of Urban Transport Arrangement Policies to Support the Achievement of Sustainable Transportation. *Journal of Contemporary Governance and Public Policy*, 5(1), 1-18. <https://doi.org/10.46507/jcgpp.v5i1.185>

Permalink/DOI: <https://doi.org/10.46507/jcgpp.v5i1.185>

Introduction

The Yogyakarta Special Region (*Daerah Istimewa Yogyakarta* [DIY]) in Indonesia, which contains Yogyakarta City, has a high population density and activity. According to data from the Directorate General of Population and Civil Registration of the Ministry of Home Affairs, the population in DIY reached 3.68 million in the second quarter of 2022 (Databoks, 2021). DIY is also known as a student, cultural and tourist region, which often attracts migrants from other regions and abroad to visit. Known as a ‘student city’, DIY has the 6th largest number of students in Indonesia, reaching 110,711 students in 2021 (Databoks, 2022). Immigrant students from outside Java or DIY reached 60%, or around 200,000 students (Mukhijab, 2022). Meanwhile, the number of tourists in DIY until the second quarter of 2022 reached 4 million visitors (Winduajie, 2022). The large number of residents and immigrants in Yogyakarta has increased transport activities and raised demand for mobility.

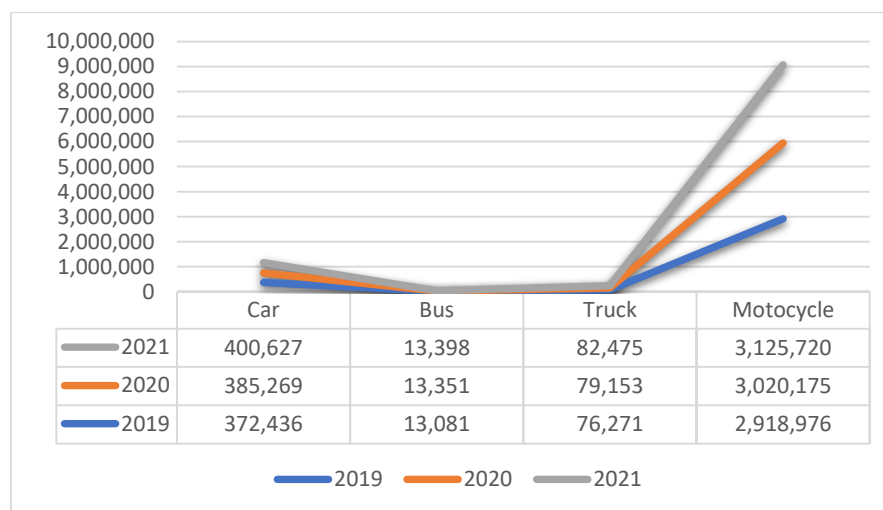


Figure 1. Vehicle Intensity in Yogyakarta, Indonesia 2019–2021

Source: Official Data from the Yogyakarta Province Transportation Agency (2022)

This increased demand is shown in official data from the Yogyakarta Provincial Transportation Service in 2022, which recapitulates the intensity of vehicles operating in Yogyakarta from 2019 to 2021. Figure 1 shows a significant increase in four vehicle classifications in Yogyakarta, including passenger cars, buses, trucks and motorbikes. Motorcycles are the fleet with the highest intensity, with 2.9 million motorbikes in 2019, reaching 3.12 million in 2021. Passenger cars follow at 372,000 cars in 2019, increasing to 400,000 in 2021. Meanwhile, other fleets, such as buses and trucks, have also experienced an increase in intensity, though not too significantly in the same period. These increases demonstrate that the rise in population and population activity has raised the intensity of the fleet to meet the mobility needs of the community.

Increasing transportation activities in DIY also affect environmental quality and sustainability. Conducted by the Ministry of Environment and Forestry, the 2019

Environmental Quality Index (IKLH) survey stated that Yogyakarta is one of the provinces in the 'very poor' IKLH category, with an index of $50 < \text{IKLH} < 60$ (Karliansyah, 2019). Nationally, only DIY and DKI Jakarta fall into this category, which can indicate that Yogyakarta is in an environmental emergency. Although the air quality index in Yogyakarta is still relatively good, the DIY government must maintain this quality by optimising low-emission vehicles, which will positively affect air quality in the Yogyakarta area in the future.

According to Solaymani (2019), transport is one of the sectors greatly contributing to the production of emissions. The urgency of air pollution makes it necessary to evaluate or assess emissions, including aspects of air pollution, particularly in the transport sector (Fan, Perry, Klemeš, & Lee, 2018). In a survey conducted by the Yogyakarta Transportation Service and the Yogyakarta Environment and Forestry Service, vehicle emissions contributed around 80% of carbon gas compared to emissions produced by activities in other sectors (Dishubdiy, 2021). It is therefore necessary to pay attention to the intensity of air pollution considering that the level of pollution has a negative impact on health (Almetwally, Bin-Jumah, & Allam, 2020; Lim et al., 2022). Intense air pollution is also dangerous for pregnant women and increases infant mortality. Air pollution can even trigger diabetes in motorists (deSouza et al., 2022; Wu et al., 2021).

Therefore, a synergy of stakeholders is urgently needed to combat emergency environmental conditions and overcome the problems of air pollution (Gulia et al., 2022). Policymaking is also needed to encourage innovative transport infrastructure that can support environmental sustainability (Umar, Ji, Kirikkaleli, & Xu, 2020). Until now, the Yogyakarta government has not made a significant breakthrough against environmental problems caused by transport. Yogyakarta is ranked after Jakarta as one of the provinces with poor environmental quality at a crisis level, yet few innovations have been developed. This minimal response in Yogyakarta contrasts with Jakarta, which has developed innovations through both policies and field implementations to improve environmental conditions.

Innovation is needed to create a green city prioritising environmental sustainability based on digital applications in transport modes as a solution. One such innovation is using green transport for movement and connectivity in an urban area (Sultana et al., 2019). The Yogyakarta government has not put much effort into realising a green city through the transport sector and has failed to introduce innovative policies for urban transport. In fact, no policy reforms for transport have been announced in Yogyakarta, as seen from the absence of updates to regulation 8/2015 concerning regional transport. The regional regulation still identifies 'sustainable transport' as traditional transport, such as *becak* (rickshaws) and *andong* (horse-drawn carriage). Examining current conditions, Yogyakarta should already have recognised the demand for good and environmentally friendly public transport. Moreover, sustainable transport should have been defined more broadly than traditional transport and prioritised with rapid mass transit and other initiatives. A sustainable transport system is defined as one in which fuel consumption, vehicle emissions, safety, congestion, and social and economic access

are of such levels that they can be sustained into the indefinite future without causing great or irreparable harm to future generations of people throughout the world (Richardson, 1999).

Public transport provided by the Yogyakarta government, such as the rapid bus system Trans Jogja, has not met the needs of the community optimally, which is evident from the number of passengers declining every year. For example, in 2016, the number of public transport passengers (including Intercity Transportation Within Provinces [*Angkutan Antarkota Dalam Provinsi* (AKDP)], Urban Transportation, and Trans Jogja) reached 6,459,181 people. However, this level decreased to 5,999,335 passengers in 2017 and experienced a peak decline in 2020, with only 2,776,667 passengers (Muhammad, 2022). The decrease in the number of passengers indicates that Trans Jogja has not become a solution to transport problems in Yogyakarta. A lack of community satisfaction in the system has resulted in people not using Trans Jogja for the long term, even though public transport infrastructure can connect residential, social and economic centres while simultaneously controlling urban physical growth (Moor, 2015).

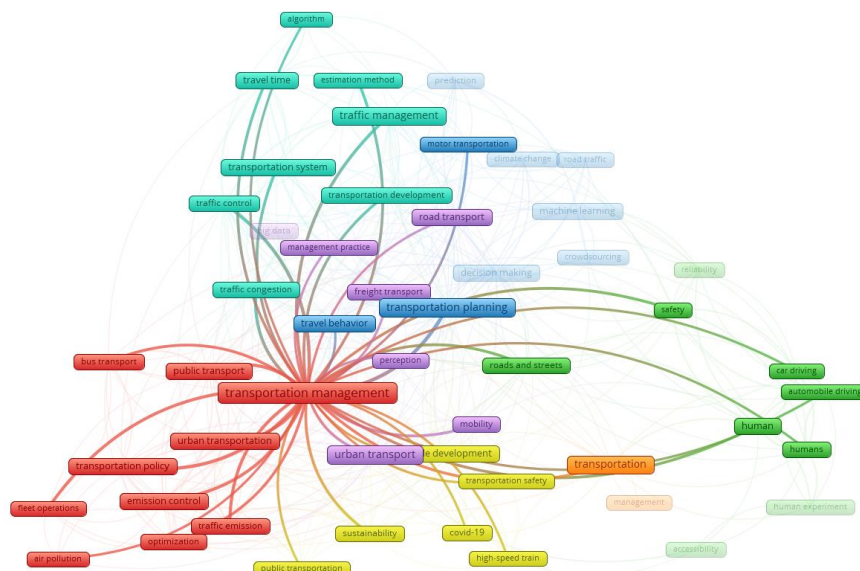


Figure 2. Transport Management Publication Map
Source: Mapping Previous Study using VOSviewer (2023)

However, as shown in Figure 2, scant research related to transport management has been analysed from a sustainability perspective. Based on research in various countries, a visualisation was generated from 98 transport management studies indexed from the Scopus database for the period 2019–2023. Meanwhile, the agenda of the United Nations Sustainable Development Goals is currently being pursued by various countries as one of the strategies to overcome the climate change crisis. Studies related to sustainable transport are urgently needed to serve as evaluation material for the government regarding transport management as well as being a reference for realising sustainable transport.

In view of these urgent problems, the authors are interested in examining the policy dynamics of urban transport management in Yogyakarta based on the sustainability concept to advance development of a green city. This research has relevance to several previous studies, such as Khumvongsa et al., (2023) and Hidayati and Febriharati (2016), which also discuss the development of public transport in urban areas. However, their research lacks a more specific examination of the arrangement of sustainable public transportation in green cities. Therefore, this study is novel in examining efforts to arrange transport in DIY given the high urgency for organising environmentally friendly transport to promote sustainable development.

Research Methods

This study uses a qualitative method with a descriptive approach. The selection of this method is adjusted to the research objectives, which are intended to be examined in depth through descriptive sentences related to the topics that are the focus of this research. As Patton (1987) outlined, qualitative data collection consisted of three techniques, namely in-depth interviews, observation and the use of supporting documents. Interview and observation techniques were carried out with the Head of the Traffic Section of the Transportation Service (Dinas Perhubungan DI Yogyakarta), the Transportation Substance Group, Regional Infrastructure and Energy Mineral Resources of the Regional Planning and Development Agency (Bappeda DI Yogyakarta) and the Head of the Pollution Control and Environmental Damage Division at Environment and Forestry Service (Dinas Kehutanan dan Lingkungan Hidup DI Yogyakarta). Documentation techniques were conducted by examining supporting documents from previous research, official government data and information from other institutions operating in relevant contexts. Data analysis in this study used the interactive model technique developed by Miles, Huberman, and Saldaña (2018), consisting of data reduction, data visualisation and drawing conclusions.



Figure 3. Data Analysis Process
Source: Processed by Authors (2023)

Based on the process outlined in Figure 3, data reduction is the stage of grouping data according to the research variables. The data reduction process was carried out with NVivo 12 Plus tools to facilitate data clustering through nodes and codes. Grouped data is visualised to make it easier to comprehend the data identified. Data visualisation is the stage of organising data in the form of graphs, pictures and tables. One of the visualisation features used in this study is a word cloud, which is a tool in NVivo 12 Plus that depicts the intensity of words mentioned in the text as dominant words (Allsop et al., 2022). The last stage is drawing conclusions that describe the visual data presented.

Results and Discussion

The current high population growth and urban development will increase the need for mobility to support community activities. High mobility needs will require public transport as part of the urban infrastructure needed to support social and economic mobility (Pramana & Efendi, 2019). In addition, increasing population mobility through public transport services can support economic growth and family welfare (Kadarisman, Gunawan, & Ismiyati, 2016). However, the massive use of public transport will trigger new issues in urban areas, including the production of emissions and pollution (Hanif & Nurmandi, 2022). Therefore, the government should follow up on urban transport arrangements to create green and sustainable cities. In examining the development of sustainable cities, the author uses the sustainability transport theory, which is shown in Table 1.

Table 1. Sustainability Transport Theory
Source: Jeon, Amekudzi, and Guensler (2013)

Variable	Indicators	Parameter
Transport System Sustainability	Transport System Effectiveness	Mobility System Performance
	Environmental Sustainability	Natural Resources
	Environmental Integrity	System Resilience
	Sociocultural Sustainability	Safety
	Social Equity	Human Health

Transport System Effectiveness

The transport system effectiveness indicator reflects the government's efforts in facilitating the community through effective modes of transport and access to mobilisation. This indicator has two parameters: system performance and mobility. System performance refers to the provision of fleets as a mobilisation tool, such as public transport, which enables environmentally friendly communities to support sustainability. Mobility relates to the provision of transport access that is smooth and does not cause congestion. Regarding mobility management, the Yogyakarta government has several plans to improve community mobility activities by optimising Trans Jogja public transport to minimise the number of vehicles in DIY. A reduction in the number of vehicles can reduce the intensity of emissions and the resulting pollution. Thus far, however, the implementation of Trans Jogja has been below par as it is considered unable

to meet the mobility needs of the community regarding timely arrivals (Dishubdiy, 2021). This problem increases the use of private vehicles, which adds to congestion. On the other hand, private vehicles supply revenue to the Yogyakarta government (Dishubdiy, 2017).

The challenges above illustrate that the implementation of public transport policies in Yogyakarta has not been optimal. Several obstacles to implementing effective and sustainable transport are faced by the Yogyakarta government in terms of policy and budget availability. The issues begin with the policy dynamics affecting programme planning and activities. The Yogyakarta government has not yet established transport sector regulations referring to the implementation of a green city and only has a few transport policies, as seen in Table 2.

Table 2. Transport Policies in Yogyakarta, Indonesia
Source: Processed by Authors (2023)

Regulation	Regarding
Law Number 22 of 2009	Traffic and road transport
Regional Regulation Number 8 of 2015	Regional Transportation Development Pattern
Regional Regulation Number 5 of 2016	Traditional Mode of Transportation <i>Becak</i> (rickshaws) and <i>Andong</i> (horse-drawn carriage)
Governor Regulation Number 32 of 2017	Organising Taxi Transportation and Special Rental Transportation Using Information Technology-Based Applications
Governor Regulation Number 109 of 2020	Assignment of Trans Jogja Subsidised Urban Transportation System Management with 'Buy the Service' System to PT. Anindya International Partners
Governor Regulation Number 127 of 2021	Implementation of the Trans Jogja Subsidised Urban Transport System with the 'Buy the Service' System

The current era of new urban development is directed at reducing air pollution and increasing green space (Nieuwenhuijsen, 2021). This general pattern prevails in urban spaces with high social interaction and mobility (Askarizad, Jinliao, & Jafari, 2021). However, the regulations above demonstrate that the Yogyakarta government has not yet formed a good plan in terms of policies, programmes and activities that support sustainable transportation. Only in 2024 will the DIY government plan a discussion on sustainable transportation, starting with conducting scientific studies as the basis for policy formulation and developing programmes and supporting activities.

The slow development of sustainable transportation at the regional level is also one of the effects of the central government's delay in responding to the urgency of green transportation, which has just been announced in the last five years. The slow pace in developing environmentally friendly urban planning will affect people's mobility in open spaces. Efforts to optimise urban connectivity through environmentally friendly public transportation have only been included in the 2020–2024 National Medium-Term Development Plan. The national development of green transportation infrastructure has also just begun in 2018 but remains concentrated in the Jakarta area. Meanwhile, in Yogyakarta, the contribution to the development of green transportation infrastructure has only been implemented through the operation of the airport train in Kulon Progo Regency (Biro Komunikasi dan Informasi Publik, 2022).

This problem of delayed development of sustainable transport is also related to medium-term development planning in Yogyakarta, specifically, the Regional Medium-Term Development Plan, which is calculated for five years in the periods 2017–2022 and 2023–2028. In the 2017–2022 plan, the priority of the Yogyakarta government did not yet lie in sustainable development because the plan followed instructions from the central government, which only formulated sustainable development in the 2020–2024 National Medium-Term Development Plan. As a region, the Yogyakarta government cannot move without instructions from higher government. Therefore, the central government's delay in responding to the urgency of sustainable development in the transport sector has left local governments struggling to catch up.

The government of Yogyakarta is currently attempting to reform its city transportation through planning, programmes and activities. In essence, 2023 is the first year for establishing sustainability-based Regional Medium-Term Development Plan priorities. Also in 2023, the Yogyakarta government has conducted research and formed electric vehicle prototypes, managerial institutions and supporting infrastructure. The Yogyakarta government faces policy dynamics in implementing sustainable transportation, and other challenges hinder efforts to achieve green transportation, which are revealed in the word cloud in Figure 4.



Figure 4. Problems in Access to Mobilisation in Yogyakarta, Indonesia
Source: Word Cloud Analysis Using NVivo12 Plus (2023)

Figure 4 summarises results of interviews with informants in this study. Some of the keywords appearing in the word cloud visualisation represent the topic being discussed in the context under study (Olapane, 2021). The word cloud also displays word frequency, which is represented by the size of each word. Large words have the highest frequency and can indicate that the keywords are points of concern in the data (Wilk et al., 2019).

The word cloud in Figure 4 depicts several high-frequency keywords, including 'transportation', 'traffic', 'agency' and 'AKDP'. Words with large sizes are interpreted as keywords representing the discussion. The keyword 'traffic' represents a discussion related to the high intensity of vehicles operating on the highways in the Yogyakarta area, which causes congestion, and for which mobility access is not smooth. The keyword 'transportation agency' shows that the problem of mobilisation remains a problem for the government of Yogyakarta. As the main driving actor, the Department of Transportation is still studying solutions to the traffic jams that occur. The 'AKDP' term reflects the principal problems regarding transportation mobility in Yogyakarta. These issues are triggered by the many choices of modes of transportation and facilities offered, which affect people's interest in using public transportation.

One of the points that hinders smooth access to mobilisation in Yogyakarta is the birth of technological innovations such as semi-private online ride-sharing apps that provide easily accessible, fast and comfortable transport facilities. However, this development increases the number of vehicles, which can impact the production of emissions (Bityukova & Mozgunov, 2019; Lu, Li, Li, & Al-Barakani, 2021; Miao, Baležentis, Shao, & Chang, 2019; Sun et al., 2020). Government policies allowing online transportation operations seem to backfire on the successful implementation of sustainable transportation, especially in influencing people's interest in using it. The effectiveness of efforts to minimise the intensity of vehicles operating on the highway will be futile if the government continues to grant permits for online transportation operations that create alternatives for the community to meet their mobility needs. It can be concluded from the word cloud that the Yogyakarta government is still addressing mobility problems, particularly smooth access to transport mobilisation in the Yogyakarta area. Therefore, it is necessary to conduct a review of the online transport operating licensing policy as a step in encouraging the success of sustainable public transport.

Environmental Sustainability and Environmental Integrity

This indicator consists of two parameters. First, a 'resilience system' refers to the ability of vehicle automation to detect an obstacle using the help of sensors and artificial intelligence. Second, 'natural resources' discusses the use of vehicle fuel. Vehicle automation capabilities can help smooth travel because vehicles can detect and choose the best route to avoid traffic jams with efficient mileage. Route design and mobility access affect the mileage and consequently emissions issued along with the length of time the vehicle has been operating (Kuo & Wang, 2011). Moreover, the effectiveness of

mobilisation is also related to the more efficient use of fuel. According to Shaheen and Lipman (2007), good mobility management contributes to minimising emissions production. Therefore, this indicator has a continuous correlation with the transportation system effectiveness indicators. Meanwhile, the Yogyakarta government is still reviewing the best solution to address the problem of transport mobilisation, which will affect the success of the indicator.

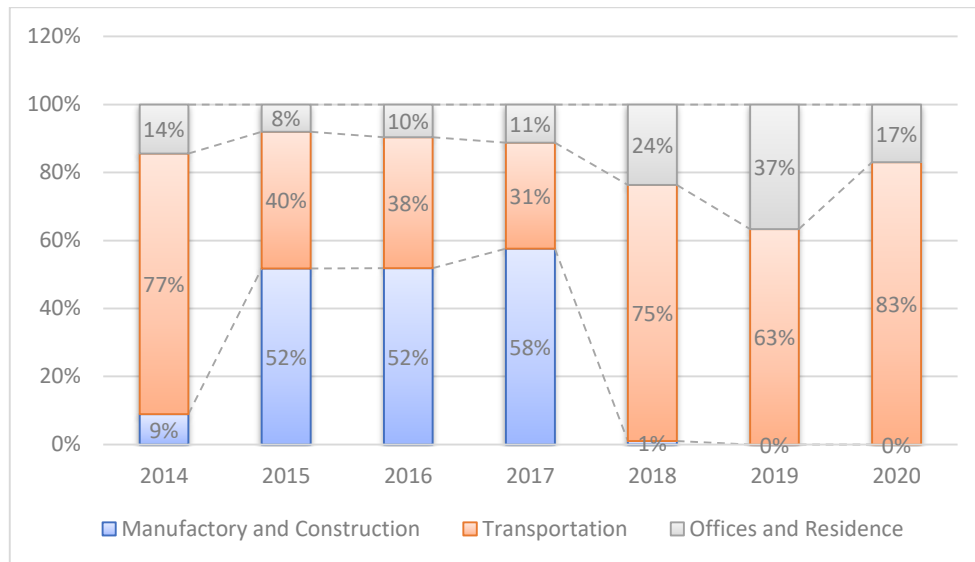


Figure 5. Emissions produced from Fuel Consumption

Source: Official Data of the Environment and Forestry Service of Yogyakarta (2021)

Figure 5 displays the percentage of emissions production from the activities of several sectors in DIY from 2014 to 2020. As seen in the figure, the transport sector contributes to the highest emissions production compared to other sectors. The manufacturing and construction sector has seen a decrease in the percentage of emissions production in recent years. Meanwhile, emissions produced from office activities and residential areas have shown a stagnant percentage from year to year. These results contrast with the production of emissions due to transport activities, which tend to increase every year and dominate compared to other sectors. This condition becomes crucial when combined with the mobility problems that are still being faced by the DIY government. According to the Institute for Transportation and Development Policy (2019), cities globally have a role as the largest emitters of carbon emissions and energy consumers. The high production of vehicle emissions in the last few years indicates that DIY will face emergency environmental conditions if it is not balanced with efforts to develop sustainable urban transportation.

On the other hand, the construction of electric transportation aimed at reducing emissions of new vehicles will be put into operation around 2024 or 2025 by the Yogyakarta government. Regarding this parameter, the Yogyakarta government has not contributed much effort considering that a sustainable transportation plan will only be implemented in 2023. The Yogyakarta government needs time to be able to operate

automated vehicles, which will expedite mobility due to limited technological developments in the region. Currently, efforts that can be made by the Yogyakarta government to facilitate mobility access are only through education and socialisation for citizens to use public transport to meet their mobility needs.

The use of public transport contributes to reducing the number of private vehicles operating on the roads while reducing vehicle emissions (Pietrzak & Pietrzak, 2020). One of the efforts to minimise the impact of environmental damage is the construction of public transport infrastructure based on electromobility energy (Gharehbaghi, McManus, & Robson, 2019). The use of renewable energy sources such as biofuels is also a way to decarbonise the transport sector (Panchuk, Kryshchuk, Sładowski, & Panchuk, 2020; Xie, Wu, & Zhu, 2021). The use of renewables is a key factor in the natural resource parameter, which aims to minimise the use of fuel oil to maintain environmental sustainability.

Sociocultural Sustainability and Social Equity

The sociocultural sustainability and social equity indicator reflects the government's efforts to create environmental sustainability in urban areas by balancing security, public health and quality of life in the community as well as high mobility for urban transport. The indicator consists of several parameters, namely public health, community quality of life and safety for transport activities in urban areas. Public health is achieved by the government's efforts to monitor and evaluate the dynamics of the percentage of emissions produced by transport activities. This monitoring is carried out as a basis for programmes and activities to reduce vehicle emissions that impact public health. Meanwhile, the community's quality of life is related to the development of Green Open Spaces, which is an effort to balance environmental quality and neutralise transport emissions that affect people's lives in the long term (Jennings & Bamkole, 2019; Labib, Lindley, & Huck, 2020; Rojas-Rueda, Nieuwenhuijsen, Gascon, Perez-Leon, & Mudu, 2019). Meanwhile, the safety parameter discusses the government's efforts to create safe routes, especially for pedestrians, cyclists and people with disabilities, as part of realising sustainable and inclusive mobility.

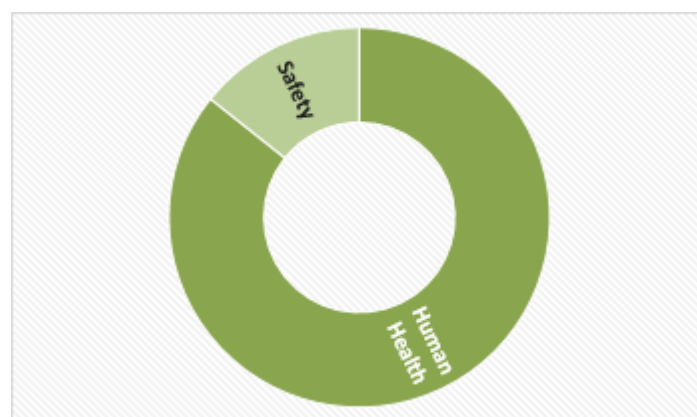


Figure 6. Sociocultural Sustainability Problematics in Yogyakarta, Indonesia
Source: Analysis Using NVivo12 Plus (2023)

Based on the data shown in Figure 6 as well as mapping the problems faced by the Yogyakarta government in implementing sustainable transport, the authors found two dominant problems in the sociocultural sustainability indicator that are also related to the dynamics of the prevailing policies. Regarding public health parameters, the Yogyakarta government, particularly the Environment and Forestry Service, has limitations in carrying out environmental restoration due to vehicle emissions because they have not been given instructions from the central government. In the absence of these instructions, Yogyakarta currently cannot do much to restore its environment from vehicle emissions. Meanwhile, the central government still relies on the Langit Biru programme launched in the early 2000s, and there have been no subsequent programme innovations to accelerate environmental quality recovery from high vehicle emissions.

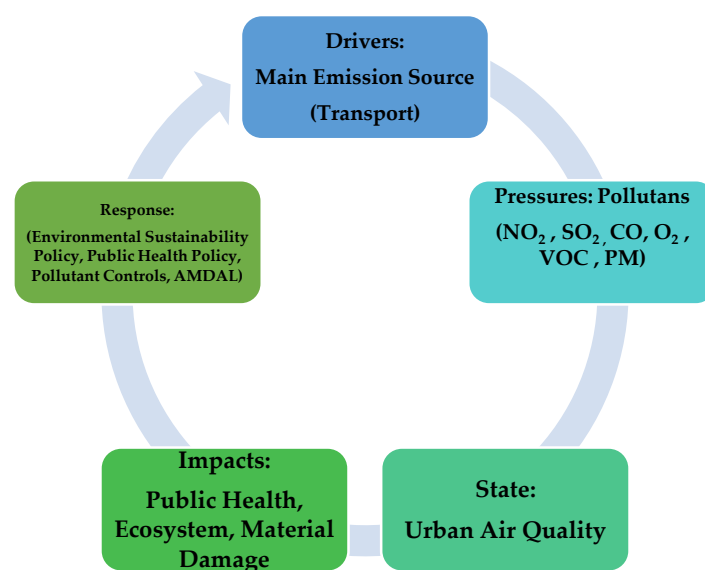


Figure 7. Langit Biru Cycle Programme
Source: Processed by Authors (2023)

Figure 7 shows the cycle of the Langit Biru programme pursued by the central government for the last two decades, which until now has not yielded effective results. This outcome can be seen in the poor quality of the environment in Indonesia due to vehicle emissions. Several steps have been taken by the central government in the Langit Biru programme, namely mapping carbon emissions caused by various activities, one of which is the transport sector. Minimising emissions produced from these activities through regular monitoring management and implementing carbon reduction policies can help reduce emissions. The Yogyakarta government carried out a similar strategy by monitoring the dynamics of vehicle emissions through detectors installed in areas with dense traffic.

An issue is that vehicle emissions monitoring by the Yogyakarta government was last held in 2019 due to several obstacles, including the slowness of the central government in enforcing instructions related to vehicle emissions monitoring. In

addition, the DIY government faces limited tools and budget and a lack of synergy between Regional Apparatus Organisations in Yogyakarta, particularly those engaged in the environmental sector. The absence of directness from the central government regarding the sustainability of the Langit Biru programme has placed regional governments in a dilemma – efforts to restore the environment in their regions have stagnated. The Yogyakarta government is still waiting for instructions from the central government regarding programmes that must be carried out to strive for environmental sustainability, particularly when the need for accessibility is currently rising. Previously, the local Yogyakarta government conducted studies related to vehicle emissions on a regular basis by taking samples of vehicle emissions, which were analysed in the laboratory through a collaboration with academics. Due to budget constraints, however, this study was last carried out in 2019.

The Yogyakarta government also has limitations in procuring vehicle emission detectors, which should be installed evenly throughout the Yogyakarta area so that each district has a detector. However, until now, the Yogyakarta government only has one vehicle emission detector, which is installed in the Yogyakarta City Environment and Forestry Service office complex. This issue is related to another problem in the form of weak interagency synergy, particularly for the inter-district Environment and Forestry Services in DIY. Most districts in the Yogyakarta area are not yet aware of the importance of vehicle emission detectors for monitoring emissions in their areas, although the Yogyakarta Environment and Forestry Service has given instructions to propose the procurement of the devices.

Regarding security, which relates to the provision of easy accessibility of transportation infrastructure for pedestrians, cyclists and the disabled, it appears that the DIY government remains searching for solutions to some of these concerns. The density of transportation activities in Yogyakarta often does not provide space for cyclists and pedestrians and creates a feeling of discomfort. Other issues include the provision of disability-friendly transportation infrastructure, such as the creation of public transport stops that can be easily accessed by persons with disabilities. The obstacle lies in the limited land available for bicycle and pedestrian paths, including gentle inclines readily accessible by people with disabilities. The conditions of damaged sidewalks, sidewalk areas used for selling and less accessibility for people with disabilities are problems for optimising pedestrian movements in Yogyakarta (Manifesty, 2021).

The Yogyakarta government currently remains focused on establishing sustainable transport, while the creation of facilities for cyclists, pedestrians and disabled persons is still in the discussion stage. Regarding sidewalk management for cyclists' and pedestrians' right of access, the government and law enforcement should require street vendors to relocate. This step must be done because bicycle use can be a key strategy to manage and transform urban transport systems (Gössling, 2020). Without appropriate policy and guidance, transportation problems will not be resolved (Jiao & Wang, 2021). Transportation management is not only about emissions but also involves equitable access to every mode of transport, including bicycle and pedestrian routes.

Regarding quality of life, the development of green open spaces has not become a top priority for the Yogyakarta government, which is still in the stage of preparing infrastructure and institutions to support electric transport, which will be operated in the next few years. The results of these findings indicate that Yogyakarta has not fully implemented sustainable transportation and will be working on it for some time to come. In the future, DIY must increase green open space capacity as it is an urgent requirement to develop the natural-social ecosystem to improve the health of citizens (Zhang, Cao, & Han, 2021). Green open space development is also part of the strategy to decrease air pollution, increase urban quality and combat climate change affected by transport activities (Mueller et al., 2020; Qiao, Mengjiao, Haochen, Xizi, & Xiaoyan, 2022; Ring, Damyanovic, & Reinwald, 2021; Xu, Fang, Huang, & Xu, 2023). Developing urban green spaces and implementing land-use planning, such as the construction of city gardens, roadside vegetation and city parks, can achieve sustainable and environmental urbanisation (Ramaiah & Avtar, 2019).

Conclusion

Based on the findings in this study, this researcher concludes that the concept of sustainable transport has not been implemented by the government of Yogyakarta. Several items must be prepared by the DIY government to implement sustainable transport, including transport policies, infrastructure development and public awareness. Moreover, the Yogyakarta government does not yet have regulations forming the basis for the implementation of sustainable transport in the region. In fact, sustainable transport has only become a developmental priority in the 2020–2024 Regional Medium-Term Development Plan. This delay reflects the Indonesian government's lagging instructions on sustainable transport development on a national and regional scale.

Regarding the availability of sustainable transport infrastructure, the government of Yogyakarta has operated Trans Jogja as public transport to reduce congestion and the intensity of vehicles on the highway. However, the implementation of Trans Jogja has not been optimal because it fails to meet the needs of the community in both timeliness and inclusive accessibility. This condition triggers the people of Yogyakarta to use private vehicles as a mode of daily mobility, which increases the intensity of vehicles, congestion and air pollution from vehicle emissions. Several transport policies, such as the ease of owning private vehicles and online transportation operations, contribute to the reluctance to use Trans Jogja public transport. Trans Jogja has also been unable to accommodate passenger safety, particularly at bus stops, which are less friendly for disabled wheelchair users. The Yogyakarta government is currently working on electric energy-based public transport (electromobility), which is more environmentally friendly as it does not use fuel oil and has low emissions. Electric transport will be implemented in the next few years after the construction of supporting infrastructure and institutions. Currently, infrastructure development for pedestrians and cyclists has not become a

developmental priority because the Yogyakarta government remains focused on developing electric transport to meet the mobility needs of the community.

Acknowledgement

We would like to thank the government for helping with this research by providing data. In addition, we also thank the Muhammadiyah Council of Higher Education, Research and Development through the RisetMu Programme, which has supported research funding.

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