



Sustainable Urban Mobility in The Largest Metropolitan Cities of Indonesia: Planned or Realised?

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Abstract: This study aims to analyze the optimization of sustainable mobility in several metropolitan cities in Indonesia. The locus of this study, where the comparison objects will be Jakarta and Surabaya City. The research method used was a qualitative case study approach. The data resources of this study are collected by the researcher through documentation techniques. The data analysis of this study is based on interactive models, which consist of data collection, reduction, visualization, and a conclusion to the answer to the research question. The results of this study show that the sustainable mobility concept has been realized by Jakarta's Government and Surabaya's Government. In environmental sustainability indicators, Jakarta has made better progress than Surabaya in organizing public transport and switching to EVs to reduce traffic emissions. In economic effectiveness, the Jakarta and Surabaya governments have the same progress through providing incentives to use public transport. In socio-cultural sustainability, Jakarta and Surabaya have the same problems in providing accessible facilities, including for disabled people. The Jakarta and Surabaya government needs to improve their mobility system, especially accessibility infrastructure, so public transport can be reached by all of the community and achieve sustainable mobility concept optimally.

Keywords: Metropolitan Cities, Plan, Realization, Sustainable Mobility, Urban Mobility Development

Introduction

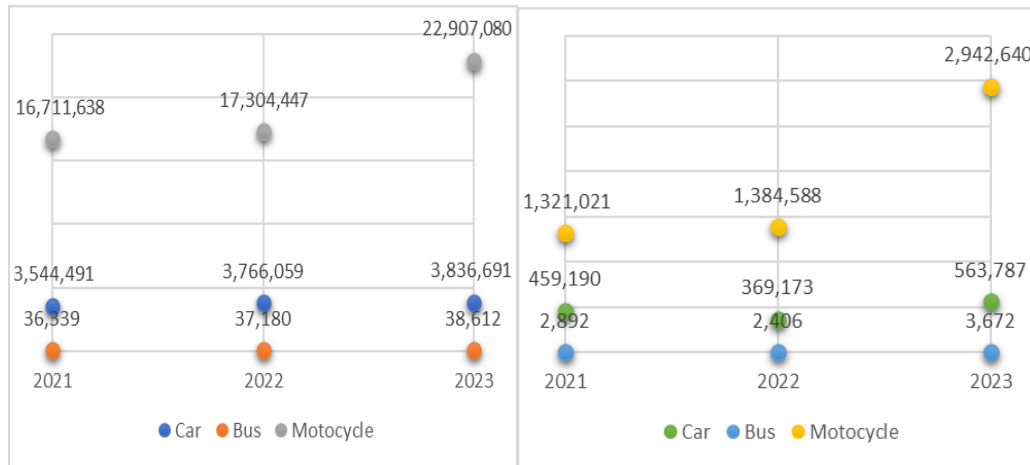
Jakarta and Surabaya are the biggest population cities in Indonesia with 10,56 million and over 3 million inhabitants in 2020 (Badan Pusat Statistik, 2021) and (surabayakota.bps.go.id, 2021). So, both cities are called metropolitan cities. In line with Berry et al.(1968), who argued that a metropolitan city has a minimum of 50 thousand inhabitants and a population density of 150 people per square mile or more. Another similarity between Jakarta and Surabaya cities, as the locus of this research, is those cities

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as center of government provinces, centres of industry and business and have the highest population density compared to other cities on Java Island. This condition makes Jakarta and Surabaya cities have environmental problems, especially related to air pollution and green area as impact of settlement, building, and mobility needs of the public.



Source: (Statistic Indonesia, 2024; Statistic Jakarta, 2023; Statistic Surabaya, 2024)

Figure 1. Transportation Mode Trend in Jakarta (Left) and Surabaya (Right)

The figure 1 shows Jakarta and Surabaya City having private vehicle increases, especially motorcycle and car according to Statistic data of cities in 2021 to 2024. In Jakarta City, number of car is 3,5 million in 2021; 3,7 million in 2022 and 3,8 million in 2023. More than it, motorcycle uses in Jakarta City also has increases number since 2021 is 16,7 million to 2023 is 22, 9 million. Surabaya City has same phenomenon, car uses in 2021 is 459 thousand, and the last in 2023 terrace to 563 thousand. Motorcycle uses in Surabaya City has significant increases since 2021 is 1,3 million and 2023 is 2,9 million. Meanwhile bus uses still on stagnancy number. This condition presents the car and motorcycle as the mobility modes prioritised by communities. There are several reasons to makes the communities choose private vehicle than public transportation such as lack facilities, un-accessible, and proper infrastructure (Atmojo, et al., 2024). At other hand, the high use of private vehicles in both cities impacts emissions, which is urgent for the implementation of the sustainability concept.

Mobility activities in Jakarta produce Particulate Matter (PM)_{2.5}, Nitrogen Dioxide (NO₂) and Carbon Monoxide (CO) (Dinas Lingkungan Hidup Jakarta, 2022). The same condition in Surabaya, the transportation sector contributes 44.2% of PM_{2.5} compared to other sectors (Ahmad & Santoso, 2016). The fatality of this phenomenon can affect public health threat in long-term period, as occurs in Jakarta, where air pollution impact to 7000 disease for children annually (Syuhada et al., 2023). Related study of several cities in Europe, PM_{2.5} and NO₂ concentrate caused by air pollution and high level of motorized traffic is the highest mortality and disease source (Khomenko et al., 2021). Mortality caused by ambient air pollution has increase in several years also occurs in Africa and majority of non-communicable disease (Fisher et al., 2021). This finding, shows sustainable mobility management is urgent to be realized by the government to reduce the number of mortality and diseases caused by traffic pollution.

The President Regulation (PP) number 22 of 2021 related to Organizational of Functional Property and Environmental Management stated land transportation as one of emission produce source and define particulate matter as air pollution type is consist of CO, NO_x, Sulfur Dioxide (SO₂), and hydrocarbon (HC) at article 204 and 66. Particulate is a

mixture of solid and liquid particles in the air in the form of dust, dirt, or smoke, and has small size, even invisible particles. To easier government to classify the air pollution component, The Ministry of Environment and Forestry of Indonesia has standard indicator namely Air Pollution Standard Index (ISPU) through Air Quality Monitoring Stasion (AQMS), which it is has same measurement as IQAir, a monitoring air pollution according to United State Standard/National Ambient Air Quality (NAAQS).

Table1. Air Pollution Index Comparison

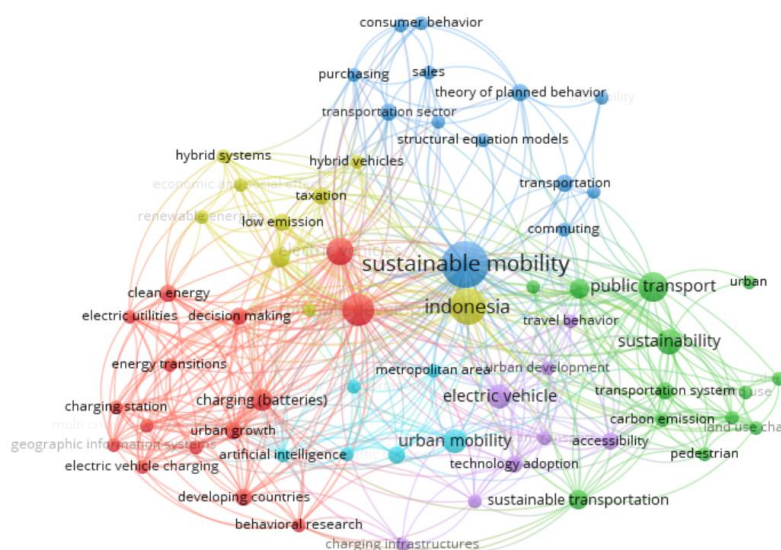
ISPU	Indonesia			United State EPA		
	PM _{2,5} / Day	Classification	Color Indicator	PM _{2,5} / Day	Classification	Color Indicator
0-50	15,5	Health		0-12	Health	
51-100	55,4	Medium		12,1 - 35,4	Medium	
101-150	150,4	Unhealthy		35,3 - 55,4	Unhealthy for Vulnerable People	
151-200				55,5 - 150,4	Unhealthy	
201-300	250,4	Very Unhealthy		150,5 - 250,4	Very Unhealthy	
301-400	500	Dangerous		250,5 - 350,4	Poisonous / Dangerous	
401-500				350,5 - 500,4		

Source: The Ministry of Environment and Forestry Regulation number 14 of 2020 (Indonesia) and the United States EPA

The Indonesian Government through the Ministry of Environment and Forestry has a serious stage to minimize air pollution through decision-making related to air pollution classification, as conducted by the United States government that shows in Table 1. There are several classifications of ISPU, encompasses health (0-50), whereby air quality is safe for humans, animal, plants, building and aesthetic value; Medium (51-100), the air quality is safe for humans and animal, but affect for plants and decrease aesthetic value; Unhealthy (101-200) and Very Unhealthy (201-300), that air quality is dangerous for humans, animals, plants and aesthetic value. And the last as the most dangerous air quality when air quality index is more of 300 or dangerous classification, its potential to causing the seriously disease for humans and animal, likewise ecosystem damage. Air pollution classification should be a parameter by the government and practitioners to create a strategy and realize sustainable mobility as the highest sector to produce emissions, even included in the Sustainable Development Goals (SDGs) agenda in 2030. Minimizing air pollution is also part of reducing climate change damage, and it's important to apply to the urban transportation management system.

Although the sustainable mobility concept has been proclaimed by the Indonesian government and cities, in several cases, it is found that the concept is not optimal to apply. As found by (Banister, 2018) that the step to realize sustainable mobility has been

provided by regulation, and the future challenge is a strategy to make the change, which is an independent aspect of innovation and quality that was built. That problem is the gap for this study to critically investigate the sustainable mobility implementation in Indonesian metropolitan cities, especially in Jakarta and Surabaya City, which has been implemented well or is just a plan. The novelty of this study is to compare sustainable mobility applications in several of the biggest metropolitan cities in Java Island of Indonesia based on a policy and government capability overview. This novelty has been explored through previous studies in Scopus with an advanced query keyword search: TITLE-ABSTRACT-KEYWORDS ("sustainable mobility") AND (LIMIT-TO (COUNTRY, "Indonesia")) AND PUBYEAR > 2016 AND PUBYEAR < 2025. The results found 80 articles with relevant topics in sustainable mobility case studies in Indonesia.



Source: Scopus Database (2026)

Figure 2. The Sustainable Mobility Previous Studies Mapped by the Authors

The figure 2 shows that previous studies on the sustainable mobility topic focus on several perspectives, such as renewable energy use in transportation engines, behavioural studies, technology adoption and artificial intelligence in mobility. Strengthened by Hanif & Nurmandi (2022) her study found that the sustainable mobility analysis in developed and developing countries focuses on carbon emission, performance and planning. But the policy and governmental perspective analysis in sustainable mobility is unfounded, as is evident that many researchers only focus on the technical application of sustainable mobility, while regulation and government support are the basis of their implementation, leaving behind to highlight in scientific studies. So, this study will fill the research gap and the output of this study is a policy brief, especially for the Jakarta and Surabaya governments, and other various government cities in Indonesia to realise the sustainable mobility concept.

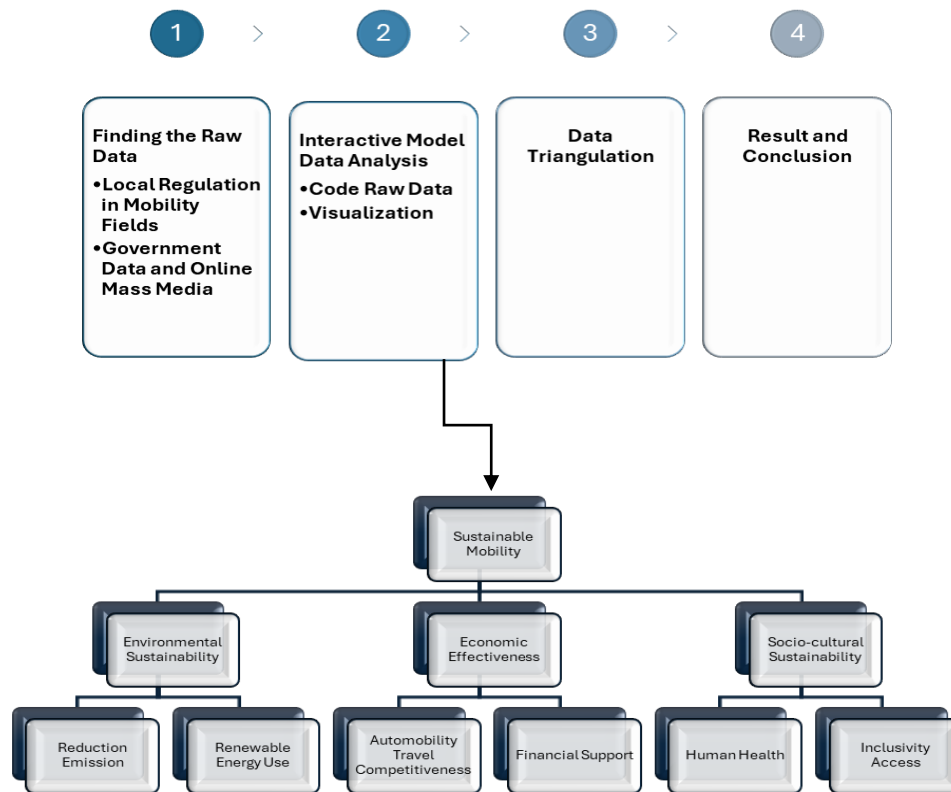
Research Methods

This study uses qualitative methods and a comparative studies approach. Qualitative methods are chosen because they have features to describe phenomena of the experience, explore in detail, and connect the elements to identify the cases and their impact (Ritchie, 2013). As such, the aims of the study are to analyze sustainable mobility implementation. This study has to explore the regulation and application of policy in urban areas. The data resources of this study are primary and secondary data. The data

collection techniques of this study are through the documentation technique, consisting of regulations related to the issue, online data resources of mass media or official government data, and previous studies related to the topic. Various data resources are used to strengthen and validate data obtained by the author.

Figure 3 presents the research framework of this study conducted by the authors. Government regulations are involved as the basis of policy implementation analysis. The study also analyses the local government's action in Jakarta and Surabaya to encourage sustainable mobility applications. According to the methods used, this study can be applied to social research. The statement causing research build-up through theoretical analysis, based on applied and policy implementation or evaluation, is related to practice (Patton, 2002). Data analysis in this study uses an interactive model technique, which was argued by Miles & Huberman (1998), which consists of data reduction, data visualisation and concluding. Data reduction is a step to classify the raw data into indicators and parameters of the study. In data reduction, this study uses tools of assistance, namely NVivo 12 Plus or Qualitative Data Analysis Software (QDAS). Data classified by codes and nodes is also called data coding in qualitative. The coding result is processed through a crosstab query and the conclusion from the analysis process. Coding data can also be the basis for data visualisation to ensure the readers are able to learn, through a table, graphic, figure, or chart.

Before applying data findings as a result, this study assess the data validation through data triangulation. Triangulation data is required in qualitative approaches to ensure the validity, objectivity, and strengthening of the findings of the conclusions (Bulmer, 1986). As was identified by Denzin (1970), Triangulation data has four types consisting of (1) data triangulation based on multiple data in a study; (2) investigator triangulation, which involves multiple researchers conducting a study for a particular case; (3) methodology triangulation, involving various methods to conduct a study; (4) theory triangulation, based on several viewpoints/perspectives to interpret the result of a study. Therefore, according to Denzin's statement, this study refers to data triangulation in the analysis process. In the case of this study, use data resource triangulation, which involves several data resources in the same indicator assessment to find the data redundancy. That data is the final finding and can be used to conclude to answer the research questions.



Source: Authors (2024)

Figure 3. Data Analysis Process and Research Framework

To compare the sustainable mobility realization in urban areas, Jakarta and Surabaya Cities, this study identifies data according to the sustainable mobility combination theory of Jeon et al. (2013) and Karjalainen & Juhola (2019). Theory in social science contributes to building a sharp analysis, and without theory, a study is impossible (Silverman, 2000). Figure 2 shows sustainable mobility theory, which is used in this study, it is an environmental sustainability indicator, an economic effectiveness indicator, and a socio-cultural sustainability indicator. That theory has been chosen because it is suitable for the sustainable concept, which consists of the environment, the economic, and the social dimension. The sustainable mobility concept expected can involve three dimensions of the SDGs concept as references to achieve the 2030 Sustainable Agenda. Environmental sustainability indicators consisting of (1) reduction emission to analyze government program to minimize traffic emission by public transport uses and (2) renewable energy, to explain the government strategy to replace fuel consumption to renewable energy as basic of transportation materials.

The second indicator, economic effectiveness, contains (1) automobility travel competitiveness, which is the performance of public transport to compete with private vehicle use in mobility cost perspective. The comfort and low-cost mobility were facilitated by the government's public transport, considered by the community for the switch to public transport use. (2) Financial support is the facilitation of the government or stakeholders to grant a subvention for public transport; therefore the community can pay for tickets more inexpensively than using private vehicles. The economic aspect is one of the reasons communities use public transportation, moreover, it can give high performance and customization to their needs.

Socio-cultural sustainability, as the last indicator, is related to mobility management systems that facilitate the comfort of the public. Comfortable aspects include health-life without air pollution caused by transportation emissions, accessible mobility for vehicle and bicycle users, and pedestrian-friendly. The inclusivity aspect is an important point in sustainable mobility to facilitate people with a disability easier to reach out and use public transportation, and other mobility routes according to their condition. The balance of environmental maintenance, low-cost operations, and public health care is the main component to encourage sustainable mobility.

Results and Discussion

Environmental Sustainability

Mobility activities affect emission production, which is dangerous for the environment. The government as an urban manager needs to maintain environmental sustainability for balancing ecosystem and human activities such as the Sustainable Development Goals (SDGs) Agenda. Making decisions is the first step for the governments to manage environmental sustainability for application guidance. So far, the Local Governments of Jakarta and Surabaya have several regulations to reduce traffic emissions through public transport use, green spaces, and the use of renewable energy in the transportation sector. Although the regulation cannot be an indicator of the success of environment maintenance, it can be one indicator that the government encourages the sustainable mobility agenda in urban areas.

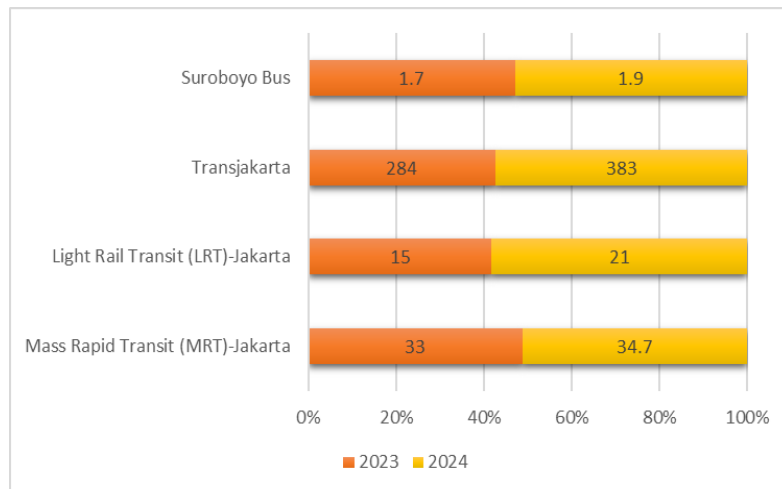
Table 2. Local Regulation of Jakarta and Surabaya Government Relates to Public Transport

Local Government	Regulation	Concern
Jakarta Government	Local Government Regulation of Jakarta number 5 of 2014 relating to Transportation	-the complement of traffic in general -public transport such as train and boat -terminal and bus stop
	Local Government Regulation of Jakarta number 95 of 2019 relating to Minimum Service Standards for Integrated Mass Rail Transit (MRT) and Light Rail Transit (LRT)	-minimum service standard of MRT and LRT -MRT and LRT budgeting -implementation, monitoring, and evaluation system
	Local Government Regulation number 9 of 2018 relating to Limited Company of MRT Jakarta	MRT route expansion
Surabaya Government	Regional Regulation of the City number 7 of 2006 concerning the Implementation of Transportation of People on the Road by Public Vehicles	-Manage public transport in comfort, accessibility and reliability aspect -public transport as strategy to reduce congestion -public transport should deserve best for passengers

Source: Authors (2025)

Table 2 presents that Jakarta and Surabaya governments create regulation as guidance for public transportation development with comfort and accessible facility. This step indicates that Jakarta and Surabaya governments encourage sustainable mobility implementation. Jakarta has Mass Rapid Transit (MRT), Light Rapid Transit (LRT), and Transjakarta as public transport to accommodate public mobility needs. The same thing in

Surabaya, which has Suroboyo Bus as a regional government program to reduce emissions.



Source: *bps.go.id* (2024), *jakartamrt.co.id* (2024), *Koloway* (2025), *Catriana & Setiawan* (2025)

Figure 4. Public Transport Passengers in Jakarta and Surabaya Cities (million)

Figure 4 shows that passengers who use public transport in Jakarta and Surabaya cities have an increase from 2023 to 2024. In 2023, MRT Passengers will be 33 million, and that will increase in 2024 to 34,7 million. LRT and Transjakarta also have to step up from 15 and 284 million in 2023 to 21 and 383 million in 2024. The enhancement occurs in Surabaya City, where Surabaya buses had 1,7 million passengers in 2023 and increased in 2024 to 1,9 million, although that increase is not as much as public transportation in Jakarta. This condition presents the public transportation in Jakarta and Surabaya cities, which are considered by the community as a mobility mode option in their daily.

Community satisfaction was strengthened by the survey related to LRT and MRT service, which is 97,4% in 2024 and 88,51% in 2023 (*dephub.go.id*, 2024; *jakartamrt.co.id*, 2023). According to the survey results, respondents agreed that public transport encourages their mobility needs, stimulates economic development in urban areas, and creates equitable development. The integration system served by public transportation in Jakarta is successful in building comfort, and excellent time travel estimation is a key principle for urban mobility systems. Public transport connectivity in urban mobility management systems, also called smart cities, claimed by Ceder (2021) as the main point of sustainable mobility manifestation in the future. Good experiences of passengers can stimulate communities to be satisfied and switch to public transportation (Hanif, 2024). The consistency of public transportation use can reduce air pollution in urban areas (Lu et al., 2021). This survey shows that the Jakarta Government succeeded in applying their regulation relating to public transport service.

Contrary to Surabaya City, the Suroboyo Bus is not optimal to accommodate the public mobility needs and requires improved service. The lack of adequate time travel estimation forced the Surabaya Government to improve the Suroboyo Bus Crew's performance (Kristyowati, 2024). Infrastructure improvement consisting of a public transport integrating system, multiplying the bus stop number in wide area coverage, and Closed-Circuit Television (CCTV) installation to increase the security system is an important aspect of sustainable mobility development by the Surabaya Government based on customer satisfaction survey and research conducted by (Aza & Supriyatno, 2023; Dewi & Ayuningtiyas, 2024; Sukma et al., 2024). The findings show that the Surabaya Government is required to improve its management of public transport services,

especially on punctual travel time, bus stop quantity, and CCTV for intensifying security systems, such as regulations that they create.

Another key thing to increase the public interest in modal switch from private vehicles to public transport is to align the increase in public transportation quality with the private vehicle ownership requirement. This action is part of the national government's efforts to tighten private vehicle ownership through several new requirements, such as a minimum income to ensure they can maintain their vehicle. Vehicle maintenance is an important thing to reduce vehicle emissions, so the private vehicle operationalisation is more environmentally friendly (Khan et al., 2023). This regulation in-direct contributing to minimising private vehicle ownership and stimulate public interest to move to public transportation.

Sustainable mobility not only realised by public transport, but the electric vehicle (EVs) also needs to reduce emissions from mobility activities. EV holds a role in reducing non-renewable fuel demand and encouraging the use of eco-friendly fuels (Barakat et al., 2024; Atmojo et al., 2024). Infrastructure-based electric networks are believed to decrease Greenhouse Gas (GHG) emissions, carbon emissions, and lower global warming risk (Singh et al., 2024; Onat et al., 2019). In other global north countries, they are well prepared to use EVs. But for cities in the global south, such as Jakarta and Surabaya, one of the initiator cities to switch from conventional to EVs in Indonesia, it's a bit challenging in preparing regulation basis, infrastructure and public acceptance.

Table 3. EV Regulation of Jakarta and Surabaya Government

Local Government	Regulation	Concern
Jakarta Government	Regional Government of Jakarta Province number 5 of 2023 relating to General Planning for Regional Energy (RUED) of 2023-2050	- Encourages EV users to 10% in 2030 and 75% in 2050, calculated according to the vehicle quantities in the same year - Building charging station for EV - Provides incentive for EV users - Develop EV industry
	Governor Regulation of Jakarta number 3 of 2020 relating to Incentive Provision of Tax Incentives for Motor Vehicle Transfer Fees (BBNKB) for battery-based Electric Vehicles	- EV is given incentives not to be subject to BBNKB tax - Incentive tax is provided automatically on the regional tax collection system
Surabaya	Mayor's Regulation of Surabaya City number 112 of 2024 relating to EV uses and availability of EV charging stations	- Provision of EV and charging station around the Regional Government of Surabaya

Source: Authors (2025)

Table 4 presents that the Jakarta government has a mature planning action to apply EV through the infrastructure provided in the regional planning and tax incentives to stimulate public acceptance. This regulation as basis in charging station building in Jakarta City, with 126 charging stations. It's a different progress in Surabaya; they only have a regulation for charging station provision, but the tax incentive warrant is not provided, and the scheme to stimulate public acceptance to switch to EVs is also affected. The charging station in Surabaya has 4 locations. The distinction of the preparation process of Jakarta and Surabaya impact on the switch to EVs success. Strengthened by (Hanif, 2024) that limited infrastructure for charging EVs is discourage community to

switch to EVs. The differences of Jakarta and Surabaya's progress in EVs use is present in table 5.

Table 4. Comparison of CV and EV Number in Jakarta

Vehicle Type	Number		Comparison	
	Motorcycle	Car	Motorcycle	Car
CV	16,141,380	3,365,467	0.99993235	0.999983658
EV	1,092	55	0.0006764	0.00001634

Source: databoks.katadata.co.id (2021) adapted by the author

Table 5 shows the comparison of CV and EV numbers in Jakarta in 2020. The table shows that conventional and electric motorcycles in Jakarta have an inequity percentage of 99% for conventional motorcycles and 0,067% for electric motorcycles. Likewise, the conventional car user percentage is higher than the electric car user, 99% compared to 0,0016%. EV use in Jakarta shows that the community is interested in switching from CV because of environmental reasons and accessible facilities. However, EV percentage uses in 2021 are still far from achieving the Jakarta government's target in 2030 to reach 10% of users of EVs. The Jakarta Government has long-term goals to realize the target through their EV use movement program, such as free tax for EV users.

Meanwhile, in Surabaya, EV use data are not available, but the Surabaya Government requires fulfilling the EV charging station infrastructure first before promoting EV purchasing to communities. The EV charging stations that are distributed well in the Surabaya area are one of the considerations for communities to use EVs with a comfortable feeling. As Liu et al. (2021) state their study found that feelings of comfort due to the fulfilment of charging station infrastructure influence people's motives for using EVs more than other motives, including purchase incentive motives. Although that's the opposite of previous studies, such as (Wurster et al., 2020), who found that EV ownership is a majority characteristic of the higher-income communities and also considers pro-environmental behaviour, and the ideal solution preferred by Cordera et al. (2019) for achieving a more sustainable vehicle is two-way: firstly, punishing CV use to reduce CV operation number; and secondly, distributing incentives for lowering the purchasing price of electric and hybrid vehicles.

In Indonesia, the government provides an incentive for EV purchasing at a lower price, which is regulated by the President Regulation Number 55 of 2019 relating to the Electric Vehicle-based Battery Acceleration Program for Mobility. In chapter 3, article 17, paragraph k, examining that the government will allocate an incentive for EV purchasing. This regulation applies to the purchase of an electric car or motorcycle in Indonesia's areas, including Jakarta and Surabaya. More detail: Regulation of the Minister of Industry Number 6 of 2023 relating to the Government Incentives Guidance for Motorcycle Vehicle Purchase. Inside has regulated the incentives recipient indicator; these are the communities that have micro enterprises, enterprise credit users, people with incentive salaries, and electric incentive users to 900-volt ampere. The incentives for EV purchasing are applied by the government to promote EVs, including in Jakarta and Surabaya. However, that regulation is not in line with the realisation in the field, which shows the demand for EVs is lower than that for conventional purchases. Therefore, infrastructure is an important thing that must be developed by the Surabaya government to increase the number of EV users.

Another factor contributing to the high demand for CVs compared to EVs is the conflicting regulations at the national level regarding the ease of purchasing CVs through credit loans, which stimulate public interest in purchasing private CV vehicles, and the fact that CVs are generally priced lower than EVs. Although the credit loans are initiated by the private sector in the vehicle company field, the national government can intervene in that marketing strategy to mediate the CV and EV purchasing gap, and also reduce the

emissions produced by CVs operationalisation. In this case, the local government needs to be guided by the national government to intervene in the market regulatory interventions in the electric and conventional vehicle industries are needed to align with government policy.

Economic Effectiveness

Economic effectiveness relates to the economic perspective of public transport to provide a comfortable service but low-cost mobility. As such, it is applied by several cities in developed countries, such as Kansas, Dunkirk, Paris, and cities in Luxembourg. They have incentives for public transport users so that they can decrease their mobility spending. Financial incentives of public transport can be an effective strategy to increase users, especially for the low-income communities segment (Guzman & Hessel, 2022). Therefore, financial incentive for public transport is implemented by the Jakarta and Surabaya governments.

Table 5. Public Transport Fare Regulation in Jakarta and Surabaya Cities

Local Government	Regulation	Concern
Jakarta	Local Government Regulation number 34 of 2019 relating to the fare of Mass Rail Transit (MRT) and Light Rail Transit (LRT)	-Fare rules for passengers who use MRT and LRT
Surabaya	Mayor Regulation of Surabaya city number 56 of 2021 concerning Suroboyo Bus Service fare on Transportation Service Agency of Surabaya city	-Suroboyo Bus/Bus Rapid Transit (BRT) Service Fare
	Mayor Regulation of Surabaya City number 22 of 2023 relates the roles of waste for access Transportation Agency Service of Surabaya City	-Fare for access Suroboyo Bus and Feeder Wira Wiri Suroboyo service -Public Transport payment use plastic waste (bottles and glasses)

Source: Authors (2025)

Table 6 shows that Jakarta and Surabaya governments regulate public transportation fares to manage and control mobility costs and make them affordable for all levels of communities. Jakarta has an integrated public transport system, namely Jaklingko, LRT, and MRT. Jaklingko is consisting of Transjakarta and microtrans (ataringkutan kota/angkot). Transjakarta is an electric bus with an integrated route on the main road in the Jakarta area. The passengers only pay Rp. 3500,00 when access Transjakarta for all routes. To accommodate the specific location, Transjakarta integrated with a microtrans. The passengers bring enough electronic money (e-money) cards to use micritrans, and it is free or Rp. 0,00 for all of the routes. There are similarities between LRT and MRT in Jakarta, which have an integrated system and low-cost mobility. The passengers paid by e-money card Rp. 3000,00 for each voyage route.

In Surabaya, the integrated transport system and financial incentives are also implemented by Suroboyo Bus, Trans Semanggi Suroboyo (TSS), and Wirawiri. Suroboyo Bus and TSS have routes in the main road of the whole Surabaya city areas. To access a specific place, the passengers use Wira Wiri, which is integrated with Suroboyo Bus and TSS in one pay system. Financial incentive system in Surabaya called Buy The Service (BTS), which has a fare 5000 IDR for access to all of the public transport in Surabaya city in 2 hours. The passengers who have traveled more than 2 hours in time, should be refunded 5000 IDR when they use public transport. The Suroboyo Government has an innovation in a flexible public transport payment system through digital payment such as

Shopepay, OVO, Dana, Quick Responses Indonesia Standard (QRIS), Dompetku, and LinkAja (Sari et al., 2024). To minimize traffic emission and plastic waste intensity, The Surabaya Government apply plastic pay program on public transport payment system. Plastic pay applies for bottles and glasses packaging from plastic which regulated by Mayor Regulation of Surabaya City number 22 of 2023 relates the roles of waste for access Transportation Agency Service of Surabaya City. Inside, stated that 3 plastic bottles with capacity 1000ml; 5 plastic bottles with capacity under 1000ml; and 10 plastic glasses will be get 1 point for access public transport which managed by The Surabaya Government with free of charge. This regulation be of one strategy of the Surabaya Government to motivate the communities to switch for public transport uses.

Financial source to encourage an incentive in Jakarta city from the Regional Revenue and Expenditure Budget of the Jakarta Government. In 2023, they spent budget on public transport 4,3 trillion of year. At specific allocation for MRT 800 billion and Transjakarta 3,5 trillion in the same year. Meanwhile in Surabaya city, they have allocating for BTS financial incentive 108 billion in 2024. Financial source which is from National Revenue and Expenditure Budget, will be switch to Regional Revenue and Expenditure Budget of the Surabaya Government. The budget allocation will continue to increase in line with the growth in public transportation needs.

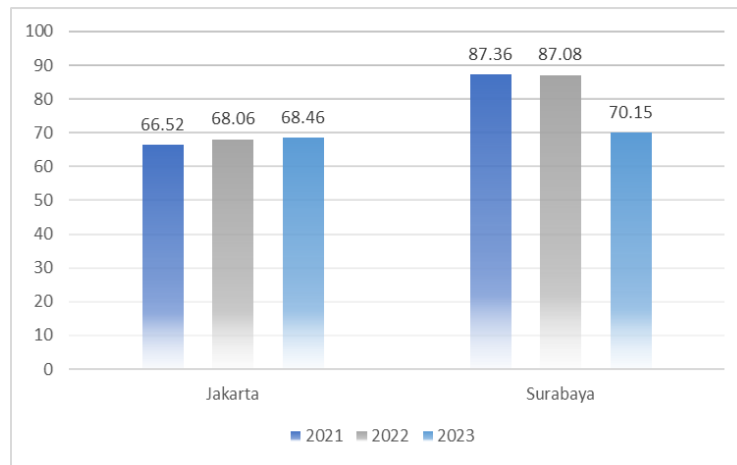
Contrary to previous studies, Zeiske et al. (2021) found that the incentive public transport only has short-term motives of the community to use public transport. Financial incentive cannot engage the community to use public transport in the long term. Likewise, the study found that the community considers the accessibility aspect more than the financial incentive aspect in public transport use. Accessibility aspect is discussed, the impact of public transport on reducing traffic congestion. The community is motivated to switch to public transport because they care about the traffic density condition and the time mobility effectiveness. Public transport, which facilitates the guarantee of accuracy of arrival time, is an important thing for the community to use.

Other fiscal scenarios to increase modal shift can be applied through parking pricing. Benchmark from the Scottish Government, they are intervening in parking policies and have a positive impact for reduce car use, also modal shift (Rye et al., 2023). In Jakarta, parking pricing, namely parking progressive regulation based on parking duration, location where high mobility and emission assessment have been conducted and it is effective to stimulate modal shift (Adib et al., 2024). But, the same regulation in Surabaya is not optimal to apply. Meanwhile, the parking pricing is one of the fiscal scenarios to cross-subsidise with public transport incentive, increase public transport infrastructure and quality service, which is supported by the local government expenditure. The last statement of this study for economic effectiveness, financial incentives, parking pricing and regulation to lower the public transport cost is an effective strategy to increase public transport users. However, the economic aspect is not the only indicator of a community to use public transport because the public transport service quality is the first consideration for the community to use public transport.

Socio-Cultural Sustainability

Urban mobility relating to emissions and air pollution, which both influence public health in the long term. The high mobility activities in urban areas produce the largest emissions and decrease air quality (Hanif et al., 2021). This statement be evidenced by Wallington et al. (2022), His study analyzes vehicle emissions in the past 60 years in United States and Europe, found PM, NO_x, CO, hydrocarbons (HCs), lead (Pb) and SO₂, which are contained in the air. Moreover, the high of mobility demand and transportation activities in urban areas stimulate traffic congestion, which worsens air pollution by the increase of time travel (Lu et al., 2021). This phenomenon can occur in Jakarta and

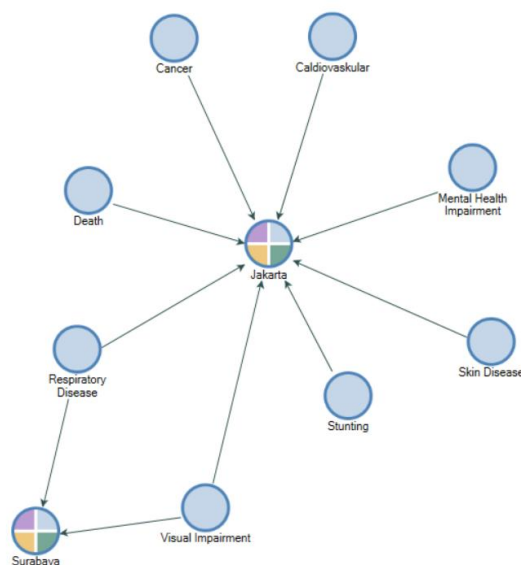
Surabaya because both cities are the Top Two of the Largest Metropolitan cities in Indonesia with mobility density.



Source: bps.go.id (2024b) , ppkl.menlhk.go.id(2024)

Figure 5. Air Quality Index in Jakarta and Surabaya (2021 – 2023)

Figure 5 shows the air quality index in Jakarta and Surabaya from 2021 to 2023, with a fluctuating graphic. In 2021, Jakarta's air quality index was 66,52 and increased in 2022 and 2023 is 68,06 and 68,46. This number is the worst air quality point compared with other cities/provinces in Indonesia in the same period. There are several factors that make Jakarta have the lowest air quality. Firstly, there is a high number of traffic activities every day, and secondly, there is a limited number of green space areas that can neutralize vehicle emissions. Renewable energy based on EVs is needed in Jakarta as a strategy to reduce air pollution. Compared with Surabaya, it has a better air quality index than Jakarta in the same period, although it has a lower number in the latest period. In 2021, air quality in Surabaya reached 87,36 and decreased in 2022 and 2023 to 87,08 and 70,15. This number correlates with the significant growth of several vehicles in Surabaya from 2021 to 2023, and it is likely one of the factors that increases air pollution. Moreover, the EV users in Surabaya are still limited, and the charging station infrastructure is not sufficient, which makes renewable energy in mobility activities not a supportive situation.



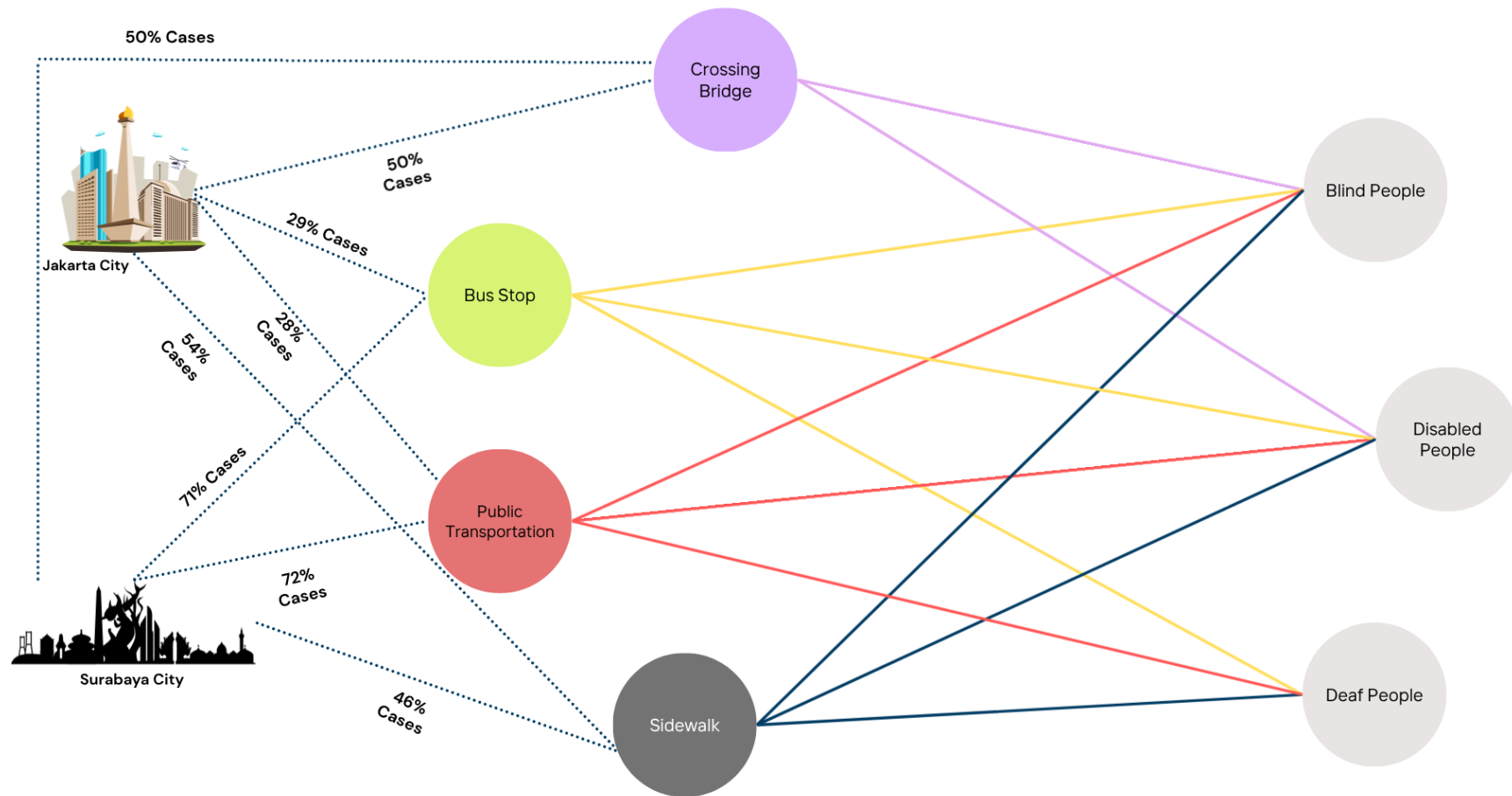
Source: Authors (2025)

Figure 6. Severe Diseases in Jakarta and Surabaya Cities

Figure 6 illustrates various severe diseases in Jakarta and Surabaya that emerged concurrently with air pollution issues in those cities, based on findings from cases reported by online mass media. Jakarta has more complex public health problems than Surabaya. Several diseases suffered by Jakarta's communities include respiratory disease, visual impairment, skin disease, cardiovascular disease, cancer, mental health impairment, even death, and stunting for children and toddlers. This study also compares the percentage of disease cases that occur. The results show that respiratory disease is more prevalent than other diseases in Jakarta, with 52,43%. The next disease with high vulnerability is cardiovascular disease, and Stunting is 11,65% and 8,74%. Even this study found that air pollution in Jakarta causes mortality to reach 10,68%. Likewise, cancer has a percentage of 7,77%; skin disease of 3,88%; visual impairment of 2,91%; and mental health impairment of 1,94% of cases that occur in Jakarta. In Surabaya, disease cases occur, causing air pollution to be lower than in Jakarta, whereby this study only found respiratory disease and visual impairment.

The phenomenon presents that air pollution in Jakarta is more dangerous and unhealthy than the Surabaya city. This study analyzes several factors, which are causing high air pollution in Jakarta, consisting of: (1) the public transport movement conducted by the Jakarta Government is not optimal to decrease private vehicle use. Although the public transport in Jakarta is more advanced and high capacity than Surabaya, but the mobility density in Jakarta is higher than Surabaya and makes it crowded, uncomfortable, also. The communities consider this condition for using public transport in Jakarta. The Recommendation is that the government needs to add a number of public transport to accommodate the community demand in Jakarta with comfort and reliability. Optimizing public transport service can motivate the communities to use public vehicles and reduce air pollution.

(2) Jakarta has limited green area, which has a role to neutralize vehicle emissions. Inequity between air pollution production and greenery effort is an urgent problem to improve air quality and optimize public health movement. Change the land use from green area to building areas to fulfill the apartment, office, and economic building needs, which makes Jakarta have limited land to encourage a greenery program. This study recommends that the Jakarta government apply the green building (GB) concept as a solution for limited land in urban areas. Planting some trees in the building areas, the balcony or the rooftop can replace the loss of green area on the land that is built into the building area. GB implementation has several benefits, which are argued in previous studies. He (2019) stated GB can be a strategy to reduce urban heat island (UHI) and carbon emission as climate change mitigation efforts. More detail, the air pollution reduction is effective until (-23% PM₁₀ and -15% NO₂) (Manzueta et al., 2024). High commitment from industry and residential building to apply GB can increase the pollution reduction movement in urban areas. Likewise, the Surabaya Government must implement both recommendations of this study to reduce air pollution and improve public health quality.



Source: Authors (2025)

Figure 7. Accessibility Issues According to Disability Type in Jakarta and Surabaya Cases Study

This study found that the mobility infrastructure in Jakarta and Surabaya is inaccessible for people with disabilities, according to case studies published in online mass media. As we know, disability has several classify consisting of disabled people, deaf people, blind people, speech impairment people and mentally retarded person. However, this study only found cases related to blind, disabled, and deaf people, which occur in Jakarta and Surabaya. Based on the results, mobility access is facing several problems, including an inaccessible crossing of the bridge, the bus stop, the public transportation, and the sidewalk. Public transportation and bus stop infrastructure in Jakarta and Surabaya cities have the most serious problems for blind, deaf, and disabled people, although Jakarta has better rates than Surabaya.

Illustrated by Figure 7, the Jakarta and Surabaya governments are facing inclusivity in public transport, bus stops, sidewalks and crossing bridge infrastructure. The higher the percentage in that figure, the more cases are found. The Jakarta and Surabaya governments have innovated their public transport, such as electronic money for payment, real-time updates, and integration. But they are leaving behind the disabled people to access those facilities. Electronic payment and real-time updates by visual means cannot be accessed by blind people. Moreover, the drop-off and route information through running text and audio, which is inaccessible for blind and deaf people. The same things in the bus stop, a lot of information uses text and hardly for the deaf people to know it. The employee with special skills to assist disabled people at public transport hubs and bus stops is also an important part of achieving sustainable and accessible mobility.

Other issues in achieving sustainable mobility in Jakarta and Surabaya are the pedestrian space provided. The pedestrian area includes sidewalks and the crossing bridge, and both cities are facing those problems. Many of the sidewalks were used by street hawkers to set up temporary stalls, crossed by motorcyclists as shortcuts during traffic jams, and planted with large trees or electricity poles, which are dangerous for disabled pedestrians, especially blind people. Moreover, the uneven and guiding blocks in sidewalks are often not arranged according to their function, which is hardly for the blind people. The same condition as the crossing bride with stairs, and it is inaccessible for wheelchair users and blind people to use it by themselves. Inadequate pedestrian infrastructure makes people less interested in carrying out their activities without a vehicle, even though walking is also part of the mobility options.

Sidewalks should be improved by the government because pedestrians will use them when they feel comfortable, otherwise, they will look for other options (Corazza et al., 2018). Comfort is an important thing to motivate the communities to be pedestrian. There are 6 fundamental aspects to develop comfort sidewalks for pedestrian, consisting of (1) safety; (2) security; (3) temperature and weather condition; (4) accessibility to public transport network; (5) environmental condition such pollution level and canopy providing; also (6) facilities such lighting, public toilet, path width and route information (Tanzil & Gamal, 2021). Besides this, the cleanliness of the sidewalk is also an aspect that influences pedestrian comfort (Lee et al., 2021). Attractive spatial and efficient drainage is another aspect that enhances pedestrian satisfaction, which should be considered by the government when managing sustainable and community-friendly sidewalks (Ibrahim, 2023). Compared to the sidewalk conditions of Jakarta and Surabaya, of course, the situation in both cities is far from ideal in this aspect. The government must review the sidewalk condition in both cities and re-arrange according to the ideal aspect of the sidewalk through academic studies and user surveys, therefore, sidewalk development customizes to pedestrian needs, including people with disability rights.

Conclusion

According to the findings, this study has concluded that overall sustainable mobility indicators are realised by the Jakarta and Surabaya governments. Implementation of regulations related to sustainable mobility is the main point to present the policy is success to realized in this study. This study was found to have several evaluations, especially for environmental and socio-cultural sustainability. In environmental sustainability indicators, Jakarta has made better progress than Surabaya in organising public transport and switching to EVs to reduce traffic emissions. The public transport service in Surabaya needs to improve, such as public transport in Jakarta, notably for travel time estimation reliability, adding the number of bus stops, EV charging station development, and tax incentives. However, in green space management as the strategy to neutralise air pollution, both cities face the same challenge of not optimally achieving the minimum target of 30% green space, caused by the high of demographic growth and difficult to avoid. In socio-cultural sustainability, Jakarta and Surabaya have the same problems in providing accessible facilities, including for disabled people. Both cities are required to improve their infrastructure access, considering that public transport is the most reliable main mobility option to achieve sustainable mobility. For public health impact, Jakarta has a complicated impact on causing various diseases compared to Surabaya due to the long-term effects of unenvironment friendly mobility. In terms of economic effectiveness, the Jakarta and Surabaya governments provide incentives to use public transport. This program must be maintained because the low cost of mobility can motivate the community to use public transport, in addition to accessibility and comfort considerations.

The main policy recommendations of this study are (1) the regulation alignment between public transport optimisation and tightening private vehicle purchasing needs to be applied. Contradiction policy in shift modal promotion, besides the ease of private vehicle purchasing, shows the inconsistency of government regulation and is ineffective for modal shift goals. So, the Jakarta and Surabaya governments not only increase their public transport service quality, but also push other regulations which has indirect impact to stimulate public interest in using public transport. (2) Fiscal regulation scenarios in parking pricing progressively to reduce private vehicle use need to be optimised in the whole of the area in Jakarta and Surabaya. Other advantages of this regulation are cross-subsidies to empower the local budgeting circulation in the transportation sector, so the government can use the parking funds to finance the public transport incentive and increase public transport infrastructure facilities. (3) The certainty of annual targets and budgeting to build the EV infrastructure, such as charging stations, is urgent to be considered by the government, especially in Surabaya. The infrastructure provides for public interest use of EVs, which is conducted by the Jakarta Government. A limitation of this study is the lack of data sources, relying solely on regulations and online media, without involving policymakers and the public as participants in validating the findings. Therefore, further research is proposed to explore public perceptions regarding mobility regulations, as suggested in this study, and their implications for sustainability goals using mixed methods.

References

- Adib, A., Shiddiqi, A., Sutjiningsih, D., Tjahjono, T., & Darmajanti, L. (2024). *Modal Shift in Public Transport Under Fiscal-Based Policies Scenarios for Jakarta*. 15(October 2022), 1862–1872. <https://doi.org/10.14716/ijtech.v15i6.5723>
- Ahmad, E. F., & Santoso, M. (2016). Analisis Karakterisasi Konsentrasi dan Komposisi Partikulat Udara (Studi Case : Surabaya). *Jurnal Kimia VALENSI*, 2(2), 97–103. <https://doi.org/10.15408/jkv.v2i2.3602>
- 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>
- Atmojo, M. E., Hanif, N. A., Kamil, M., & Rasanjani, S. (2024). COMPAIRING SEMARANG AND YOGYAKARTA CITY TOWARD URBAN SUSTAINABLE MOBILITY AGENDA. *Revista de Gestao Social e Ambiental*, 18(7). <https://doi.org/10.24857/rgsa.v18n7-103>
- Aza, A. N., & Supriyatno, D. (2023). Kesesuaian Kualitas Pelayanan Suroboyo Bus Bagi Masyarakat Pengguna Transportasi Massal di Wilayah Kota Surabaya. *Mitrans: Jurnal Media Publikasi Terapan Transportasi*, 1(1), 95–106. <https://journal.unesa.ac.id/index.php/mitrans/article/view/25927/9933>
- Badan Pusat Statistik. (2021). *Hasil Sensus Penduduk 2020 Provinsi DKI Jakarta*. <https://web-api.bps.go.id/download.php?f=um3tB1dcxPQjSMDAS8m8/VZ4NDBYdTIDVGoxVXZEN2wzeEFEYXY4Tk5sRjBEcTQranhFQ0QzZ0EzMnMyYmFmSXBxV2lhLzVRemlwT3NzMU1IS3YwMXNGdDN4VkY3Y3N2d3VUcHBta043VW5BV1Z6M1RLYUlhREZBNG1XQnkyQUJlTdTdGdnc284dGo2TGt6d005bmtiVkJFZdVRqdEJITzBHdX>
- Banister, D. (2018). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73–80. <https://doi.org/https://doi.org/10.1016/j.tranpol.2007.10.005>
- Barakat, S., Osman, A. I., Tag-Eldin, E., Telba, A. A., Abdel Mageed, H. M., & Samy, M. M. (2024). Achieving green mobility: Multi-objective optimization for sustainable electric vehicle charging. *Energy Strategy Reviews*, 53, 101351. <https://doi.org/https://doi.org/10.1016/j.esr.2024.101351>
- Berry, B. J. L., Goheen, P. G., & Goldstein, H. (1968). *Metropolitan Area Definition: A Reevaluation of Concept and Statistical Practice* (Revision). U.S. Bureau of the Census. https://books.google.co.id/books?hl=en&lr=&id=6Cc5yxtBoDgC&oi=fnd&pg=PP10&dq=metropolitan+city+definition&ots=HSELzo4Wc5&sig=duhtYOBKA624NQ-OgHEUKltnI3w&redir_esc=y#v=onepage&q=metropolitan city definition&f=false
- bps.go.id. (2024a). *Perkembangan Transportasi DKI Jakarta Agustus 2024*. <https://jakarta.bps.go.id/id/pressrelease/2024/10/01/1186/perkembangan-transportasi-dki-jakarta-agustus-2024.html>
- bps.go.id. (2024b). *Statistik Lingkungan Hidup Indonesia 2024*. <https://web-api.bps.go.id/download.php?f=XpMLCj/uElE+JTzy207dhIjyQ1VTT0FRa3VydDFVUHVCRIg3OHRUMk8vcFBSU0RnN3N3L2djbjFmZVdocUtWNGU2TUJ1MjdkOHk2RDN4UDV0cXRTTlI2R0hCSFdvbmK4ZVE2b1dsMDhsSno3MzF1cTh0cE01b1dXa2poa3VVdjVEY3duWk1DTElGZnB2dnNmQ0VBQVh3eVJKcS9lVkrPM3>
- Bulmer, M. (1986). The Value of Qualitative Methods. In *Social Science and Social Policy* (p. 24). Routledge.
- Catriana, E., & Setiawan, S. R. D. (2025). *Jumlah Pengguna LRT Jabodebek Tembus 21 Juta Sepanjang 2024*. Money.Kompas.Com. <https://money.kompas.com/read/2025/01/09/134010426/jumlah-pengguna-lrt-jabodebek-tembus-21-juta-sepanjang-2024?page=all>
- Ceder, A. (Avi). (2021). Urban mobility and public transport: future perspectives and review. *International Journal of Urban Sciences*, 25(4), 455–479. <https://doi.org/10.1080/12265934.2020.1799846>
- Corazza, M. V., Mascio, P. Di, & Moretti, L. (2018). Management of Sidewalk Maintenance to Improve Walking Comfort for Senior Citizens. In S. Ricci & C. A. Brebbia (Eds.), *Urban Transport XXIII* (1st Editio, p. 195). WITPress.
- Cordera, R., dell'Olio, L., Ibeas, A., & Ortúzar, J. de D. (2019). Demand for environmentally friendly vehicles: A review and new evidence. *International Journal of Sustainable Transportation*, 13(3), 210–223. <https://doi.org/10.1080/15568318.2018.1459969>
- databoks.katadata.co.id. (2021). *Ribuan Kendaraan Listrik Beredar di Jalanan Ibu Kota*. Katadata.Co.Id. <https://databoks.katadata.co.id/utilitas/statistik/5757cbd4fa0fe4e/ribuan-kendaraan-listrik-beredar-di-jalanan-ibu-kota>
- Denzin, N. (1970). *An Introduction to Triangulation*. https://www.unaids.org/sites/default/files/sub_landing/files/10_4-Intro-to-triangulation-MEF.pdf
- dephub.go.id. (2024). *Hasil Survey Nasional Indikator: 72% Masyarakat Puas Dengan Kinerja Kementerian Perhubungan*. <https://www.dephub.go.id/post/read/hasil-survey-nasional-indikator--72--masyarakat-puas-dengan-kinerja-kementerian-perhubungan>
- Dewi, P. P., & Ayuningtiyas, I. S. (2024). Analysis of the Satisfaction Level of Suroboyo Bus Public Transportation Users in Surabaya City. *Economic and Sustainable Development*, 8(2), 61–69. <https://ejournal.unipra.ac.id/index.php/ESD-UNIPRA/article/view/9/14>

- Dinas Lingkungan Hidup Jakarta. (2022). *Pemantauan Kualitas Udara Provinsi DKI Jakarta 2022*.
- Fisher, S., Bellinger, D. C., Cropper, M. L., Kumar, P., Binagwaho, A., Koudénoukpo, J. B., Park, Y., Taghian, G., & Landrigan, P. J. (2021). Air pollution and development in Africa: impacts on health, the economy, and human capital. *The Lancet Planetary Health*, 5(10), e681–e688. [https://doi.org/10.1016/S2542-5196\(21\)00201-1](https://doi.org/10.1016/S2542-5196(21)00201-1)
- Guzman, L. A., & Hessel, P. (2022). The effects of public transport subsidies for lower-income users on public transport use: A quasi-experimental study. *Transport Policy*, 126, 215–224. <https://doi.org/https://doi.org/10.1016/j.tranpol.2022.07.016>
- Hanif, N. A. (2024). Tantangan mobilitas berkelanjutan sebagai mitigasi perubahan iklim di Indonesia 1. *Journal Of Government :Manajemen Pemerintahan Dan Otonomi Daerah*, 10(1), 113–124. <https://journal.uta45jakarta.ac.id/index.php/gov/article/viewFile/8098/3044>
- Hanif, N. A., Hakim, M. L., & Atmojo, M. E. (2021). *Indonesia ' S Readiness In Realizing Sustainable Transportation In Urban Transportation Management (Jakarta And Yogyakarta City Case Study)*. <https://doi.org/http://dx.doi.org/10.2139/ssrn.4783789>
- Hanif, N. A., & Nurmandi, A. (2022). Sustainable Transport Development Strategy in Developed and Developing Countries. *Human Interaction and Emerging Technologies (IHJET 2022)*, 174–180. <https://doi.org/10.54941/ahfe1002729>
- He, B. J. (2019). Towards the next generation of green building for urban heat island mitigation: Zero UHI impact building. *Sustainable Cities and Society*, 50(di), 101647. <https://doi.org/10.1016/j.scs.2019.101647>
- Ibrahim, D. M. F. O. (2023). Enhancing the Streetscape of Sidewalks for Sustainability and Liveability in Shared Streets. *Green Building & Construction Economics*, 4(2), 225–240. <https://doi.org/10.37256/gbce.4220232244>
- jakartamrt.co.id. (2023). *Nilai Indeks Kepuasan Pelanggan MRT Jakarta 2023 Meningkat*. <https://jakartamrt.co.id/id/info-terkini/nilai-indeks-kepuasan-pelanggan-mrt-jakarta-2023-meningkat>
- jakartamrt.co.id. (2024). *Sepanjang 2023, Lebih dari 33 Juta Orang Gunaan MRT Jakarta*. <https://jakartamrt.co.id/id/info-terkini/sepanjang-2023-lebih-dari-33-juta-orang-gunakan-mrt-jakarta>
- Jeon, C. M., Amekudzi, A. A., & Guensler, R. L. (2013). Sustainability assessment at the transportation planning level: Performance measures and indexes. *Transport Policy*, 25, 10–21. <https://doi.org/10.1016/j.tranpol.2012.10.004>
- Karjalainen, L. E., & Juhola, S. (2019). Framework for assessing public transportation sustainability in planning and policy-making. *Sustainability (Switzerland)*, 11(4). <https://doi.org/10.3390/su11041028>
- Khan, Z. I., Taimoor, A. A., Rabbani, J., & Nawaz, F. (2023). Effect of Fuel Quality, Vehicle Maintenance and Advanced Emission Control Technology on Pakistan In -Use Light Vehicle Emissions. *Journal of King Abdulaziz University: Engineering Sciences*, 33(1), 95. <https://doi.org/10.4197/Eng.33-1.7>
- Khomenko, S., Cirach, M., Pereira-Barboza, E., Mueller, N., Barrera-Gómez, J., Rojas-Rueda, D., de Hoogh, K., Hoek, G., & Nieuwenhuijsen, M. (2021). Premature mortality due to air pollution in European cities: a health impact assessment. *The Lancet Planetary Health*, 5(3), e121–e134. [https://doi.org/10.1016/S2542-5196\(20\)30272-2](https://doi.org/10.1016/S2542-5196(20)30272-2)
- Koloway, B. C. (2025). *Alasan Meningkatnya Jumlah Penumpang Suroboyo Bus pada 2024, Ada Tarif Integrasi Sampai Rute Baru*. <https://jatim.tribunnews.com/2025/01/15/alasan-meningkatnya-jumlah-penumpang-suroboyo-bus-pada-2024-ada-tarif-integrasi-sampai-rute-baru#:~:text=Laporan Wartawan Tribun Jatim Network%2C Bobby Constantine,andalan jutaan masyarakat selama kurun waktu terse>
- Kristyowati, R. (2024). Evaluasi Inovasi Pelayanan Program Suroboyo Bus dalam Mewujudkan Transportasi Publik Berkelanjutan di Kota Surabaya, Jawa Timur. *PRAJA Observer: Jurnal Penelitian Administrasi Publik* (e-ISSN: 2797-0469), 4(05), 24–34. <https://www.aksiologi.org/index.php/praja/article/view/1629/1105>
- Lee, S., Han, M., Rhee, K., & Bae, B. (2021). Identification of factors affecting pedestrian satisfaction toward land use and street type. *Sustainability (Switzerland)*, 13(19), 1–14. <https://doi.org/10.3390/su131910725>
- Liu, X., Sun, X., Zheng, H., & Huang, D. (2021). Do policy incentives drive electric vehicle adoption? Evidence from China. *Transportation Research Part A: Policy and Practice*, 150, 49–62. <https://doi.org/https://doi.org/10.1016/j.tra.2021.05.013>

- Lu, J., Li, B., Li, H., & Al-Barakani, A. (2021). Expansion of city scale, traffic modes, traffic congestion, and air pollution. *Cities*, 108, 102974. <https://doi.org/https://doi.org/10.1016/j.cities.2020.102974>
- Manzueta, R., Kumar, P., Ariño, A. H., & Martín-Gómez, C. (2024). Strategies to reduce air pollution emissions from urban residential buildings. *Science of the Total Environment*, 951(August). <https://doi.org/10.1016/j.scitotenv.2024.175809>
- Miles, M., & Huberman, M. (1998). *Qualitative Data Analysis a Sourcebook of New Methode*. Sage Publications.
- Onat, N. C., Kucukvar, M., Aboushaqrah, N. N. M., & Jabbar, R. (2019). How sustainable is electric mobility? A comprehensive sustainability assessment approach for the case of Qatar. *Applied Energy*, 250, 461–477. <https://doi.org/https://doi.org/10.1016/j.apenergy.2019.05.076>
- Patton, M. Q. (2002). *Qualitative Research & Evaluation Methods* (3rd Editio). SAGE Publications.
- ppkl.menlhk.go.id. (2024). *Laporan Kinerja Direktorat Pengendalian Pencemaran Udara 2023*. <https://ppkl.menlhk.go.id/website/filebox/1196/240118151938LKjDitPPU2023.pdf>
- Ritchie, J. (2013). The Applications of Qualitative Methods to Social Research. In L. Maruster & M. J.Gijsenberg (Eds.), *Qualitative Researh Methods* (1st Editio, pp. 24–46). SAGE Publications.
- Rye, T., Burns, J., Whitefield, A., & Oxley-glenister, K. (2023). *Reducing car use through parking policies: an evidence review*. August.
- Sari, E. Y., Hariyoko, Y., & Soesiantoro, A. (2024). Analisis Pelayanan Digitalisasi Transportasi Pada Transportasi Publik “Suroboyo Bus” Kota Surabaya. *PRAJA Observer: Jurnal Penelitian Administrasi Publik*, 4(2), 103–111.
- Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook*. SAGE Publications Ltd.
- Singh, A. R., Vishnuram, P., Alagarsamy, S., Bajaj, M., Blazek, V., Damaj, I., Rathore, R. S., Al-Wesabi, F. N., & Othman, K. M. (2024). Electric vehicle charging technologies, infrastructure expansion, grid integration strategies, and their role in promoting sustainable e-mobility. *Alexandria Engineering Journal*, 105(June), 300–330. <https://doi.org/10.1016/j.aej.2024.06.093>
- Statistic Indonesia. (2024). *Jumlah Kendaraan Bermotor Menurut Provinsi dan Jenis Kendaraan (unit)*, 2023.
- Statistic Jakarta. (2023). *Jumlah Kendaraan Bermotor Menurut Jenis Kendaraan (unit) di Provinsi DKI Jakarta*, 2022.
- Statistic Surabaya. (2024). *Jumlah Kendaraan Bermotor Menurut Kabupaten/Kota dan Jenis Kendaraan di Provinsi Jawa Timur (unit)*, 2021.
- Sukma, D. A. W., Suaedi, F., & Supeno, E. (2024). Evaluasi Kepuasan Masyarakat Pengguna Transportasi Publik Suroboyo Bus. *Kaganga: Jurnal Pendidikan Sejarah Dan Riset Sosial Humaniora*, 7(2). <https://doi.org/https://doi.org/10.31539/kaganga.v7i2.11046>
- surabayakota.bps.go.id. (2021). *Proyeksi Penduduk Kota Surabaya (Jiwa)*. <https://surabayakota.bps.go.id/id/statistics-table/2/MTk3lzl=/proyeksi-penduduk-kota-surabaya.html>
- Syuhada, G., Akbar, A., Hardiawan, D., Pun, V., Darmawan, A., Heryati, S. H. A., Siregar, A. Y. M., Kusuma, R. R., Driejana, R., Ingole, V., Kass, D., & Mehta, S. (2023). Impacts of Air Pollution on Health and Cost of Illness in Jakarta, Indonesia. *International Journal of Environmental Research and Public Health*, 20(4). <https://doi.org/10.3390/ijerph20042916>
- Tanzil, Y. T., & Gamal, A. (2021). Elements identification for pedestrian comfort. *IOP Conference Series: Earth and Environmental Science*, 673(1). <https://doi.org/10.1088/1755-1315/673/1/012026>
- Wallington, T. J., Anderson, J. E., Dolan, R. H., & Winkler, S. L. (2022). Vehicle Emissions and Urban Air Quality: 60 Years of Progress. *Atmosphere*, 13(5). <https://doi.org/10.3390/atmos13050650>
- Wurster, S., Heß, P., Nauruschat, M., & Jütting, M. (2020). Sustainable circular mobility: User-integrated innovation and specifics of electric vehicle owners. *Sustainability (Switzerland)*, 12(19). <https://doi.org/10.3390/SU12197900>
- Zeiske, N., van der Werff, E., & Steg, L. (2021). The effects of a financial incentive on motives and intentions to commute to work with public transport in the short and long term. *Journal of Environmental Psychology*, 78, 101718. <https://doi.org/https://doi.org/10.1016/j.jenvp.2021.101718>