



Modal shift behavior towards bus rapid transit in Indonesia: A systematic literature review

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ABSTRACT

Background: Commuting is a prevalent activity for Indonesian people. People commute for various activities, but most of them choose to use their private vehicles in their daily mobility, inferring that the willingness to choose public transportation is still low. The huge reliance on private vehicles has various impacts, such as creating heavier traffic congestion and worsening the air pollution. Hence, modal shift behavior of the passengers from private vehicles to public transport is essential. This study aims to analyze the research trends and development of modal shift behavior towards Bus Rapid Transit (BRT) systems in Indonesia and synthesize the main influencing factors. **Methods:** This quantitatively synthesized study applies a systematic literature review where the articles published in relevant academic databases from 2004 to 2026 were collected and went through identification, screening, eligibility, and inclusion based on the PRISMA framework. The 251 selected articles were analyzed and reveal that BRT has been able to support the commuters to shift towards public transportation. **Findings:** The bibliometric analysis using Bibliometrix and VOSviewer software and further systematic content analysis were employed. Some studies also used the theory of planned behavior (TPB) as their approach. Several key factors influencing the modal shift behavior of the passengers are time travel, accessibility, service quality, and cost efficiency. Therefore, BRT has significant potential to increase the use of public transportation in Indonesia and the modal shift behavior of the commuters. **Conclusion:** Future study is recommended to explore the modal shift behavior towards other types of public transportation and analyze the environmental impacts of public transportation in Indonesia. **Novelty/Originality of this article:** This review contributes in providing a comprehensive synthesis of the relevant research in supporting the policy makers in designing strategies to optimize the use of BRT as well as in developing better sustainable transportation in urban cities across Indonesia.

KEYWORDS: bus rapid transit; Indonesia; modal shift; public transportation.

1. Introduction

Commuting has become an unavoidable routine in the daily life of modern society, especially in urban areas. They commute for various of purposes, such as going to school, working, businesses, social activities, and others. Rapid urbanization and mobility demand are inextricably linked to each other (Nikolaou & Basbas, 2023). The large cities around the world are still facing the complex challenges of mobility, such as traffic congesti, especially due to the amount of private vehicles. (El Amrani et al., 2024). In Delhi, traffic congestion and unclear travel time influence the efficiency of transportation services, such as emergency transportation which is a very critical service to the people (Wajid & Nezamuddin, 2022). Moreover, a study conducted in Bangladesh revealed that traffic

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congestion is causing the economic loss about USD 2.01 million per day (Fattah et al., 2022). As the number of private vehicles increases, the environmental situation could worsen. The use of fossil fuels as the main energy source for private vehicles has become one of the biggest concerns relating to urban transportation as it significantly contributes to the increase of greenhouse gas emissions. This situation leads to the other environmental problem, which is air pollution that will cause various human diseases, such as chronic pulmonary disease, asthma, and other respiratory diseases (Ofremu et al., 2025). In addition, the escalated greenhouse gas emissions will give a prominent impact to climate change.

Indonesia as a country with more than 280 million people, faces the same urban mobility and transportation problems. According to the TomTom traffic index in 2025, Bandung is in 16th place and followed by Jakarta in the 24th place among cities in the world in terms of traffic congestion (Tomtom, 2025). A study highlights that traffic congestion in the centre of Jakarta region is resulting economic losses due to increased travel times which leads to reduced productivity (Nurhidayat et al., 2023). In Bandung, the air pollution resulting from the traffic congestion is also worsened by the increase in population density (Sofa et al., 2024). A study in Bali stated that traffic congestion contributes to air pollution through increased greenhouse gas emissions which showing how this urban mobility problem impacts the environmental aspect (Wedagama, 2019).

Modal shift has become an important concept in transportation studies, particularly in addressing mobility challenges in rapidly urbanising areas. Modal shift refers to the transition of travellers from one mode of transportation to another, usually from private vehicles to more sustainable public transport systems. A study frames modal shift as reducing commuters' dependency on private vehicles and increasing public transport share, and estimates the probable shift from private modes to BRT (Kumar & Electricwala, 2014). This shift is considered essential to reduce traffic congestion, environmental pollution, and energy consumption in urban areas. In many developing countries, including Indonesia, the dominance of private vehicles has significantly contributed to increasing congestion and declining air quality. Therefore, encouraging travellers to shift to public transportation has become a key strategy in sustainable urban mobility planning.

One public transportation system that has gained attention in many cities is the Bus Rapid Transit (BRT). BRT is designed to provide high-capacity and efficient public transport services through features such as dedicated bus lanes, off-board fare collection, and priority signalling at intersections. BRT systems are also supporting in organizing public transportation systems to be more organized and structured (Bouraima et al, 2023). Several cities around the world have adopted BRT systems as a cost-effective alternative to rail-based transit systems. In Indonesia, the development of BRT systems has been implemented in several cities, most notably through TransJakarta, which is considered one of the largest BRT systems globally. The presence of BRT is expected to encourage commuters to shift from private vehicles to public transportation.

Understanding the behavioral aspects of travellers is crucial in analysing modal shift. Travel behavior theory explains how individuals make decisions regarding their travel choices, including route selection, travel time, and mode choice. Travel behavior is influenced by various factors such as socio-demographic characteristics, trip purposes, and personal preferences. Additionally, travel behavior studies often distinguish between revealed preferences, which are based on actual travel behavior, and stated preferences, which are based on individuals' responses to hypothetical scenarios. These approaches help researchers understand the determinants influencing travellers' decisions to use public transportation.

A widely used behavioral framework in transportation research is the Theory of Planned Behavior, which is a framework that is widely used in understanding and predicting human behavior, especially in the context of mode choice in transportation studies (Ali et al., 2023). This theory also emphasizes that an individual's behavior is influenced by three main factors, which are beliefs or attitudes, normative expectations (subjective norms), and perceived behavioral control. Subjective norms refer to an

individual's perception of societal support or pressure to perform or not perform a specific behavior. It's about how others' opinions or expectations influence one's actions. Perceived behavioral control (PBC) can be interpreted as internal or external beliefs that can either facilitate or hinder an individual's ability to perform a particular behavior. It represents the perceived ease or difficulty an individual has in executing an action. Related to the context of transportation, PBC can be perceived as not only intention but also accessibility. A study analyzes accessibility as a variable within the theory of planned behavior (TPB). framework shows that accessibility perception towards public transportation is closely related to the intention to move to more sustainable transportation option (Sheng & Zhang, 2022).

Urban transportation challenges have become increasingly complex in rapidly growing cities, particularly in developing countries. One of the major issues is the dominance of private vehicle usage, which contributes to severe traffic congestion, environmental pollution, and inefficiencies in urban mobility. To address these problems, many cities have introduced Bus Rapid Transit (BRT) systems as an alternative public transportation mode. In Indonesia, several cities have implemented BRT systems, with TransJakarta being one of the most prominent examples. Despite the expansion of BRT infrastructure, the shift from private vehicles to public transportation remains relatively limited, indicating that the success of BRT systems is strongly influenced by travellers' behavioral factors.

Interestingly, ever since the first BRT system was implemented Indonesia, which is Transjakarta, which was operating in Jakarta in 2004, there were increase of other BRT systems in different cities across Indonesia. For Instance, Trans Bandung Raya, Trans Banjarbakula in Banjarmasin, Trans Banyumas in East Java, Trans Batik Solo in Central Java, Trans Metro Deli in North Sumatera, and in other several region across Indonesia. However, Transjakarta is the most well-known BRT system, and it has developed to a good extent that they are the longest BRT system in the world with an increase in commuters every year.

In terms of modal shift, previous studies have examined modal shift behavior in several BRT systems in Indonesia. A research estimated the mode shift towards Trans Padang is influenced by the travel cost (Yaldi et al, 2019). In the case of Trans Jakarta, it is able to engaged the commuters to mode shift from private motorcycle to this BRT system (Prayogi & Hanton, 2021). However, the other BRT systems such as in Bandung and Surabaya faced challenges from the social community, such as political actors and other type of public transport such as *Angkot* (minibus) operators which can influence the commuters decision on shifting to BRT system (Wijaya et al., 2016). These previous findings indicate that overall existing research remains fragmented and context-specific. Most studies focus on individual cases, such as TransJakarta or Trans Padang, without providing a comparative understanding across different regions that implemented BRT systems. Furthermore, findings are often inconsistent, as some studies highlight successful modal shift driven by operational factors such as cost and travel time, while others emphasize social and institutional barriers, including resistance from local transport operators. This indicates a lack of synthesis in identifying the dominant factors influencing modal shift across different urban contexts. Therefore, there is a need for a comprehensive review that systematically integrates these findings to better understand the effectiveness of BRT systems in Indonesia and the key factors shaping modal shift behavior.

The novelty in this study lies in its integrative and comparative synthesis of modal shift behavior towards Bus Rapid Transit (BRT) systems across different urban contexts in Indonesia. Unlike previous studies that focus on individual case studies, this research systematically examines and consolidates findings from multiple regions to identify patterns and inconsistencies in modal shift outcomes. In particular, this study proposes a structured classification of influencing factors, encompassing operational factors, passenger perception factors, and socio-economic characteristics, to provide a more comprehensive analytical framework. By bridging fragmented evidence and highlighting the interaction between these factors, this study offers a deeper understanding of why modal shift success varies across cities, thereby contributing more nuanced insights for both research and policy development.

Based on this research gap and the novelty, this study has three main objectives. First, it aims to analyze the publication trends and overall development of research on modal shift behavior towards Bus Rapid Transit (BRT) systems in Indonesia using bibliometric analysis. Second, this study seeks to identify and map the key themes, research clusters, and theoretical approaches within the existing literature. Third, it aims to examine and synthesize the main factors influencing modal shift behavior, encompassing operational factors, passenger perception factors, and socio-economic characteristics, while also identifying inconsistencies and gaps to inform future research and policy development in sustainable urban transportation.

2. Methods

This study employs a Systematic Literature Review (SLR) which is a research method designed to identify, evaluate, and integrate findings from existing research in a structured and transparent manner (Thankachan & Srinivasan, 2025). Several reviews on BRT have been conducted, but most of those are not in Indonesia or not mainly about BRT as public transport. For instance, a systematic literature review has been conducted to analyze how is the service levels of traditional public transportation in several middle cities in the world, including Indonesia (Widyatni et al., 2025). Other review analyzed the urban public transportation in the world (Sarjana, 2021). Hence, this study aims to provide a comprehensive understanding of the determinants influencing modal shift behavior and the research trends related to BRT systems.

To ensure methodological rigour and transparency, this study adopts the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. The PRISMA framework provides systematic guidelines for conducting literature reviews through several key stages, including identification, screening, eligibility assessment, and inclusion of relevant studies (Rethlefsen & Page, 2022). These stages help researchers clearly document the article selection process and ensure that only relevant and high-quality studies are included in the review.

The literature search was conducted to identify relevant articles published between 2004 and 2026. The main reason that this review is analyzing the articles published since 2004 is that the first BRT system in Indonesia, which is Transjakarta, has been operating since 2004 (Muryanti et al., 2025). The publications reviewed in this study are released in 2026 are all in press or accepted manuscripts. To obtain relevant literature, several keywords in both English and Bahasa Indonesia were used during the search process. The English keywords included *"modal AND shift OR mode AND choice OR travel AND behavior, Bus AND Rapid AND Transit OR BRT, AND Indonesia"*. Alternative keywords that give the same meaning on modal shift were also used, such as travel behavior change, mobility transition, and ridership. In addition, Bahasa Indonesia keywords were also used to capture relevant national publications, including *"peralihan AND moda OR pemilihan AND moda AND transportasi OR perilaku AND perjalanan, Bus AND Rapid AND Transit OR BRT, AND Indonesia"*. Boolean operators such as AND and OR were applied to combine and refine the search queries to improve the accuracy and relevance of the search results.

Several inclusion and exclusion criteria were applied to ensure the quality of the selected literature. First, this review only includes peer-reviewed scientific journal articles. Publications in the form of conference proceedings, book chapters, reports, and working papers were excluded to ensure the academic reliability of the selected studies. Second, the articles must discuss topics related to modal shift behavior, travel behavior, public transportation, or Bus Rapid Transit systems. Third, the selected articles must be indexed in recognised academic indexing systems, particularly journals indexed in Scopus and the Indonesian academic indexing system Science and Technology Index (SINTA), which ensures the credibility and scholarly quality of the publications. Scopus is viewed as reputable database resources that covers wide range of publications worldwide (Kraus et al, 2020). Meanwhile Sinta is viewed as credible main resource of Indonesian scientific journals.

In the identification stage, there were 20 articles found on Scopus and 2,840 articles on Google Scholar. Then, 37 publications were removed before screening due to the duplication found in both databases, resulting in 2,803 publications remaining. After that, the publications were screened, and 805 of them were excluded based on the publication year, languages, type of publication, and journal index. This stage resulted in 1,998 publications being assessed based on the abstract keywords and title. From this stage, 14,94 publications were excluded. 504 publications were assessed for their eligibility based on the full-text review. Finally, there were 251 publications that were eligible and included in the bibliometric and content analysis.

To clarify the process of synthesizing the results in this systematic literature review, the selected studies were classified based on several key aspects. First, the studies will be grouped based on the research variables analyzed, such as socio-demographic factors, trip characteristics, and the quality of public transportation services. Second, the studies will be analyzed based on the analytical method used. Third, they will be compared based on the location which is the cities in Indonesia.

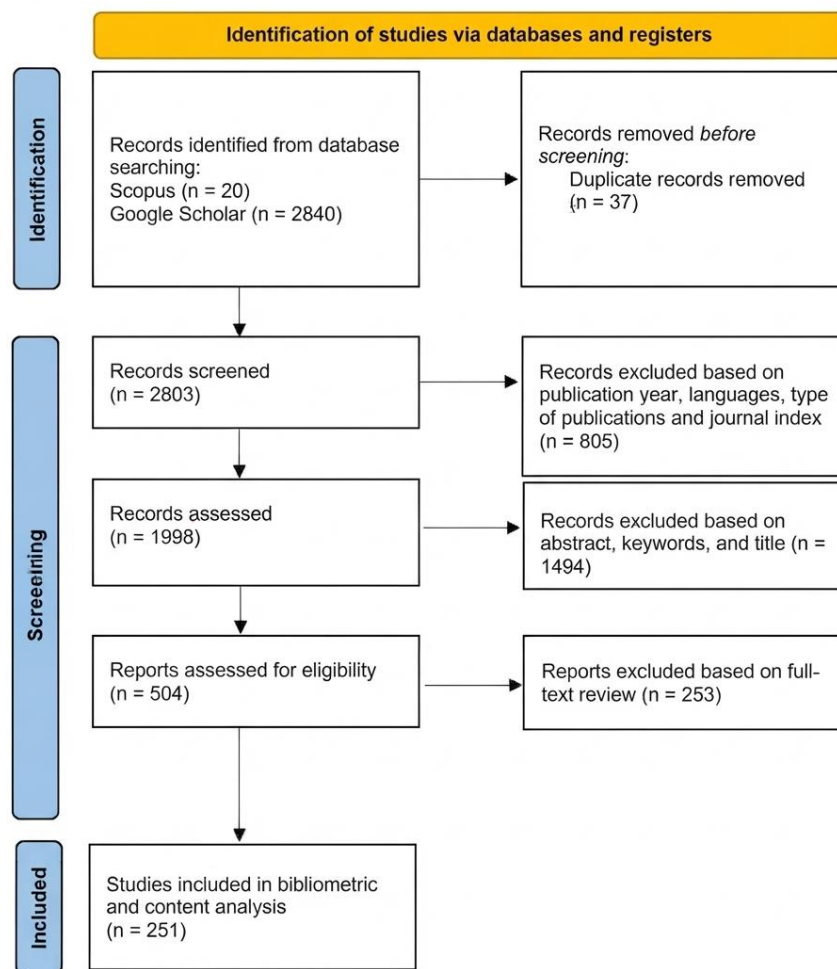


Fig. 1. PRISMA systematic filter result

After the eligible and relevant publications were collected through the PRISMA framework, these publications were then analyzed. In this review, the bibliometric analysis was employed to discover the research trends and to analyze the research patterns (Wang et al., 2010). There are several indicators in bibliometrics, such as the number and the year of publications, the funding institutions, countries, and the author's productivity, the most cited publications, and the most prominent publications (Zyoud et al., 2024). The bibliometric analysis was conducted by using two main software programs, which are

Bibliometrix and VOSviewer. The integration of these tools will enable a visual representation of the bibliometric data to get an in-depth understanding (Guleria & Kaur, 2021). In order to quantitatively analyze these publications, Bibliometrix was also used to discover the development of publication trends, the distribution of publications production based on geographic, the network of collaboration as well as the frequency of the keywords used, the topic trends, and the conceptual structure which covers the thematic mapping, the thematic evolution, and factorial analysis in this scope of research (Sekyere et al., 2025). Meanwhile, the VOSviewer software was utilized to provide a clear visualization in the format of networks of the research trends and their connections. The network visualization will cluster the keywords into the topic nodes that uncover the theoretical structure and cognitive relationship within the scope of this topic. This software will execute the volume of publication in by keywords, co-authorship, co-occurrence, and co-citation analysis (Oanh et al., 2026). Furthermore, co-authorship, co-occurrence, and co-citation analyses were applied to better understand the relationships within the collected publications. Co-authorship analysis was used to identify collaboration patterns among researchers and institutions, highlighting the extent of academic cooperation in this field. Co-occurrence analysis focused on the frequency and relationships between keywords, allowing the identification of major research themes and emerging topics. Meanwhile, co-citation analysis examined how often publications were cited together, which helps reveal the intellectual structure and key references shaping this research area.

To deepen the findings from the quantitative bibliometric analysis, the most prominent and relevant publications were analyzed qualitatively and systematically using the standardized extraction protocol, describing the methods used in the research, main findings, conceptual frameworks, innovations, policy recommendations, and research gaps. In spite of this, there are several limitations in this review methodological approach. The database used in this review were only Scopus and Google Scholar, which may limit some findings in other database, such as Web of Science. Moreover, as this review only limited to only indexed and peer-reviewed papers and excludes other types of publications, such as conferences, this might limit to other relevant findings related to BRT and the modal shift in Indonesia. The publications indexed in this review were also restricted to Scopus and Sinta (an Indonesian journal index system), which may possibly limit the review to other types of journal indexes. Additionally, citation bias could be a limitation in this review as the most cited publications might be more visible in the bibliometric analysis, while the newer publications with fewer citations might provide significant findings that can be underexplored. Although this review will be systematically reviewed using the standardized procedure, the selection bias is inevitable because the process of filtering and extracting the publications using the inclusion and exclusion criteria still involves the researcher's subjective judgment. To minimize this bias, several mitigation steps were applied, including the use of clearly defined and consistent criteria throughout the screening process, careful documentation of decisions, and repeated checking of selected studies to ensure consistency. In addition, the data extraction process was conducted systematically using structured guidelines to reduce errors and improve transparency. Therefore, the interpretation of results must be done carefully in the context of these limitations.

Applying this type of systematic review can give several implications. This filtering process helps make sure that the selected studies are relevant and reliable, which improves the overall quality of this review. However, most of the studies are focused on large cities, especially Jakarta, meaning that findings from well-developed BRT systems may be discussed more often. Because of this, the results may not fully represent conditions in smaller or less-developed cities. In addition, more studies have been published in recent years, showing that this topic is still growing and changing, with newer research offering more practical insights. Therefore, this review considers these differences in where and when the studies were conducted, recognising both its strength in identifying key trends and its limitation in covering a wider range of contexts.

3. Results and Discussion

This review analysed 251 articles retrieved from Google Scholar and scopus as the database and utilised some keywords such as “modal shift”, “Bus Rapid Transit”, and “Indonesia”. The selected articles span publications from 2004 until 2026, reflecting the growth of academic interest on investigating the modal shift towards bus rapid transit system in Indonesia. The selection process prioritised the relevance to modal shift behavior and the factors influencing it.

Initial observations indicate a significant increase in publications over the past decade, especially with the expansion of other BRT system in cities across Indonesia. Most of the publications were released in 2022 with 17 articles, followed by 2023 and 2025 with 11 articles, and in 2021 with 10 publications. This happens due to the expansion of BRT systems across the cities in Indonesia. In Indonesia, the development of TransJakarta has played a crucial role in stimulating academic discussions surrounding public transport usage and behavioral change. As one of the earliest and most prominent BRT systems in Southeast Asia, TransJakarta has frequently been used as a case study to evaluate the effectiveness of BRT in reducing congestion and encouraging modal shift (Ernst et al., 2010). Many studies focus on densely populated urban areas, where traffic congestion, environmental degradation, and rapid urbanisation have intensified the demand for efficient and sustainable transportation solutions. This trend highlights the growing recognition of BRT as a potential strategy to address urban mobility challenges.

The thematic analysis of the reviewed literature reveals several key patterns. First, a large proportion of studies emphasises the factors influencing modal shift from private vehicles, such as cars and motorcycles, to public transport systems. Based on the operational factors, there are several factors, including travel time reliability (Benita, 2023), accessibility (Fathoni & Widyastuti, 2025), and overall service quality (Simangunsong et al., 2023). Additionally, there are some factors based on passengers' perception, such as comfort (Romadlon et al., 2020) and cost efficiency (Aghisna et al., 2025). Among these variables, travel time and reliability are consistently identified as the most critical determinants influencing user decisions. Commuters tend to prioritise punctuality and predictability, as these directly affect daily productivity and convenience. In addition, affordability remains an important consideration, particularly for middle- and lower-income groups who are more sensitive to transport costs.

Second, several studies highlight socio-economic variables, such as income level (Sugiarto et al., 2021), occupation (Sofianti, 2025), and educational background (Rifai et al., 2022), as important factors affecting individuals' willingness to shift modes. Higher-income groups tend to demonstrate lower levels of public transport adoption, often due to a preference for the flexibility, privacy, and perceived status associated with private vehicle use. Conversely, lower-income groups are generally more dependent on public transportation, although their continued usage is still influenced by service quality and accessibility. These findings suggest that modal shift behavior is not solely determined by infrastructure, but also by socio-economic characteristics and lifestyle preferences. These findings indicate that uniform policies are less effective in encouraging modal switching among various user groups. In high-income groups, improving service quality such as reliability, comfort and integration is important to be able to compete with private vehicles, and needs to be supported by policies such as controlling vehicle use. Meanwhile, for low-income groups, fare affordability and ease of access, including feeder systems and last-mile connectivity, are the main factors. Therefore, modal shift strategies need to be designed in a differentiated manner by considering operational aspects and specific user needs to be more effective and inclusive.

Third, the literature points to significant infrastructural and policy-related challenges that hinder the effectiveness of BRT systems in Indonesia. In many cities, limited integration between different modes of transport, such as feeder buses, rail systems, and non-motorised transport, reduces the overall efficiency of the network. Inadequate feeder systems and poor last-mile connectivity make it difficult for users to access BRT corridors

conveniently. Furthermore, inconsistent service quality, including overcrowding, delays, and insufficient fleet capacity, diminishes user satisfaction and discourages long-term behavioral change. Studies also indicate that weak policy implementation and lack of coordination among stakeholders contribute to these challenges, limiting the potential impact of BRT systems.

Apart from structural issues, behavioral factors also play a significant role in influencing modal shifts, but this cannot be separated from the weaknesses of existing transportation policies and implementation. Habit, perceived convenience, and attachment to private vehicles remain the main obstacles, which in practice are strengthened by less than optimal intermodal integration and weak feeder systems. This condition is exacerbated by a lack of coordination between stakeholders, so that designed policies are often not implemented consistently in the field. As a result, public transportation services have not been able to provide an efficient and integrated travel experience, which has a direct impact on users' low interest in switching from private vehicles. Many individuals continue to consider private vehicles to be more reliable and comfortable, not only because of personal preference, but also because of the limitations of the public transportation system itself. Therefore, efforts to encourage modal shift are not enough just to improve infrastructure, but also require strengthening policy implementation, increasing coordination between stakeholders, as well as more targeted behavioral interventions, such as awareness campaigns and providing incentives.

Overall, the initial findings suggest that while there is a growing body of literature on modal shift towards BRT systems in Indonesia, significant challenges remain in achieving widespread behavioral change. These include limitations in infrastructure, service quality, and policy support, as well as deeply rooted user preferences. Further analysis is required to explore these issues in greater depth and to identify strategies that can effectively encourage a transition towards more sustainable urban transportation systems.

Several key indicators influencing modal shift towards Bus Rapid Transit (BRT) in Indonesia, are identified and analyzed from the studies. Among these indicators, service quality consistently emerges as the most influential determinant. A study investigating the service quality and operation of one of BRT systems in Central Java found that the interval between bus arrivals, transit shelter capacity and BRT infrastructure are the significant factors influencing passengers' satisfaction on the modal shift (Simangunsong et al., 2023). A previous research also found that among high school and university students, factors such as travel cost, travel time, and sociodemographic characteristics are key determinants of transportation mode choice (Risdiyanto et al., 2022). In contrast, poor service reliability is often cited as major barriers. Research has shown that a BRT System in Semarang found that its inclusive service, such as facilities for disabled people and pregnant women, remains inadequate, which influences the passengers' perceptions in choosing BRT as their transportation.

Cost and fare affordability also play a notable role. Research mentioned that BRT users in Banda Aceh are dominated by students and low-income households which indicates that there is a need to set the cost affordable for them (Lulusi et al., 2021). Accessibility is another crucial factor highlighted in the literature. The distance between residential areas and BRT stations, as well as the availability of first-mile and last-mile transport options, strongly affects users' willingness to shift to BRT (Sari et al., 2025). In many Indonesian cities, inadequate feeder systems and limited integration with other modes of transport create significant barriers to accessibility. Furthermore, comfort and safety considerations, including overcrowding, cleanliness, air conditioning, and personal security, particularly for female passengers, are frequently mentioned as influencing factors. Socio-demographic characteristics such as income level, age, and vehicle ownership further shape travel behaviour, with higher-income individuals and those who own private vehicles showing a lower propensity to shift to public transport (Sari et al., 2025).

Several patterns and trends can be identified from the analysed studies. A consistent trend across the literature is that travel time saving is a significant driver of modal shift towards BRT. An investigation conducted in Bandung mentioned that the travel cost is a

significant factor to influence the commuters to shift to a transport mode (Joewono et al., 2023). This indicates that users prioritise efficiency and predictability over other attributes when choosing their mode of transport. In contrast, findings related to cost show some variation. While lower fares can attract potential users, they are often not the primary deciding factor. Another important pattern is the variation in the importance of accessibility across different urban contexts. In densely populated areas with better transport integration, accessibility issues are less pronounced, whereas in peripheral or less developed areas, poor connectivity remains a significant obstacle.

In the Indonesian context, a particularly notable trend is the strong dependence on motorcycles as a dominant mode of transport. Motorcycles are likely to be used by people who have a lower income (Chiu, 2022). Motorcycles offer a high level of flexibility, door-to-door convenience, and relatively low operational costs, making them highly competitive with BRT systems (Sugiarto et al., 2022). This creates a unique challenge for promoting modal shift, as BRT must compete not only with private cars but also with a highly efficient and culturally embedded mode of transport. Additionally, perceptions of public transport play a role in influencing user behaviour. Research revealed that a BRT system in Yogyakarta gives positive perceptions to the passengers, such as comfort, safety, security, and low cost (Irawan et al., 2022). The adoption of technology, such as cashless payment systems, enhances the attractiveness of BRT, especially for younger passengers (Aghisna et al., 2025). These improvements have contributed to increased user satisfaction.

Therefore, although various factors have identified, but service quality becomes the dominant factors that influencing the modal shift of passengers to BRT. Moreover, this finding suggests that in making the public policy regarding transportation to emphasize more on the service quality in order to increase the ridership of BRT system. It also gives suggestion to BRT company and operators to improve their service quality according to the characteristics of the people living in that city in order to enhance the modal shift.

A previous literature review analyzed the characteristics of BRT systems, the main components of BRT, performances, and the impact on social, economic, and environmental factors, as well as the passengers' perception and the modal shift in various BRT systems in the world. Modal shift refers to the change of transportation mode, commonly when they switch from one type of transportation mode to another. In terms of passengers' perception and the modal shift, it was found that passengers show a relatively high level of perception and the modal shift happened, as shown by the significant increase in ridership (Wirasinghe et al., 2013). Another literature review was published discussing the global development of BRT in terms of cost-effective approach to provide good quality of transport service as well as analyzing the impact on land development. This paper mainly highlighted the development of BRT system in Latin America and found that BRT system is able to increase the transport capacity, shortening the travel time, and increasing the reliability and comfort for the passengers. In addition, this paper highlights that BRT system can increase the passengers' satisfaction and supporting the modal shift from private vehicles to public transportation (Deng & Nelson, 2011). Both of these articles show that BRT is a transportation system that is efficient as well as cost-effective. Moreover, both mentioned that BRT can promote modal shift from the private vehicle to public transportation which will give positive impacts on economic, social, and environmental.

Hidalgo & Graftieaux (2008) were conducting a review and a case study in 11 cities in Latin America and Asia to summarize the technical, financial, and performance information regarding BRT system implemented in those cities. Moreover, this article explains that BRT can increase the safety of the passengers while commuting, increasing the quality of a transportation system in a city, and reduce the air pollution. Related to modal shift, this article views modal shift as the impact of implementing BRT system which is reflected in the shift from conventional transport modes or from private vehicle to modern public transportation such as BRT. Ingvardson & Nielsen (2018) were reviewing the 86 transportation system in the world, including Indonesia in order to compare the impacts from various transportation systems such as Bus Rapid Transit (BRT), Light Rail Transit (LRT), and metro rail. The results highlighted that in terms of modal shift, both BRT and LRT

systems with high attractiveness can attract the other transportation users, such as private car users. It is also highlighted that modal shift is necessary to reduce traffic congestion and supporting sustainable transportation system. However, it is necessary to understand that the effect of a public transportation system can vary between cities because it can not be generalised as each city has its own characteristic. Both of the reviews mentioned that travel time savings, reliability, and bus frequency are the factors that support the modal shift to happen. Based on their findings, the challenge in achieving modal shift are the accessibility of the first and last mile, as well as the tariff integration across various public transportation within a trip.

Prayogi & Satwikasari (2019) conducted a literature review to identify the factors that can be considered by the passengers when they intend to shift modes from private vehicle to BRT in the global context. It reveals that the service quality of BRT such as the bus speed, frequency, waiting time, information clarity, comfort, and safety are the factors that was dominant for the passengers. Furthermore, mode shift is not only influenced by the service quality, but also built environment, the passengers characteristics, and types of trips. According to this analysis, it reveals that the service quality and the built environment are the factors that influence the passengers' perception of BRT, which also affects them in making the modal shift. However, the influence is not homogeneous across passengers as the passengers' background and types of trips are also other factors that drive the passengers' decision to do the modal shift.

Most of these previous review articles that discuss the factors that influence the modal shift of BRT system show that it is still dominated by the global context and analyzed through case studies conducted in cities around the world. Hence, a review that focuses on discussing the modal shift in BRT system across cities in Indonesia remains limited. Additionally, those review articles mostly take the case of BRT system from Trans Jakarta as the representative of BRT system in Indonesia. Yet, a review that summarizes BRT systems across the cities in Indonesia that are still developing has received less attention in terms of understanding the factors of the modal shift in the local context. As Indonesia is rich with social and cultural aspects across the cities, the pattern of modal shift of BRT system can vary. Moreover, the topography and the characteristics of the cities are different. For instance, Trans Jakarta is operated in Jakarta, which is a metropolitan city and can reach greater area with big operational scale. Meanwhile, Trans Jogja is operated in Yogyakarta, Central Java, that covers smaller area and service capacity. Therefore, this study contributes more on discussing the factors influencing the modal shift on various BRT systems in Indonesia.

The findings of this study show that service quality is the most important factor influencing people to do the modal shift to Bus Rapid Transit (BRT) systems in Indonesia. Reliability, punctuality, travel time, safety, information availability and accessibility collectively represent key dimensions that shape individuals' decisions to do the modal shift to BRT systems. A higher level of perceived comfort, safety, reliability, and convenience tends to increase users' willingness to use the system. People are more willing to use BRT system when they feel that the service is comfortable, safe, reliable, and convenient. This result can be explained using the theory of planned behavior, which suggests that people's decisions are strongly influenced by their attitudes (Kaewklueklom et al., 2017). When commuters have a positive experience with BRT system, such as clean buses, punctual schedules, and a sense of safety, they develop a favorable perception of the system. This positive attitude then increases their willingness to do the modal shift from using private vehicles, especially in cities where traffic congestion makes daily travel stressful.

Another way to understand this finding is through utility theory. This theory explains that people tend to choose the option that gives them the most benefit (Arun, 2023). From this perspective, improvements in service quality enhance the perceived utility of BRT while simultaneously reinforcing positive attitudes and perceived behavioural control. In the case of the BRT system, these service attributes function as tangible benefits for users. For example, if the BRT system offers shorter waiting times, smoother journeys, and predictable arrival times, it becomes more attractive than driving a car or using informal transport.

Affordable fares also play an important role, as they make BRT system a practical choice for many people. When all these advantages are combined, BRT system can offer higher overall value, encouraging people to change their travel habits. Despite the importance of service quality, its benefits can only be fully realized when the system is accessible to the public.

Accessibility theory highlights how easy it is for people to reach and use a transport system (Saif et al., 2019). When BRT system is accessible for everyone, people will feel it is easy to use. This will also be part of the theory of planned behavior. In Indonesia, one common challenge is getting to and from BRT system stations. If stations are too far away or difficult to access, people may choose not to use the service at all. However, when there are good feeder services, safe pedestrian pathways, or connections with other transport modes, BRT system becomes much easier to use. As a result, people are more likely to consider it as part of their daily commute. In addition to accessibility, economic factors such as cost efficiency play a role in shaping transport choices.

Compared to owning and using a private car or motorcycle, BRT system is generally more affordable. This factor can be understood through push-pull theory (Wang et al., 2020). On one side, high fuel prices, parking costs, and heavy traffic act as “push” factors that discourage people from using private vehicles. On the other side, lower fares and reliable services act as “pull” factors that attract people towards BRT system. When both forces work together, they create a strong motivation for individuals to do the modal shift their mode of transport. This theory describes how external influence strengthens the intentions of the passengers to do the modal shift, which also has an important role when integrated with other theories.

The findings in this paper offer implications for both academic and policy areas. This review is able to strengthen the models for behavioral transport. Additionally, the findings expand the literature of the modal shift, specifically BRT system in developing countries, such as Indonesia. Not to mention, research across disciplines can be integrated to further discuss the modal shift towards BRT system in Indonesia or worldwide. Nevertheless, the results in this paper can support local governments in implementing better transportation system management in Indonesia. Local transport companies, especially those managing BRT system in Indonesia, can leverage the insights in this paper to advance the development of their BRT systems. Local governments, whether those that have implemented BRT system in their city or will implement it in the future, can take service quality into account as a factor that should be seriously maintained in BRT system. By improving the service quality, the modal shift towards BRT system can be enhanced and this will support the policy related with public and private transportation.

Several methodological factors may have influenced the results of this study, particularly the conclusion that service quality is the dominant factor. The use of a systematic literature review (SLR) guided by the PRISMA Framework shapes the outcome through its structured inclusion and exclusion criteria. While PRISMA improves transparency and rigor, it may also limit the scope of studies considered, especially if relevant local or non-indexed research is excluded. Additionally, the selection of databases, search strings, and time range may bias the dataset towards certain themes or geographical contexts. Moreover, variations in how different studies define and measure variables such as “service quality” can also affect the synthesis, leading to a stronger emphasis on commonly used constructs across the literature.

The synthesis in this study reveals that the modal shift toward BRT systems in Indonesia is influenced by the integration of operational, socio-economic, infrastructural, and behavioral factors. The increasing number of publications over the past decade reflects a growing recognition of BRT as a strategic solution to urban mobility challenges.

Among all identified variables, service quality consistently emerges as the most dominant determinant influencing modal shift toward BRT systems. This includes reliability (Liu & Guo, 2015), punctuality (Barabino et al., 2014), travel time reliability (Halyal & Mulangi, 2026), safety (Nguyen, 2021), comfort (Lámbarry et al., 2013), and information availability (Wan et al., 2016). These elements collectively shape users’ perceptions and determine whether BRT is viewed as a viable alternative to private transport. In particular,

travel time reliability and predictability are the most critical considerations, as commuters prioritize efficiency and certainty in highly congested urban environments. This indicates that users are not only sensitive to actual performance, but also to perceived consistency of service. Empirical evidence further reinforces this pattern. For instance, findings from a study indicate that users' evaluations of BRT systems across different cities are closely linked to perceived service quality attributes requiring improvement. Specifically, the study identifies the need for route expansion and extended operational hours in Transjakarta, improvements in bus stop comfort and driver service quality in Batik Solo Trans, and enhanced bus stop facilities in Trans Jogja (Muryanti et al., 2025). These findings highlight that variations in service quality dimensions across cities shape user satisfaction and, consequently, influence the likelihood of modal shift.

However, the influence of service quality cannot be separated from accessibility and network integration (Tomaz de Aquino et al., 2018). The findings show that inadequate first-mile and last-mile connectivity, limited feeder systems, and weak integration between transport modes significantly reduce the effectiveness of BRT systems. Even when service quality is relatively high, poor accessibility discourages users from adopting BRT as part of their daily travel. This suggests that accessibility functions as an enabling condition that determines whether service improvements can translate into actual behavioural change.

Socio-economic factors further shape the modal shift toward BRT systems in significant ways. Income level, occupation, and vehicle ownership influence users' preferences and willingness to adopt public transport. Higher-income individuals are less likely to rely on BRT, as they often have greater access to private vehicles (Hu et al., 2019). Occupation is also a factor that shapes the attitude of modal shift toward BRT systems. For instance, students are more likely to support BRT systems (Li et al., 2020). Moreover, high levels of private vehicle ownership often reduce the likelihood of individuals switching to BRT systems (Salameh & Jawad, 2019). Additionally, socio-economic factors further related to the previous factor, service quality. For instance, the group with lower income is sensitive to the tariff and accessibility, meanwhile the higher income group places greater emphasis on comfort and travel time efficiency. These findings highlight that the modal shift toward BRT systems is not uniform across population groups and requires tailored policy approaches.

In addition, behavioral factors such as habit and attachment to private vehicles play a crucial role (Kaewklungklom et al., 2017). Motorcycles, which are widely used in Indonesia, offer flexibility, affordability, and door-to-door convenience, making them strong competitors to BRT systems. Importantly, these factors are closely linked to institutional support, which includes government commitment, regulatory frameworks, funding mechanisms, and inter-agency coordination. Strong institutional support ensures consistent service standards, integrated transport planning, and long-term policy continuity. Overall, the findings indicate that while BRT has strong potential to encourage modal shift towards BRT systems, its effectiveness depends on the alignment between service quality, accessibility, user characteristics, and institutional support. Without addressing these factors simultaneously, the impact of BRT systems on sustainable urban mobility remains limited.

Building on these findings, several new perspectives can be proposed to advance the understanding and implementation of modal shift toward BRT systems in Indonesia, as elaborated in Figure 2. First, service quality should be reconceptualized not merely as an operational attribute, but as a strategic instrument for behavioral transformation. Rather than focusing solely on technical improvements, policymakers and operators need to consider how service quality shapes user perceptions, trust, and long-term travel habits. This implies that consistent and reliable service delivery may be more important than occasional high performance. Second, the relationship between service quality and accessibility suggests that future transport planning should adopt a system-based approach rather than a corridor-based approach. BRT systems need to be integrated with feeder services, non-motorized transport, and other public transport modes to create a seamless mobility experience. This perspective shifts the focus from isolated infrastructure

development to network connectivity and user journey continuity. Third, socio-economic diversity requires differentiated policy strategies. Higher-income users require improvements in comfort, reliability, and system image. In contrast, lower-income groups prioritize affordability and accessibility. This suggests that equity and inclusivity should become central considerations in transport policy design. Policymakers may introduce tiered service options, targeted subsidies for low-income users, and employer-based incentives such as commuter benefit programs. At the same time, parking pricing reforms, congestion charging, or vehicle restriction policies can be implemented in parallel to discourage private vehicle use among higher-income groups. Finally, this study highlights the importance of contextualizing transport research within local conditions.

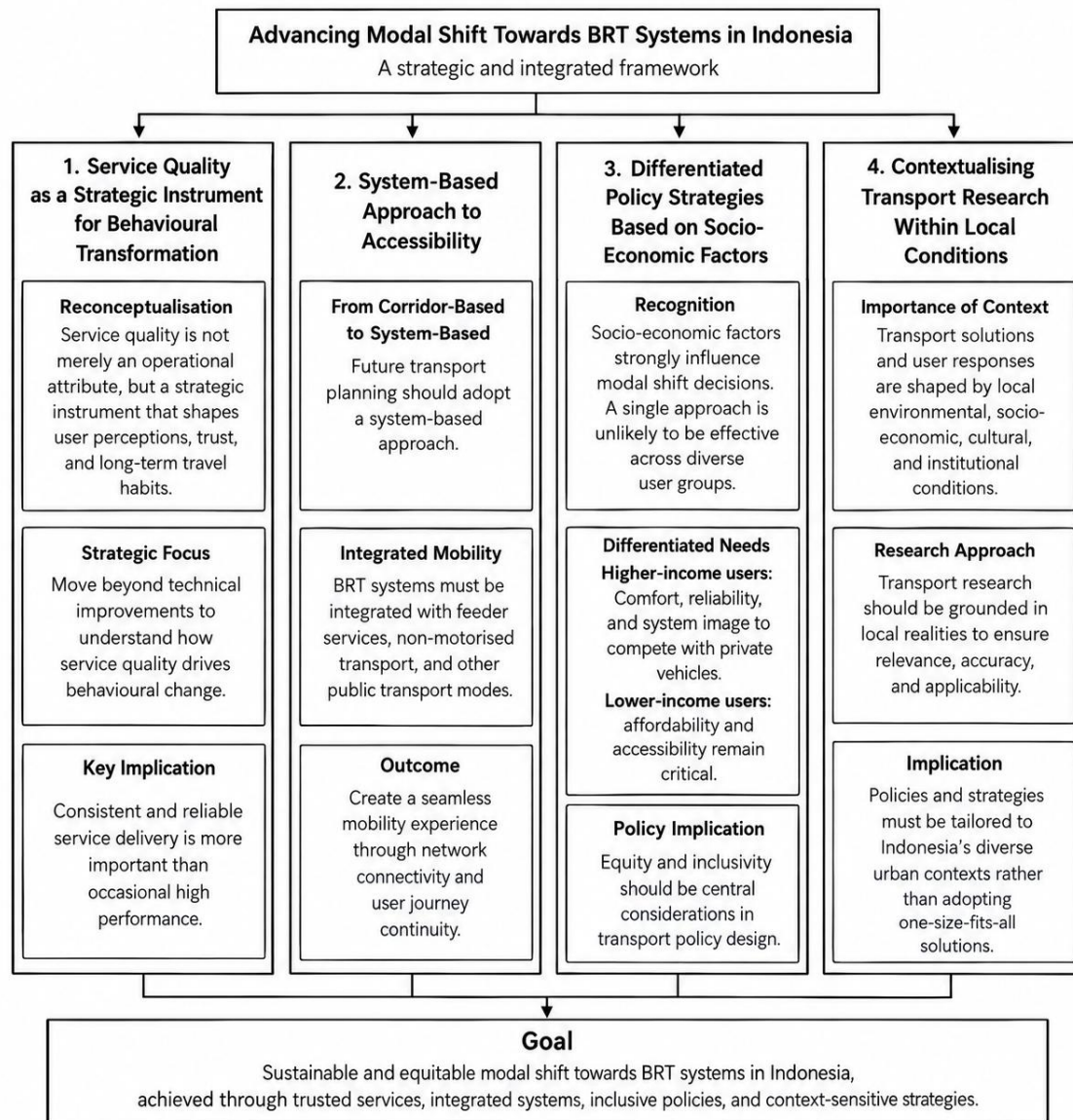


Fig. 2. Modal shift towards BRT systems in Indonesia framework

This review has several limitations that can be addressed for future research. First, the papers analyzed in relation to the modal shift toward BRT systems are limited to international and national articles that were published in reputable journals. This limits access to other original research that may have been conducted but published in conference papers or proceedings. Methodologically, this could lead to publication bias and limit the comprehensiveness of the analysis. Second, most of the BRT systems discussed in the papers focus on Trans Jakarta. However, many other BRT systems in different cities operate

but have not yet been widely studied, or existing studies do not focus on modal shift toward BRT systems. This limits the generalisability of the results across different urban contexts. Third, although service quality is generally the main factor affecting modal shift toward BRT systems, each BRT system in a given city may have other key factors that should be the focus of improvement. Fourth, this study remains limited to the factors influencing modal shift toward BRT systems identified in the original research papers, and still needs to be strengthened with public policy documents. The absence of integration with policy documents and empirical field data may limit the practical applicability of the findings. Future research should address these limitations by incorporating diverse data sources, expanding case study coverage, and integrating policy analysis with empirical investigation.

4. Conclusions

This study has contributed to analyzing the factors that influence the modal shift towards the BRT system as a sustainable mobility transportation in Indonesia, not only in a particular city, through a systematic literature review. Based on the result and analysis from the systematic literature review in this research, It is concluded that the modal shift towards BRT systems in Indonesia is influenced by complex interactions of several factors, which are operational factors, socio-economic factors, infrastructure, and behavior. Among these identified variables, the service quality appears as the dominant factor in this case. Other aspects such as the reliability on travel time, schedule punctuality, comfort, safety, and information availability have consistently shaped the passengers' perceptions on deciding to do the modal shift to BRT systems.

Based on these findings, several recommendations can be offered. First, the government and transportation operators need to prioritize consistent improvements in service quality, particularly in terms of schedule reliability, service frequency, and fleet comfort. Second, transportation system development should adopt a network-based approach, strengthening integration between modes, including building Transit-Oriented Development (TOD) systems, providing feeder lanes, pedestrian paths, and connectivity to non-motorized transportation. Third, transportation policies need to be designed in a differentiated manner based on user characteristics. Fare subsidies and increased accessibility are important for low-income groups, while improvements in service image, comfort, and policies restricting private vehicles (such as parking fees and congestion pricing) can target higher-income groups. Fourth, behavior-based interventions such as awareness campaigns and incentives for public transportation use need to be strengthened to shift public preferences. Fifth, improving coordination between stakeholders and consistent policy implementation are key to ensuring the effectiveness of developing a sustainable and inclusive BRT system in Indonesia. Additionally, in the context of cities in Indonesia, some recommendations can be offered for several cities. For developing cities, it is recommended to improve basic service reliability, strengthen first and last-mile connectivity, and offer affordable pricing. This is recommended because developing cities in Indonesia might face some challenges, such as weak traffic management, financial sustainability, and infrastructure constraints. For metropolitan cities, enhancing travel time competitiveness, integrating with multimodal systems such as MRT and LRT, as well as improving comfort and user experience, can boost the modal shift towards the BRT system. Meanwhile, for cities with a limited BRT system, it is suggested to expand network coverage, increase service frequency, and strengthen branding and visibility. Finally, as this research has its limitations, especially in terms of the research methodology, which is limited to a systematic literature review, it is recommended for future research to apply a different methodological approach in analyzing the modal shift towards BRT systems in Indonesia, using quantitative, qualitative, or mixed-methods in order to gain deeper insights of this scope of area.

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Author Contribution

The author was solely responsible for all stages of the research, including conceptualization, literature search and selection, methodology development, data collection, bibliometric analysis, systematic content analysis, interpretation of findings, manuscript preparation, revision, and final approval of the manuscript.

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During the preparation of this work, the author used Grammarly to assist in improving grammar, clarity, and academic tone of the manuscript. After using this tool, the author reviewed and edited the content as needed and took full responsibility for the content of the publication.

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