Urban Mobility and Sustainable Transport Practices: A Cross-City Comparison of Jakarta and Surabaya

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Abstract: - The implementation of sustainable urban mobility in Indonesia's major cities is critical to addressing environmental challenges and improving public service delivery. This study compares sustainable transport initiatives in Jakarta and Surabaya, focusing on system integration, infrastructure development, eco-friendly vehicles, and inclusive public services. Using a qualitative case study approach, the research draws on interviews with policymakers, community actors, and users, complemented by document analysis. Findings indicate a marked difference in urban mobility systems: Jakarta has successfully integrated multiple transport modes through the JakLingko platform, enhancing accessibility and ridership. In contrast, Surabaya's system remains fragmented, with limited intermodal connectivity and low public transport adoption, despite innovations such as the Suroboyo Bus and waste-to-fare payment schemes. The study underscores the importance of collaborative governance, technological integration, and inclusive design in promoting sustainable urban mobility. Jakarta's model offers valuable insights for Surabaya and similar cities seeking to develop effective, people-centered transport ecosystems.

Key-Words: - Sustainable Transportation, Urban Mobility, Suroboyo Bus, Trans Jakarta, Collaborative Governance, Indonesia.

Received: September 9, 2025. Revised: December 15, 2025. Accepted: May 21, 2026. Published: July 7, 2026.

1 Introduction

Indonesia's environmental quality ranks 164th out of 180 countries and 22nd in the region, with an index score of 28.2, based on the 2022 Environmental Performance Index (EPI), [1]. This fact is reinforced by data from the Ministry of Environment and Forestry (KLHK), which show that Indonesia is experiencing a temperature increase of 0.03 degrees Celsius per year, driven by a 4.3 percent annual increase in greenhouse gas (GHG) emissions, [2]. Land-based transportation using fossil fuels also produces 74 percent of CO2 emissions. Specifically, in urban areas, transportation activities contribute 23 percent of total GHG emissions, [3].

Transport emissions also affect public health and can even cause death from long-term exposure, [4]. Transport emissions can cause several diseases, including bronchitis, cardiovascular disorders, and other respiratory disorders, [5]. Among the G20 members, several cities in Indonesia are categorized as at risk of mortality from air pollution from vehicle emissions, namely Jakarta (15.4 percent) and Surabaya (3.3 percent) in 2015, [6]. The high risk of death from vehicle emissions in large cities is

a significant impact of urbanization, which drives an increase in vehicle numbers alongside the growing population, [7]. To illustrate this trend, Table 1 presents the increase in the number of motor vehicles in DKI Jakarta from 2020 to 2022 based on data from the Jakarta Central Statistics Agency (BPS).

Table 1. Increase in the Number of Vehicles in DKI Jakarta (2020-2022)

Vehicle Type	Number of Motor Vehicles in DKI Jakarta		
	2020	2021	2022
Passager Cars	3.365.467	3.544.491	3.766.059
Bus	35.266	36.339	37.180
Truck	679.708	713.059	748.395
Motorcycles	16.141.380	16.711.638	17.304.447
Total	**24.266.996**	**25.263.077**	**26.370.535**

Source: processed by researchers from data from the Jakarta Central Statistics Agency, [8]

As shown in Table 1, the number of motor vehicles in DKI Jakarta, consisting mainly of automobiles and motorbikes, had substantially increased between 2020 and 2022. In 2020 there were 3.365.467 cars, in 2021 the number increased to 3.544.491, which became 3.766.059 vehicles a year hence. A lateral shift is likewise found in motorcycle numbers. The figures line up as 16.141.380 machines in 2020 and then 16.711.638 units a year later, only to peak at 17.304.447 motorbikes in 2022. The Light Rail Transit (LRT), Mass Rapid Transit (MRT), and Electric Train (KRL) introduced by the Jakarta Provincial Government to cut short the vehicles and their carbon footprint, also represent environmentally friendly and sustainable transportation powered entirely by electricity. But little more than 32 percent of the populace use public transportation. In comparison, the ideal rate is 60 to 70 percent [9], which results in DKI Jakarta having 47 traffic congestion points and impacting vehicle emissions by up to 75 percent, [10].

Table 2. Increase in the Number of Vehicles in Surabaya (2018-2020)

Vehicle Type	Number of Motor Vehicles in Surabaya		
	2018	2019	2020
Passager Cars	469.276	495.596	503.066
Bus	3.620	3.888	3.965
Truck	142.771	149.670	153.102
Motorcycles	2.342.887	2.517.449	2.599.332
Total	**2.958.554**	**3.166.603**	**3.259.465**

Source: processed by researchers from data from the East Java Central Statistics Agency, [11]

A similar trend can also be observed in Surabaya, as presented in Table 2, which shows the increase in the number of motor vehicles from 2018 to 2020 based on data from the East Java Central Statistics Agency.

As shown in Table 2, the number of motor vehicles in Surabaya increased from 2.958.554 units in 2018 to 3.259.465 units in 2020. Passenger cars increased from 469.276 units in 2018 to 503.066 units in 2020, while motorcycles rose from 2.342.887 units to 2.599.332 units during the same period. This increase indicates that Surabaya, similar to Jakarta, has experienced continuous growth in private vehicle ownership, particularly cars and motorcycles. The rapid increase in the number of vehicles in operation in Jakarta and Surabaya is causally related to population growth and mobility needs in these cities. Higher mobility levels lead to increased demand for private, flexible public transportation, [12].

The public transportation system "Suroboyo Bus," promoted by the Surabaya government, does not appear to be functioning optimally. The limited fleet, comprising only 28 units with a 30-minute headway, is unable to meet the mobility needs of the people of Surabaya and its surrounding areas, [13]. In some cases, Suroboyo Bus has even been known to refuse passengers because the bus is full, especially during rush hour or peak commuting hours, [14]. This has prompted the public to use online motorcycle taxis to meet their mobility needs, as they are easily accessible, fast, and semi-private. However, this has increased the number of vehicles on the road and led to traffic congestion, [15]. Public transportation should play a vital role in increasing community mobility in urban areas; in addition, transportation contributes to creating safer, more effective, and more efficient mobility, [16].

Common problems persist despite these reforms. Jakarta City is still struggling with underutilized transport systems. This is due mainly to behavior patterns and last-mile access problems. Surabaya faces problems integrating and scaling its innovation because of logistical non-help and institutional barriers. Also, both cities contend with governance fragmentation, irregular stakeholder apathy, and infrastructure breaks, which all prevent comprehensive, sustainable urban movement from being achieved. Though an increasing volume of literature deals with transport innovations in Jakarta and to some extent in Surabaya, few studies have exploited a comparative approach that allows for systematic comparison of the efficiency, environmental impact, and socio-cultural acceptability of their transport systems. Even fewer practically integrate a lens on governance to examine stakeholder co-operation and policy

coherence. This paper sets out to close that gap through its comparison of sustainable transportation systems in Jakarta and Surabaya transport sustainability framework (transport effectiveness, environmental integrity, and social equity), [17]. It also analyses the institutional dynamics of the two cities with reference to collaborative governance models. By taking a comparative approach, this study provides insights into how urban transport policy can be established and managed more effectively to support the development of inclusive, low- carbon cities. The findings also contain practical advice for present or prospective Indonesian policymakers, mayors and regional planners as they try to harmonize their sustainability goals with the pressures of rapid urbanization.

2 Literatur Review

2.1 Public Transportation

It is to establish an efficient, secure and convenient traffic system for people of all levels of society in big cities, there is no better solution than public transportation for dealing with problems like congestion, pollution and getting around town. According to [18], public transportation must provide optimal services through proper network planning, adequate service frequency, and equitable accessibility. This aims to ensure that every individual, regardless of their social or economic background, has equal access to public transportation.

However, public transportation in Indonesia still faces challenges in providing affordable transportation for all levels of society. Much of Indonesia's transportation system still fails to provide equal and fair access to specific groups of people, [19]. Because of such limitations, public transport is still far from being truly comprehensive. Instead, public transport backs up the principle of giving equal and fair transportation to everyone in society. This is supported by research from [20] which states that the concept of inclusivity in public transportation refers to the principle of social justice, where everyone has the same right to participate in social and economic life without barriers to mobility. In addition, providing public, integrated transportation is very helpful for vulnerable groups to access more inclusive, adequate transportation and can support economic, social, and environmental sustainability in urban areas, [21]. Therefore, the role of local government in creating public transportation is not only determined by the existence of infrastructure, but also by institutional readiness or capacity, commitment and cross-sector coordination, [22].

The presence of inclusive public transportation has been shown to improve the community's quality of life by providing greater access to education, employment, and healthcare services, [23]. However, public transportation in Indonesia still faces obstacles in realizing sustainable transportation. According to [24], Indonesia's transportation system still faces barriers to the development of environmentally friendly modes of transportation. One cause is the low level of public participation and interest in public transportation, with people often opting for private vehicles, [25]**.** Transportation in Indonesia still faces obstacles in the development of environmentally friendly transportation. One cause is the low level of public participation and interest in public transportation, with people often opting for private vehicles, [26]. The widespread use of private vehicles can also contribute to increased air pollution, threatening public health and disrupting social activities, [27]. But in the future, sustainable public transportation is destined to be one of the mainstay components in developing environmentally friendly and resilient urban areas. Hou Zhaodong, for example, points out that this approach would mean paying special attention to environmentally friendly technology, reducing carbon emissions and increasing transport energy spatial efficiencies, [28].

Innovations in public transportation across ASEAN countries reflect significant progress toward sustainable, innovative, and environmentally friendly services. A study by [29] in Malaysia found that adopting electric buses reduced operational costs and carbon emissions, supporting a transportation transformation aligned with the ASEAN Community 2025 vision. On the other hand, research [30] using the STEELUP framework assessed electrification strategies in Thailand, Indonesia, and Vietnam and found that establishing incentive policies and pilot projects can accelerate the transition of public fleets to electric vehicles. Meanwhile, research by [31] identifies Singapore as a pioneer in the use of autonomous buses, leveraging data-driven approaches and predictive algorithms to optimize route times and efficiency. In an urban context, the implementation of the JakLingko system in Jakarta, which integrates conventional and digital modes of transportation through a single payment platform, has proven to increase public participation in public transportation, [32].

Yet structural and institutional obstacles are significant hindrances to the management of public

transportation in ASEAN countries. Research from [33] the field study in 1997, explained the limited accessibility for women and people with disabilities in Indonesia. This study found that transportation services tend to be unevenly distributed. The research from [34] also notes the lack of coordination between agencies in planning innovative transportation systems, resulting in fragmented services. In addition, public transportation fares in several major ASEAN cities remain disproportionately high compared to people's purchasing power, thereby exacerbating social inequality, [35]. A similar point is emphasized by [36] which reveals that the development of rail-based transportation modes has not been balanced with land and housing integration policies in suburban areas.

At present, ASEAN public transport is transforming for the better. Its service innovation and adherence to green technology have shown relatively rapid signs of progress. Meanwhile, we must improve governance modes, public finance arrangements, and social inclusiveness overall. To ensure that regional transport networks are sustainable, research must be cross-disciplinary. Both technological and economic factors, not to mention social aspects in some cases alone, will also, in some measure, make this possible: so regional public transport remains viable as a system. As seen in certain countries such as Singapore, Malaysia and Indonesia, the optimal outcome can be achieved by incorporating progressive legislation and community involvement together with systemic intermodal integration. To fortify regional sustainability, future research ought to focus on the development of accountability indicators for management, and cross-border cooperative mechanisms are critical for inclusive and resilient public transport systems.

2.2 Collaborative Governance

Government collaboration highlights the importance of synergy among various public sector actors in addressing complex challenges. In this context, cross-sector cooperation among the central government, local governments, and the private sector is crucial for developing holistic, effective policies, [37]. The implementation of government collaboration focuses on the government's role in working together to design and implement transportation solutions that efficiently meet the community's needs. This collaboration enables the creation of a strong consensus through intensive communication, a clear division of responsibilities, and the establishment of trust among actors, [38]. With this approach, the theory of government collaboration serves as the foundation for developing transportation policy innovations that are more adaptive and responsive to social and technological developments.

For policy development and implementation, the best practice would be collaborative governance. By incorporating multiple stakeholders and interests, it accentuates the proactive role of government, civil society and private enterprise in decision-making. Under advantageous conditions, big cities such as Jakarta and Surabaya can use this approach to achieve both more sustainable public transportation as well as the necessary inclusiveness for it. With collaboration between stakeholders, transport systems can be innovated. Including green tech - based modes of transport If we can integrate it step by collaborative step as part of that long but necessary process to bring together synergy with benefits for all concerned. By so doing, collaborative governance provides an energetic platform that manages between conflicting interests and delivers at least some common good out of defunct or nearly obsolete public transportation systems for urban areas.

3 Methodology

This study uses a qualitative case study approach. The choice of qualitative method aligns with the research objective, which is to conduct an in-depth analysis of the research object using field data from the data source, [39]. Qualitative research is a method that represents information from participants, which is then analyzed and translated into final research results, [40]. In-depth analysis in qualitative research requires researchers to systematically collect data through in-depth interviews, focus group discussions, and field notes, [41]. The approaches examined in the qualitative method include conducting in-depth interviews with policymakers, specifically government officials, community members who are policy users, and academics and transportation activists, regarding their attitudes and opinions.

Interviews were conducted with the Interviews were conducted with the Transportation Agency, the Planning and Research Agency, the Environmental Agency, the Transportation Technical Implementation Unit, and the community, which are users of public transportation. Meanwhile, the documentation technique involved collecting relevant supporting documents. Data analysis in this study employed the interactive model technique

developed in [40], which involves data reduction, data visualization, and conclusion drawing.

The data reduction process was carried out using NVivo 12 Plus Tools to facilitate data clustering using nodes and codes. The grouped data will be visualized to promote an understanding of the findings. Data visualization is the process of presenting data in a visual form, such as graphs, images, or tables. One of the visualization features used in this study is Word Cloud. Word Cloud is a feature in NVivo 12 Plus that highlights the intensity of words mentioned in the text as dominant words, [42]. The final stage involves concluding to describe the visual data presented.

4 Result

Overview of the Urban Transport Landscape in Jakarta and Surabaya: The improvement in the community's economy is evident in increased community activity and mobility. I hereby declare that with high community mobility in our daily lives, the potential economic activity in this area should be much higher than it currently is. The second prerequisite for good community mobility is adequate public transportation systems that are safe and comfortable and do not cost too much to use. Public transportation is one of the essential cornerstones of infrastructure, allowing community mobility within a region. It carries people from here to there with ease and speed and so makes high-density urban areas livable even better than they naturally would be. (However, many TV shows have depicted murder on public transportation, note that group behavior and safety rules have removed most such fears. Therefore, public transportation is one of the essential urban infrastructures needed to support community mobility and the economy, [43]. Additionally, public transportation for community mobility will support economic growth and prosperity, [44].

Indonesia is a vast country with significant mobility potential, especially in urban areas. The enormous size of Indonesia and the large number of major cities scattered across several regions remain a problem for Indonesia, particularly in terms of public transportation provision. Despite many areas already having public transportation systems, these systems have yet to address classic issues such as traffic congestion and air pollution.

Throughout the entire sphere of community movement, this is not just a question for the public; it also includes those people, like those who are disabled or handicapped. Therefore, the physical environment, including its openness and people's passage along it, also needs to be suitable for such people. So, in providing community mobility and transportation facilities, it must be made inclusive and sustainable. This is particularly important in a world that is increasingly making provisions for people with special needs. Not to embrace this idea is not only to discount people with special needs or to leave them out in the cold, but also to neglect justice as a matter of principle. Nowhere is fairness more at issue than in transport and community mobility for everyone, from city-dwellers on public buses to villagers gathering up as members of the Family Brigade.

The two major metropolitan centers of Indonesia, Jakarta and Surabaya, both face similar mobile challenges brought on by population growth, traffic congestion, and pollution, however, their scale, infrastructure capacity, and governance arrangements are vastly different. Jakarta has implemented reforms in integrated public transport since the early 2000s. First came TransJakarta (2004), then KRL Commuted Lines (2007), MRT (Mass Rapid Transit) in 2019 and LRT (Light Rail Transit) in 2017. All of these are now linked together via a single digital mobility platform, "JakLingko." This provides users with integrated route planning, e-ticketing, and provision for the transfer of costs between different modes of transport. The system mirrors Jakarta's aspiration to create a seamless and multi-mode urban mobility network.

Surabaya's initiative began later, launching the Suroboyo Bus system in 2018, notable for its unique waste-based ticketing scheme. It was followed by the Trans Semanggi service and supported by the GoBis mobile app, which helps track buses and display route information. Unlike Jakarta, Surabaya's transport system is still in the early phase of modal integration, with limited scale and coordination between services. This descriptive overview provides the necessary context for a comparative assessment structured around three pillars of sustainable transport system effectiveness: environmental Sustainability and socio-cultural inclusivity, as proposed in [17]. The analysis also incorporates the role of collaborative governance as a cross-cutting factor that influences performance in each pillar. This section presents a comparative study of Jakarta and Surabaya's sustainable transport implementation, structured according to the three pillars of Jeon [17]: (1) Transportation System Effectiveness and (2) Socio-Cultural Sustainability. In each area, collaborative governance is viewed as a key enabler (or limiter) mechanism.

4.1 Transportation System Effectiveness

Inclusive, sustainable transportation is the most critical of all. It is difficult for everyone to manipulate this system of transport except for some types of professionals, so they say that they are responsible for such vital facets as balanced literal or metaphoric mobility. In the context of the transportation system, there must be differences between the system of convenience for using public transportation and the system that regulates its operation. In this way of looking at things, the Surabaya City Government and the Provincial Government of DKI Jakarta have both taken it up effectively, especially to democratise public transport for locals.

The transportation system offers significant convenience to the community, particularly in terms of mobility and time efficiency. This system will significantly enhance public confidence in public transportation. In terms of the effectiveness of using this transportation system, Jakarta is superior to Surabaya. Of course, this superiority stems from the fact that transportation in Jakarta is more varied and is beginning to be well-integrated. The Jakarta system, called Jaklingko, covers all modes of transportation within the city. Meanwhile, the transportation system in Surabaya is called GoBis, which currently integrates only two services: the Trans Semanggi Bus and Suroboyo Bus.

Fig. 1: Jaklingko and Gobis Applications
Source: results of analysis of ease of service through applications taken from [45], [46]

Figure 1 shows that both the Jakarta and Surabaya governments have made every effort to improve services for the community, primarily through applications and systems. In this way, the community can easily reach public transportation and has scattered features to find bus stop locations and vehicle positions. In addition, this system helps the government disseminate public transportation information. Thus, disseminating information about this application can increase the community's interest in public transportation. If we examine the two application systems in Jakarta and Surabaya, they are in high demand among the public. According to a statement from [47] the number of Jaklingko application users is expected to reach 2 million in 2022, representing public transportation users in Jabodetabek. Meanwhile, in Surabaya itself, the GoBis application will make it easier for the public to find public transportation, especially buses, ensure quality public transportation services, and reduce traffic congestion and vehicle volume in the city, [48]. Considering that Suroboyo Bus was initiated by the government only in 2018, the coverage of public transportation owned by the Surabaya City Government remains limited.

The information system, facilitated by this application, can make it easier for the community to access public transportation, as the application or system has begun integrating various modes of transportation. According to [49] JakLingko makes it very easy for people in Jakarta to travel from one place to another at a more affordable price, with seamless integration. By using the GoBis application, passengers can access transportation methods such as the Suroboyo Bus and Trans Semanggi, but not modes, including their childhood dream to be a driver only the first two were actually integrated. Built both through Connected Vehicles Trial Tests held between May 2015 and March 2018, which were aimed at setting up or expanding for major cities after the User Experience Session concludes, in these jurisdictions and modes. It was only after that effort had finished that these items were incorporated into the GoBis transportation card and its related applications in late 2018. The JakLingko application, meanwhile, can integrate TransJakarta, Commuter Line trains, Light Rail Transit (LRT), and Mass Rapid Transit (MRT).'GoBis' can only integrate the Suroboyo Bus, Trans Semanggi, and Mikrolet Wira Wiri it has not yet included other modes of transport on its application. However, the GoBis app also makes it easier for the public or passengers to move around. With the GoBis app, the public can view e-ticketing information for intercity buses both within and outside the province at [50].

The app's existence has had a positive impact on public transportation users in both Jakarta and Surabaya. The transportation app system created is highly beneficial for the community, particularly for public transportation users in Jakarta and Surabaya. This is evident in the increasing number of passengers using public transportation each year. In

Surabaya, from the beginning of the year through July 2024, 1.2 million passengers have used public transportation, indicating significant growth in public transportation usage, [51]. Meanwhile, in Jakarta, the number of passengers using public transportation has also increased, with a 42 percent surge in 2024 compared to 2023, [52]. Additionally, we present graphs showing the number of public transportation passengers in both Jakarta and Surabaya, as follows:

Fig. 2: Number of Public Transportation Passengers in Jakarta and Surabaya
Source: results of analysis of public transportation users processed from [8], [11]

According to Figure 2, Jakarta and Surabaya show a positive trend in public transportation use. As we know, this positive trend in increasing transportation users depends on digital software or transportation application systems. According to the data above, there was a rapid increase from 2021 to 2023. Meanwhile, Surabaya experienced a fairly rapid increase from 2021 to 2023. However, there was only a slight increase from 2022 to 2023. This data shows that the transportation system developed by the government is very effective. With the increasing trend in public transportation use, the government and transportation operators have made numerous modifications to provide better services.

Figure 3 illustrates the involvement of actors in public transportation management. This aligns with research indicating that implementing public transportation management cannot be separated from the participation of various actors to create an effective transportation system, [53]. Actor participation in public transportation management in the city of Jakarta is limited to the government, the business world, and the community. On the government side, only the Transportation Agency is involved as the technical implementer of public transportation regulation and management. Then, on the business side, it consists of PT MRT Jakarta, PT Jakarta Propertindo, PT TransJakarta, and PT Moda Integrasi Transportasi Jabodetabek. Additionally, on the community side, it comprises the Jakarta Transportation Council (DTKJ), the JakLingko Community, the Blue Warrior Forum, and the Environmental Transportation Community.

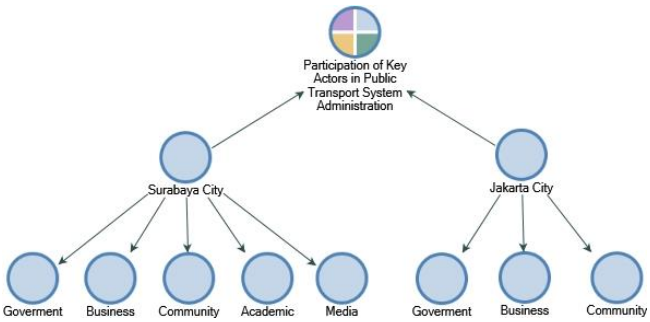

Fig. 3: Participation of Actors in Public Transportation
Source: Researchers' analysis based on interview data processed using NVivo and interpreted through the sustainability theory framework, [17]

Unlike Jakarta, the implementation of public transportation management in Surabaya has involved five main sectors: the government, the community, the business world, academia, and the media. The government has collaborated well between Regional War Organizations (OPD) and between agencies to support the success of public transportation management in Surabaya. For example, the involvement of the Transportation Agency, the Environment Agency, and the Communication and Information Agency. The community plays a role in public transportation management as observers of public transportation development, helping ensure optimal outcomes, for example, through the Surabaya Transportation Discussion Forum (FDTS). Banking institutions in Surabaya's public transportation management also function, facilitating electronic payments as one example. The city-owned Trans Semanggi Surabaya helps to oversee the Trans Semanggi Surabaya fleet. This kind of public transportation has the involvement of university scholars in research, innovation, and community service, whether seeking to share ideas with people who live in each other's neighborhoods or to learn about each other's situations. The transportation management of public opinion, from shaping it to reflecting and promoting accountability in that field, depends on the media. For instance, this could be seen through the Indonesian Journalists Association (IJ), Praa da

Journalists Indonesia, or by a regional newspaper from Surabaya entitled the 'Sinar Indonesia'.

In addition, serving the transportation needs of people with disabilities must also be an important part of public transit. The infrastructure serving public transport stops must be maintained, and that includes bus stations, roads leading to them and places for special needs people. Though Jakarta and Surabaya both fare well in public transportation, there are tiny distinctions between them. In comparison to Surabaya, Jakarta features a more complete and better-supported public transport infrastructure. Facilities include waiting rooms, information boards, food stands, restrooms that also provide changing facilities for infants, and toilets. By contrast, Surabaya lags far behind Jakarta because of financial constraints and limitations on building new living spaces outside existing city limits. The facilities at bus stops in Surabaya are limited to information boards and waiting rooms.

In addition, the increase in the number of passengers each year is also supported by very up-to-date information, both on information boards at bus stops and on social media used by public transportation. As in Jakarta, information is not only provided at bus stops but also through social media, applications, websites, running text displays inside vehicles, and the JakLingko application. In Surabaya, people can also search information about how to use the new technology itself from the website, various bulletin boards on which are again lettered with information, and still others carrying WeChat Instant Messaging serialisation column 'The City Horizontally'. For regular users of public transport, giving out information always proves particularly useful to those people. The use of this system is essential for the community and public transportation users. In addition, this system is beneficial for the community, particularly in terms of time efficiency, as it allows them to monitor the vehicles they use for daily mobility.

Therefore, the Jaklingko and GoBis applications greatly assist the community in their daily mobility. The applications created by public transportation operators are efficient in terms of time and ease of access, thanks to the connectivity between modes of transportation and the ease with which the community can monitor the vehicles they will use. Therefore, effectiveness is not only about convenience but also about waiting time for cars. Of course, when comparing the transportation apps available in Jakarta and Surabaya, public transportation apps in Jakarta are far more effective. The Jaklingko application is very comprehensive and can be connected to other modes of transportation in Jakarta. In contrast, the GoBis application remains limited to Suroboyo Bus and cannot be linked to other urban transportation services in Surabaya. Therefore, based on the transportation system's effectiveness indicators, Jaklingko is far more effective and facilitates public mobility in their daily lives.

4.2 Socio-Cultural Sustainability

When considering socio-cultural sustainability, we must consider two crucial factors: public health and inclusivity. Both are crucial in making cities safe, comfortable, and equitable for all. Developing public transportation infrastructure can create a positive community environment if supported by inclusive access, pedestrian facilities, bicycle infrastructure, and supportive mobility policies. Therefore, maintaining the social and cultural infrastructure of public transportation must be carefully balanced, so as not only to improve mobility but also to enhance the quality of life in cities. Figure 4 shows indicators of socio-cultural sustainability of public transportation in Jakarta and Surabaya.

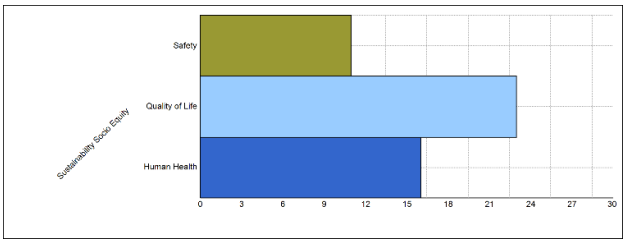

Fig. 4: Socio-Cultural Sustainability Indicators of Public Transportation in Jakarta and Surabaya

Source: Researchers' analysis based on interview data processed using NVivo and interpreted through the sustainability theory framework, [17]

As shown in Figure 4, socio-cultural sustainability in public transportation relates to the transportation system's ability to improve people's quality of life, particularly in supporting public health and promoting inclusive mobility. In Jakarta and Surabaya, public transportation systems have been developed as a more efficient, affordable, and environmentally friendly mobility option for urban communities. The presence of the city's Trans Jakarta and other modes of public transportation now provides a very good solution for residents. It is both more efficient than driving by car and slightly less expensive. In Surabaya, Suroboyo Bus and Trans Semanggi public transportation systems are relatively more economical than other options. These lines also offer a comfortable and innovative card payment system. They even encourage passengers to pay using plastic waste as their only

means of paying for tickets. Meanwhile, as important supporting factors of public transportation in Jakarta and Surabaya, bicycle and pedestrian infrastructure are essential to the overall health of a friendly community. According to [54] walking and cycling are also essential parts of the sustainable mobility agenda.

This initiative not only makes a self-sufficient and effective way for citizens to travel but also promotes public environmental conservation, which, within the past 30 years, has become a major topic of discussion around the world. Environmental conservation efforts not only promote foot and bicycle paths but also encourage public involvement in environmentally friendly living. That way, instead of a few cars clogging up the roads, you can have lots of people on foot or biking coming and going as suits them best. This fits in with sustainability initiatives that directly benefit the city. Thanks to this initiative, the community can enjoy a life of greater mobility while supporting the pursuit of sustainable living targets. At the same time, this meets goals that contribute to the general welfare of cities. The creation of this ease of mobility is not only the existence of infrastructure that supports community mobility access, but it must also be supported by sustainable public transportation.

Neither Jakarta nor Surabaya can be directly compared as two cities for public health. Jakarta was the first to institute public transport, while Surabaya was one of the cities that initiated the provision of sustainable public transport throughout Indonesia. Building pedestrian paths not only for convenience: To make everything possible, Jakarta, a city of extraordinary complexity, is now a city that meets sustainable standards for people's daily life. A great example is high-quality pedestrian walkways, which are accessible to everyone, including people with disabilities and the elderly, as well as separated bike lanes and lanes only for public transportation. Most of the pedestrian and bicycle paths in Jakarta are linked to the public transportation system, so they blend into each other and make life easier for all of us. In addition, Jakarta currently has 300 kilometers of pedestrian paths. As for dedicated bicycle lanes in Jakarta, there are already 314.1 kilometers of roads that are integrated with all public transportation services, [55].

As for Surabaya, it does not yet have many pedestrian-friendly paths; these are primarily on main roads, while other areas have not been fully utilized. The shortcomings experienced by the city of Surabaya do not preclude the government from improving, particularly in the provision of sidewalks and pedestrian and bicycle paths. The government has responded positively by allocating a significant budget in 2024 to repair damaged and inadequate sidewalks and construct new ones in areas that have not yet been developed by the Surabaya City Government, [55]. For dedicated bicycle lanes, Surabaya is among the top three most bicycle-friendly cities, [56].

Health care is indeed a public health element that helps make public transportation systems stronger. To save on transportation costs in the community and to carry out government-run innovations are two of the keys to creating a healthy society. So, in Surabaya, they're working on Trash in Transit programs between different public transportation agencies and trash collection folks, especially those aimed at plastic waste, for example. This initiative seeks to turn plastic waste into an interchange medium, so as it were, of sorts for public transportation, and at the same time, both improves the environment and makes society healthier. Apart from being a form of payment, using waste exchange value for public transportation is a means to lower environmental and public health costs incurred by plastic waste. At the same time, in Jakarta, work had also been done along the lines of health care to encourage the use of electricity and natural gas fuels for cars, and air quality monitors helped cut down on environmental damage left behind from cars.

Promoting healthy living is evident in the infrastructure developments for active living, such as walking and biking paths, by both Jakarta and Surabaya local governments. These measures are greatly helpful in minimizing smog or fume levels and in reducing diseases caused by inactive lifestyles. The goal is to make public transportation not just a means of transportation but also an engine that drives positive development on public health and environmental issues at large for all members of society in today's era.

While public transportation systems in Jakarta and Surabaya have made significant progress, including better quality of life revealed by CCTV footage from major stops The supervision and protection of passengers remains the most difficult of any problem. However, it also raises the question: what might occur when those who were the targets for Change come into transportation systems where cases of petty crime are frequently seen at bus stop areas or on buses which are less well monitored than other places. In General The need to strengthen this aspect of safety now appears increasingly important. The security system should be modified to reduce these risks. Additional officers in strategic locations and a security patrol during the night can be such

improvements as could optimize surveillance technology. In Jakarta and Surabaya, if we improve security on the transit system, this undoubtedly boosts people's sense of security and reinforces public confidence in transportation as the preeminent method in public mobility. Ultimately, this should help promote sustainability for urban transport systems. Moreover, if security is poor, this can lead to an exacerbation of crime, even as it erodes public trust and hastens the unraveling of public transportation as the preferred means for getting around the city.

Public transportation development in Jakarta and Surabaya has significantly improved the quality of life and health of the society. However, achieving this security standard is still not satisfactory by adopting a comprehensive approach to security and taking the initiative as well as being reactive in doing so, public transportation in Jakarta and Surabaya will reach an ideal balance between efficiency, service comfort, and user safety. Should they clear these hurdles successfully, Jakarta and Surabaya will join other cities as highly developed Public Transport Models around the world that care about quality of life while truly serving the mobility needs of all people. Ultimately, its integrated design will not only raise the standard of life and welfare, but it will also facilitate cities' shift to more secure, inclusive, competitive urban ecologies.

5 Conclusion

Based on our research findings, the concept of urban mobility in public transportation in Jakarta and Surabaya has been well implemented. In Jakarta, the urban transportation and public transportation are integrated into different forms, but cities that are well-developed build public enthusiasm for taking public transport. While in Surabaya, despite the public transportation solution in its early days, still in 2018 because traffic jams and poor waste management started appearing unpromising again. Therefore, in Surabaya, the government introduced public transportation through methods and forms that accepted non-cash payments and took in deposits of both bottles' plastic bottles. In terms of transportation systems, Jakarta and Surabaya are already well developed, as they use integrated systems. In Jakarta, the system developed is integrated with other public transportation modes. In contrast, in Surabaya, only the payment system has been integrated, and it is not yet integrated with other public transportation modes. Based on the effectiveness of the public transportation system, Jakarta is far more effective than Surabaya because the application used in Jakarta is integrated with other modes of public transportation and can also integrate the payment mechanisms used by the community.

On matters of socio-cultural Sustainability, was there ever really any ground for judgment? These were among the social elements that both Jakarta and Surabaya had done very well, with specifically designated pedestrian areas and bicycle pavements. Numerous public means of transportation come to mind when a private mobile plan is discussed. But while Surabaya is somewhat better in terms of public facilities than Jakarta, we still feel that Jakarta's pedestrian network is better organized and not equally disturbed by other vehicles when pedestrians are crossing streets, as in Surabaya. As for Surabaya itself, pedestrian areas are still limited, so they cannot yet fully support community mobility through public transportation. To achieve community mobility, the government will continue to support the development of good mobility and public transportation, particularly by encouraging the community to use public transportation.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

In the writing process used by the author, the author does not use AI, but the author uses the Grammarly application to help improve.

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Contribution of Individual Authors to the Creation of a Scientific Article

Writing of conceptualization, methodology, data validation, data analysis, writing and drafting, data acquisition, all authors have read and agreed to the published article.

Sources of Funding for Research Presented in a Scientific Article or the Scientific Article Itself

We would like to express our deepest gratitude to the Ministry of Higher Education, Science and Technology for its support of our research in both Surabaya and Jakarta. With this grant, we can enhance our knowledge, particularly in public policy within the urban sector. In addition, we would also like to express our gratitude to Muhammadiyah University Yogyakarta for encouraging us to apply for the grant from the Director General of Higher Education of the Republic of Indonesia. We would also like to thank the research team for their assistance in collecting and processing the data. Furthermore, we would like to express our gratitude to the governments of DKI Jakarta and Surabaya for their support, particularly in providing primary and secondary data.

Conflict of Interest

Conflict of interest The authors declare no competing interests.