

Exploratory Research

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Riding the First Line: Passenger Satisfaction, Service Quality, and User Experience on Ho Chi Minh City's Metro Line 1

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ABSTRACT

Introduction: Rapid urbanisation and escalating traffic congestion have intensified the demand for efficient, sustainable public transportation in Ho Chi Minh City. As Ho Chi Minh City's first operational urban railway, Metro Line 1 represents a major milestone in the city's transport development. However, empirical evidence regarding passengers' early experiences and satisfaction with this newly introduced system remains limited. This exploratory study investigates passenger satisfaction, identifies key service challenges, and proposes practical strategies for enhancing user experience and encouraging greater public transport adoption. **Methods:** An exploratory mixed-methods research design was employed, integrating quantitative survey data from 90 respondents with qualitative interviews and secondary documentary sources. A structured questionnaire based on recognised service quality dimensions was used to examine passengers' perceptions of accessibility, reliability, safety, comfort, connectivity, and overall travel experience. **Results:** The findings indicate that passengers generally express favourable perceptions of Metro Line 1, particularly regarding its punctuality, cleanliness, safety, and travelling comfort. Nevertheless, several operational and infrastructural shortcomings were identified, including inadequate parking facilities, limited last-mile connectivity, insufficient wayfinding within stations, and inadequate public awareness of integrated electric bus services. **Discussion:** The findings suggest that improving multimodal connectivity, strengthening passenger information systems, expanding station parking facilities, and introducing innovative digital solutions, including the proposed SmartExit navigation application and AI-assisted passenger support services, could substantially improve overall user experience. The study further contributes to the emerging body of research on passenger satisfaction in newly established urban rail systems within developing metropolitan contexts. **Conclusion:** Although exploratory in nature, this study offers timely empirical insights for transport planners, policymakers, and metro operators seeking to improve service quality and promote long-term behavioural shifts towards sustainable public transportation in Ho Chi Minh City. The findings may also provide useful reference points for future urban railway development across Vietnam and comparable rapidly urbanising cities.

Keywords: exploratory research; passenger satisfaction; public transport; service quality; urban rail transit; sustainable urban mobility; Ho Chi Minh City; Vietnam

1. Introduction

Rapid urbanisation, population growth, and the increasing dependence on private motor vehicles have intensified traffic congestion, environmental pollution, and travel inefficiencies in many metropolitan cities worldwide. Consequently, urban rail transit systems have become an integral component of sustainable urban mobility, offering efficient, reliable, and environmentally friendly alternatives to private transportation (Vuchic, 2005; Yuan & Frey, 2020). In many developed countries, metro and rapid transit systems have significantly reduced road congestion, improved travel efficiency, lowered greenhouse gas emissions, and supported more sustainable patterns of urban development (Schnieder, 2021; UITP, 2018).

Following these global developments, Vietnam has invested substantially in modern urban railway infrastructure. Ho Chi Minh City's Metro Line 1 (Bến Thành–Suối Tiên), the City's first commercially operational metro system, represents a major milestone in the modernisation of the nation's public transportation network. Beyond functioning as a transport facility, the metro is expected to reshape urban mobility, improve environmental sustainability, reduce dependence on private motorcycles, and contribute to the city's long-term socioeconomic development (Ban Quản lý Đường sắt đô thị, 2025; Vietnam News, 2025).

The development of Metro Line 1 should also be viewed within the broader context of Ho Chi Minh City's continuing urban transformation. As the city seeks to balance rapid economic growth with cultural preservation and sustainable development, major infrastructure projects increasingly serve not only as transportation initiatives but also as catalysts for enhancing urban connectivity, accessibility, tourism, and the overall quality of urban life. Recent studies have likewise emphasised the importance of adopting interdisciplinary perspectives when evaluating urban development in Ho Chi Minh City, recognising that transport infrastructure, cultural heritage, tourism, and community well-being are closely interconnected (Giang et al., 2025).

Previous studies have demonstrated that passengers' perceptions of service quality strongly influence their willingness to adopt public transportation and continue using urban rail systems (Aboul-Atta & Elmaraghy, 2022; Eboli & Mazzulla, 2007). Factors such as reliability, accessibility, safety, comfort, information availability, and overall travel experience have consistently been identified as important determinants of passenger satisfaction (Lin et al., 2022). In newly established metro systems, positive user experiences during the initial stages of operation are particularly important because they shape public

confidence and influence long-term behavioural change from private vehicle use to public transport adoption.

Despite the growing body of international literature on metro service quality and passenger satisfaction, empirical research examining users' experiences with Ho Chi Minh City's newly operational metro system remains extremely limited. Existing reports have primarily focused on technical construction progress, operational updates, or media coverage, while relatively little scholarly attention has been devoted to understanding passengers' perceptions of service quality, operational challenges, and opportunities for service improvement during the early stages of Metro Line 1's commercial operation. This lack of empirical evidence represents an important research gap, particularly given the strategic role of Metro Line 1 as a model for future urban railway development throughout Vietnam.

Accordingly, this exploratory research investigates passengers' satisfaction with Ho Chi Minh City's Metro Line 1 by examining their perceptions of service quality, accessibility, connectivity, safety, comfort, and overall travel experience. In addition, the study identifies operational challenges encountered by users and proposes practical recommendations to improve passenger satisfaction through infrastructure enhancement, improved multimodal integration, and innovative smart-city technologies.

This study contributes to the literature in three important ways. First, it provides one of the earliest empirical assessments of passenger experiences following the introduction of Ho Chi Minh City's first urban metro system. Second, it extends existing knowledge on public transport satisfaction by examining passenger perceptions within the unique socioeconomic and transport context of Ho Chi Minh City. Finally, the study offers practical recommendations for policymakers, transport authorities, and urban planners seeking to improve service quality, encourage greater public transport usage, and support the development of sustainable urban mobility in rapidly growing metropolitan areas.

2. Theoretical Framework

2.1 Passenger Satisfaction and Service Quality in Public Transportation

Passenger satisfaction is a multidimensional concept that reflects travellers' overall evaluation of the quality and performance of a transport service based on the comparison between their expectations and actual travel experiences (Parasuraman et al., 1988). In the context of public transportation, passenger satisfaction extends beyond operational efficiency to include accessibility, comfort, safety, reliability, affordability, information

availability, and the overall quality of the travel experience (Eboli & Mazzulla, 2007).

Service quality has consistently been recognised as one of the strongest determinants of passengers' willingness to use public transportation. When users perceive services to be reliable, convenient, safe, and responsive to their needs, they are more likely to continue using public transport and recommend it to others. Conversely, poor service quality often reinforces dependence on private vehicles, thereby reducing the effectiveness of investments in urban rail infrastructure (Aboul-Atta & Elmaraghy, 2022).

Among the various models developed to evaluate service quality, the SERVQUAL framework proposed by Parasuraman et al. (1988) remains one of the most widely applied in transportation research. The framework evaluates service quality across five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Numerous studies have successfully adapted these dimensions to assess passenger satisfaction in metro and public transport systems because they provide a comprehensive framework for evaluating both operational performance and users' subjective experiences (Eboli & Mazzulla, 2007).

Recognising that Metro Line 1 is still in its early operational stage, the present study adopts the underlying principles of the SERVQUAL framework while adapting them to the practical realities of Ho Chi Minh City's urban railway system. Accordingly, passenger perceptions are examined through six service dimensions: (i) timeliness, frequency, and punctuality; (ii) connectivity, accessibility, and last-mile efficiency; (iii) fare and payment systems; (iv) safety, security, and reliability; (v) comfort, cleanliness, and wayfinding information; and (vi) image, travel experience, and cultural aspects. These dimensions provide a comprehensive basis for evaluating passengers' experiences with the newly introduced metro system.

2.2 Urban Mobility and Travel Behaviour

Urban rail systems play a fundamental role in promoting sustainable urban mobility by reducing traffic congestion, lowering greenhouse gas emissions, and encouraging a gradual transition from private vehicle use to public transportation (Yuan & Frey, 2020). However, infrastructure investment alone does not guarantee increased ridership. Passengers' travel choices are strongly influenced by their perceptions of convenience, accessibility, travel time, safety, comfort, and service reliability (Lin et al., 2022).

Travel behaviour research suggests that individuals are more likely to adopt new public transportation

systems when these services provide clear advantages over existing travel modes. Efficient multimodal integration, convenient station access, reliable schedules, affordable fares, and high-quality passenger information are therefore essential factors influencing long-term behavioural change (Suzuki et al., 2013; Ceder, 2016). In newly established metro systems, positive early user experiences are particularly important because they influence public confidence and determine whether passengers continue using the service after their initial journeys.

Within the Vietnamese context, where motorcycles remain the dominant mode of urban transport, understanding passengers' travel behaviour is especially important. Improvements in service quality, connectivity, and passenger convenience are likely to play a critical role in encouraging commuters to shift from private motorcycles to public transportation, thereby supporting broader environmental and urban sustainability objectives.

2.3 International Experience in Enhancing Passenger Satisfaction

International experience demonstrates that successful metro systems are characterised not only by advanced engineering and infrastructure but also by effective passenger-centred service management. Japan's metro network is internationally recognised for exceptional punctuality, operational reliability, and rigorous maintenance systems, which have contributed to consistently high levels of passenger confidence (Vietnam Ministry of Transport, 2024). Similarly, China's rapid expansion of urban rail networks has been accompanied by the widespread implementation of integrated electronic ticketing systems, multilingual passenger information, and intelligent station management technologies designed to improve user experience (Vietnam Ministry of Transport, 2024).

Singapore provides another important benchmark through its highly integrated public transportation system, where metro services operate seamlessly alongside bus and taxi networks under coordinated transport planning (Vietnam Ministry of Transport, 2013). This level of multimodal integration significantly enhances accessibility and convenience, thereby encouraging sustained public transport use.

Environmental sustainability has also become an increasingly important component of metro service quality. Thailand's adoption of solar-powered metro operations illustrates how technological innovation can simultaneously improve operational efficiency and support national carbon reduction goals (CKPower,

2023). These international experiences demonstrate that passenger satisfaction depends not only on transport infrastructure but also on service integration, technological innovation, effective communication, and continuous operational improvement.

Drawing upon these international experiences provides valuable insights for evaluating Metro Line 1 and identifying practical strategies to improve passenger satisfaction, strengthen multimodal connectivity, and support the long-term development of sustainable urban transportation in Ho Chi Minh City.

3. Methodology

3.1 Research Design

This study employed an **exploratory mixed-methods research design** to examine passenger satisfaction, service challenges, and user experiences associated with Ho Chi Minh City's Metro Line 1 during its initial period of commercial operation. The mixed-methods approach was selected because it combines the breadth of quantitative survey data with the depth of qualitative insights, thereby providing a more comprehensive understanding of passengers' perceptions and experiences. Such an approach is particularly appropriate for exploratory studies investigating newly introduced public transport systems where empirical evidence remains limited (Creswell & Plano Clark, 2018).

The quantitative component examined passengers' perceptions of various aspects of metro service quality, while the qualitative component provided contextual insights into users' experiences, perceived operational challenges, and suggestions for service improvement. Secondary sources, including government reports, official metro publications, and recent transport-related literature, were also consulted to contextualise the findings within Vietnam's evolving urban transport landscape.

3.2 Study Area

The study focused on **Ho Chi Minh City's Metro Line 1 (Bến Thành–Suối Tiên)**, the City's first operational urban railway. Stretching approximately 19.7 kilometres and connecting the city centre with the eastern districts, Metro Line 1 represents a landmark infrastructure project intended to alleviate traffic congestion, improve urban mobility, and encourage greater use of public transportation (Ban Quản lý Đường sắt đô thị, 2025).

As the metro had only recently commenced commercial operations, it provided an appropriate setting for investigating passengers' initial experiences, expectations, and perceptions of service quality.

3.3 Participants and Sampling

Data were collected through an online questionnaire administered to **90 respondents** who had experience using Metro Line 1. A **non-probability convenience sampling** approach was adopted because of the exploratory nature of the study and the practical constraints associated with collecting data during the metro's early operational phase.

The respondents comprised passengers from various demographic backgrounds, although younger individuals and students represented a substantial proportion of the sample. This demographic profile reflects the characteristics of many early adopters of newly introduced public transportation systems, particularly those who are more technologically engaged and more willing to experiment with alternative modes of travel.

Accordingly, the findings should be interpreted as providing **preliminary empirical insights** into passenger experiences rather than as statistically representative of the entire population of Ho Chi Minh City. Nevertheless, the sample offers valuable evidence regarding the perceptions of early metro users and identifies several important operational issues requiring further investigation.

3.4 Research Instrument

The primary research instrument was a structured questionnaire developed from established literature on public transport service quality and passenger satisfaction, particularly the SERVQUAL framework proposed by Parasuraman et al. (1988) and subsequent studies on metro service evaluation (Eboli & Mazzulla, 2007).

The questionnaire comprised demographic questions together with statements evaluating six key dimensions of Metro Line 1 services:

- timeliness, frequency, and punctuality;
- accessibility and multimodal connectivity;
- fare affordability and payment convenience;
- safety, security, and operational reliability;
- comfort, cleanliness, and passenger information; and
- overall travel experience and public perception.

Responses were measured using a **five-point Likert scale**, ranging from **1 (strongly disagree)** to **5 (strongly agree)**. The Likert scale served as the measurement instrument for assessing passengers' perceptions and was not employed as a theoretical framework.

3.5 Data Collection Procedures

Primary data were collected through an online questionnaire distributed to Metro Line 1 users during

the study period. Participation was entirely voluntary, and respondents completed the questionnaire anonymously. To complement the survey findings, informal interviews with selected passengers and observations of station facilities and passenger movements were undertaken to obtain additional qualitative insights into users' experiences.

Secondary information was obtained from official publications issued by Metro Line 1 authorities, government agencies, transport organisations, and peer-reviewed academic literature to support interpretation of the findings.

3.6 Data Analysis

Quantitative data were analysed using descriptive statistical techniques, including frequency distributions and percentage analyses, to identify patterns in passengers' perceptions of Metro Line 1 services. Given the exploratory nature of the study and the relatively modest sample size, the analysis was intentionally limited to descriptive interpretation rather than inferential statistical modelling.

Qualitative responses and interview observations were analysed using thematic analysis, allowing recurrent issues, service challenges, and recommendations to emerge inductively from participants' experiences. The integration of quantitative and qualitative findings enabled a more comprehensive understanding of passenger satisfaction and facilitated the development of practical recommendations for improving Metro Line 1 services.

3.7 Ethical Considerations

Participation in the study was voluntary, and respondents were informed of the purpose of the research before completing the questionnaire. No personally identifiable information was collected, and all responses were treated confidentially and analysed solely for academic purposes. The study adhered to accepted ethical principles governing research involving human participants, including voluntary participation, anonymity, confidentiality, and the responsible reporting of research findings. The study adhered to established ethical principles governing voluntary participation, informed consent, confidentiality, and responsible reporting of research findings (Truong & Kanwal, 2022).

4. Results

4.1 Respondent Profile

A total of **90 respondents** participated in this exploratory study. The respondents represented various demographic backgrounds, although younger participants

constituted the majority of the sample. Students accounted for the largest occupational group, reflecting the demographic characteristics of many early adopters of Metro Line 1. While this distribution provides valuable insights into the perceptions of younger passengers, it also indicates that the findings should be interpreted primarily as representing the experiences of early metro users rather than the wider population of Ho Chi Minh City.

4.2 Passenger Perceptions of Metro Line 1 Services

Overall, respondents expressed generally favourable perceptions of Metro Line 1. Positive evaluations were consistently observed regarding punctuality, cleanliness, travelling comfort, station safety, and the overall modern appearance of the metro system. Many participants regarded the metro as an efficient alternative to road-based transport, particularly during peak traffic periods.

Passengers also appreciated the convenience of the metro's modern facilities, comfortable passenger environment, and comparatively smooth travelling experience. These findings indicate a generally positive public reception during the early stages of commercial operation.

Nevertheless, respondents identified several areas requiring improvement. The most frequently reported concerns related to inadequate parking facilities near stations, insufficient integration with other modes of public transport, limited directional signage, and difficulties experienced when travelling beyond metro stations to final destinations. These operational issues suggest that although the metro system itself performs well, improvements in supporting infrastructure and multimodal connectivity remain necessary.

4.3 Accessibility and Multimodal Connectivity

Accessibility emerged as one of the principal challenges identified by respondents. While Metro Line 1 provides efficient travel between major stations, many passengers experienced difficulties reaching stations or continuing their journeys after disembarking.

Respondents highlighted several concerns, including limited parking availability, insufficient feeder transport services, and inadequate public awareness regarding connecting electric bus routes. These findings suggest that last-mile connectivity remains an important factor influencing passengers' overall travel experience.

The survey further indicates that improving integration between the metro network and complementary transport services could significantly enhance convenience and encourage greater public transport utilisation.

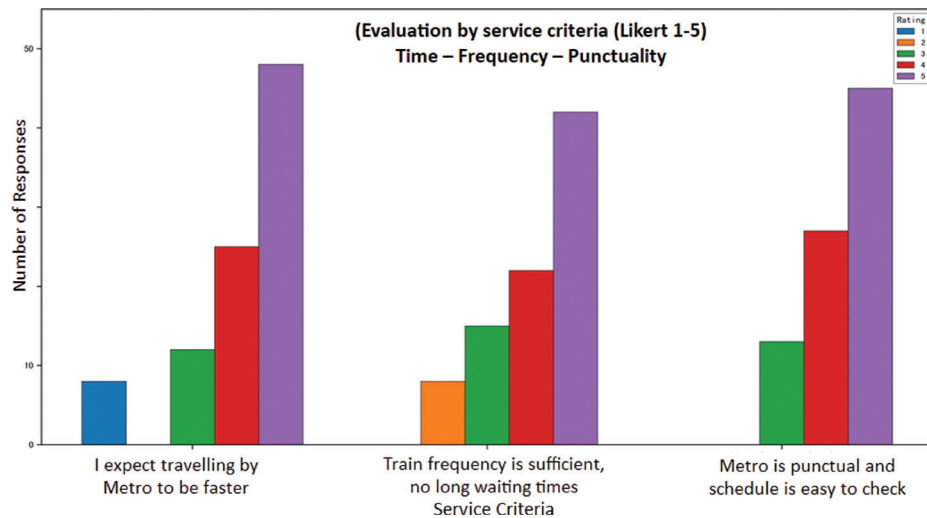


Figure 1. Passengers' evaluation of Metro Line 1 service performance in terms of timeliness, service frequency, and punctuality. **Note.** Responses were obtained from 90 Metro Line 1 passengers using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The figure illustrates passengers' perceptions of the metro's operational performance with respect to punctuality, train frequency, adherence to scheduled services, and overall timeliness. Percentages are based on respondents' self-reported evaluations.

4.4 Safety, Comfort, and Passenger Experience

Most respondents reported positive perceptions regarding passenger safety and onboard comfort. Clean coaches, orderly station environments, and reliable train operations contributed to favourable travel experiences. Many passengers also expressed confidence in the overall safety of the metro system, particularly with regard to station security and operational reliability.

Comfortable seating arrangements, air-conditioned coaches, and reduced travel time compared with road transport were frequently cited as important advantages. These positive experiences demonstrate that Metro Line 1 has established a favourable foundation for attracting and retaining passengers during its initial operational phase.

4.5 Information Services and Wayfinding

Although passengers generally appreciated the modern design of Metro Line 1, the findings indicate that information services require further enhancement. Several respondents reported uncertainty regarding station exits, interchange facilities, ticketing procedures, and onward transport connections.

Wayfinding within stations was identified as an area where clearer multilingual signage, digital information displays, and real-time navigation assistance could improve passenger convenience, particularly for first-time users, tourists, older passengers, and individuals unfamiliar with the metro network.

These findings highlight the importance of effective passenger communication in improving overall service quality and user satisfaction.

4.6 Passenger Suggestions for Service Improvement

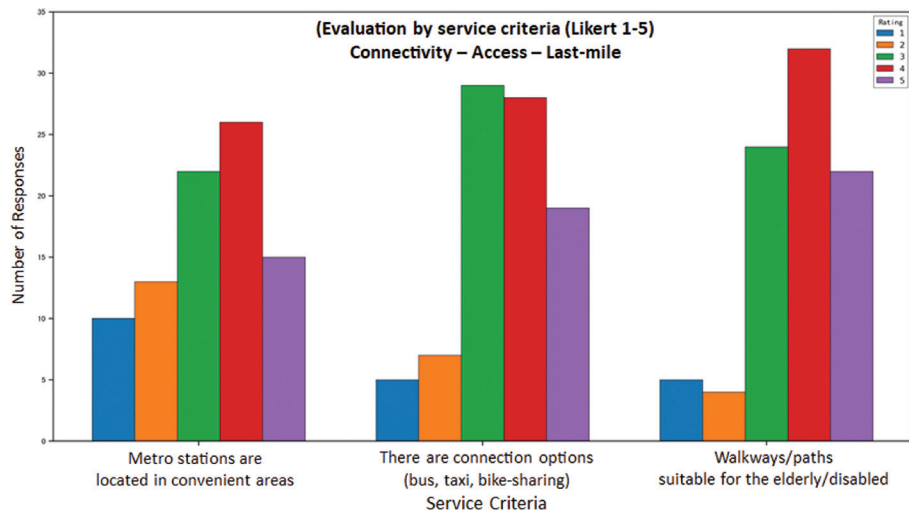
Respondents proposed several practical measures to improve Metro Line 1 services. Frequently mentioned recommendations included increasing parking capacity, strengthening integration with feeder bus services, expanding public awareness campaigns, improving station signage, and providing more comprehensive passenger information.

Many participants also expressed interest in digital technologies capable of simplifying passenger navigation and improving service accessibility. Suggestions included mobile navigation applications, real-time travel information, integrated journey-planning tools, and intelligent passenger assistance systems capable of supporting users throughout their journeys.

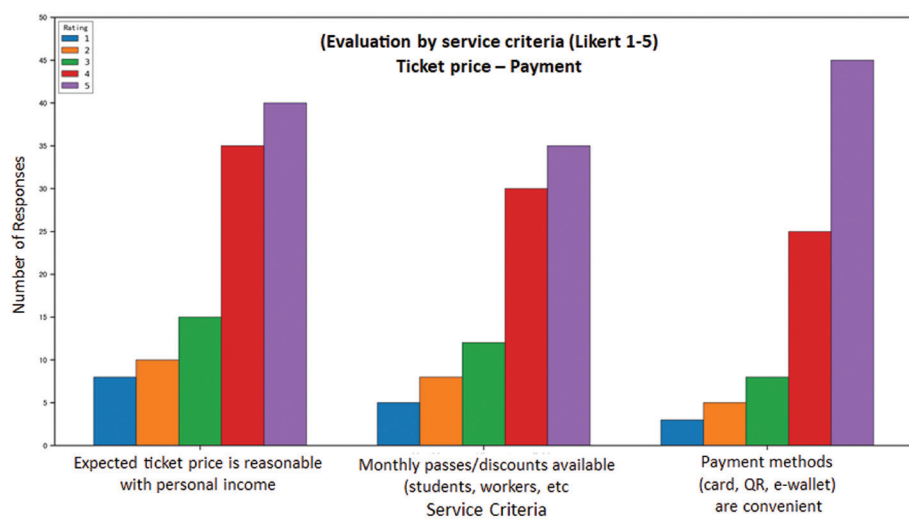
These suggestions provide valuable empirical insights into passengers' priorities and form the basis for the practical recommendations discussed in the subsequent section.

5. Discussion

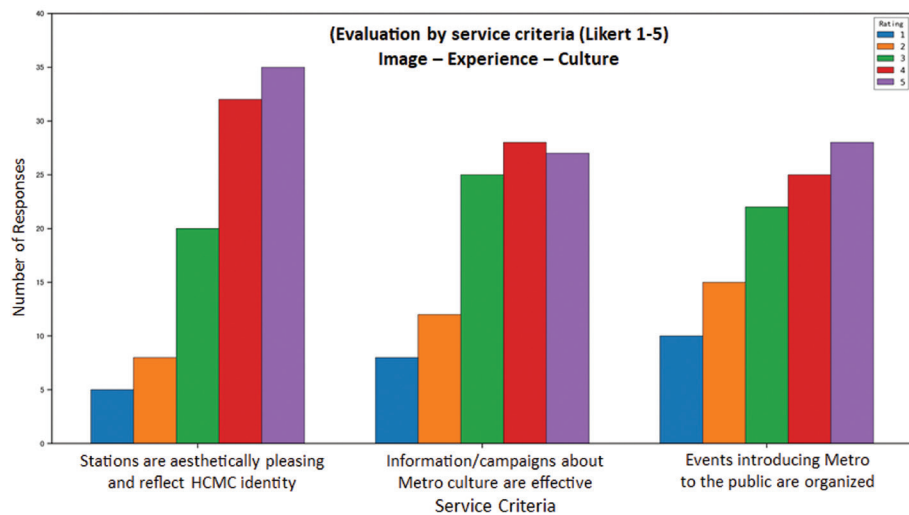
The findings of this exploratory study provide valuable insights into passengers' early experiences with Ho Chi Minh City's Metro Line 1 following its commencement of commercial operations. Overall, respondents expressed favourable perceptions of the metro system, particularly with regard to punctuality, cleanliness, passenger safety, travelling comfort, and operational reliability. These findings suggest that Metro Line 1 has successfully established a positive initial public image and demonstrates considerable potential to



(a). Passenger evaluation of accessibility and multimodal connectivity.



(b). Passenger evaluation of safety, comfort, cleanliness, and station facilities.



(c). Passenger evaluation of information services, overall travel experience, and service improvement priorities.

Figure 2. Passengers' evaluation of selected service quality dimensions of Ho Chi Minh City's Metro Line 1.

Note. The three charts summarise passengers' perceptions across key service quality dimensions, including accessibility, multimodal connectivity, safety, comfort, station facilities, passenger information, and overall travel experience. Responses were collected from **90 Metro Line 1 users** using a five-point Likert scale ranging from **1 (Strongly Disagree)** to **5 (Strongly Agree)**. The charts present descriptive distributions of respondents' evaluations and should be interpreted as exploratory findings rather than statistically representative estimates of the wider population.

become a preferred mode of urban transportation within Ho Chi Minh City.

The positive evaluations of punctuality and operational reliability are consistent with previous studies demonstrating that reliability is one of the most influential determinants of passenger satisfaction and continued public transport usage (Eboli & Mazzulla, 2007; Parasuraman et al., 1988). Reliable services reduce travel uncertainty, improve passengers' confidence in public transportation, and encourage behavioural shifts away from private vehicle dependence. Given Vietnam's longstanding reliance on motorcycles for daily commuting, the positive perceptions reported by respondents represent an encouraging indication that Metro Line 1 is capable of supporting broader sustainable urban mobility objectives.

Similarly, respondents' favourable assessments of cleanliness, safety, and onboard comfort reflect service attributes commonly associated with high-performing metro systems worldwide. Modern station facilities, comfortable coaches, effective security measures, and efficient operations collectively contribute to a positive travel experience and strengthen public confidence in newly introduced transport infrastructure. Comparable findings have been reported in studies of metro systems operating in Singapore, Japan, and other Asian metropolitan cities, where passenger satisfaction is closely associated with consistent operational quality and well-maintained transport facilities (Vietnam Ministry of Transport, 2013, 2024; UITP, 2018).

Despite these positive findings, the study also identified several operational challenges that require attention if Metro Line 1 is to achieve its long-term objective of increasing public transport patronage. The most prominent concerns related to insufficient last-mile connectivity, inadequate parking facilities near stations, limited public awareness of feeder transport services, and difficulties navigating station exits and onward travel options. These findings suggest that passenger satisfaction depends not only on the quality of metro operations themselves but also on the effectiveness of the wider transport ecosystem within which the metro operates.

This observation is consistent with contemporary research on integrated urban mobility, which emphasises that successful metro systems require seamless connections between rail services and complementary modes of transport, including buses, taxis, pedestrian infrastructure, cycling facilities, and park-and-ride services (Suzuki et al., 2013; Ceder, 2016). Consequently, improvements to multimodal integration are likely to generate greater long-term benefits than isolated improvements to metro operations alone.

One particularly important finding concerns passengers' requests for clearer station information and more effective navigation support. Although respondents generally appreciated the modern design of Metro Line 1, many experienced uncertainties regarding station exits, connecting bus services, ticketing procedures, and onward travel options. These findings demonstrate that passenger information constitutes an important dimension of perceived service quality, particularly for first-time users and visitors unfamiliar with the metro network.

The proposed **SmartExit** mobile navigation application therefore emerges directly from the empirical findings rather than representing an independent technological concept. By providing real-time navigation assistance, integrated journey planning, station guidance, and information regarding connecting transport services, SmartExit has the potential to address many of the practical difficulties identified by respondents. Such digital innovations are increasingly recognised as essential components of smart-city transportation systems, where information accessibility is considered equally important as physical transport infrastructure.

Similarly, the proposed introduction of AI-powered passenger assistance robots should be viewed as a complementary service enhancement designed to improve passenger experience rather than as a replacement for human staff. Respondents consistently highlighted the need for clearer information, multilingual communication, and improved wayfinding assistance. AI-enabled service robots could provide immediate multilingual guidance, answer frequently asked questions, assist passengers with ticketing procedures, and direct users towards station facilities or connecting transport services. Such technologies have already been implemented in several advanced metro systems and illustrate how artificial intelligence can enhance operational efficiency while improving passenger satisfaction.

The findings also highlight the importance of viewing Metro Line 1 within the broader context of sustainable urban development. Investments in rail infrastructure alone are unlikely to transform travel behaviour unless accompanied by improvements in accessibility, convenience, information provision, and public confidence. Encouraging long-term modal shifts from private motorcycles to public transportation requires a comprehensive passenger-centred approach that combines high-quality infrastructure with integrated transport planning, digital innovation, and continuous service improvement.

It is important to interpret these findings within the context of the study's exploratory design. The

respondents primarily comprised younger passengers and students, who may possess greater familiarity with digital technologies and demonstrate greater willingness to adopt newly introduced transport services. Consequently, the findings should be interpreted as preliminary empirical insights into the experiences of early metro users rather than definitive conclusions regarding the wider population of Ho Chi Minh City. Nevertheless, these early user experiences provide valuable evidence for policymakers and metro operators during the formative stages of system development and establish an important foundation for future longitudinal research examining changes in passenger perceptions as Metro Line 1 continues to mature.

Overall, the study demonstrates that Metro Line 1 has established a strong operational foundation characterised by positive passenger perceptions of service quality, while simultaneously identifying several practical areas requiring further improvement. Addressing issues relating to multimodal connectivity, passenger information, digital navigation, and integrated transport services will be essential for enhancing passenger satisfaction and supporting the long-term success of Ho Chi Minh City's urban railway network.

6. Recommendations

The findings of this exploratory study indicate that although Metro Line 1 has established a strong operational foundation, several strategic improvements could further enhance passenger satisfaction, increase ridership, and support the long-term sustainability of urban public transportation in Ho Chi Minh City. Based on the empirical findings, the following recommendations are proposed.

6.1 Strengthen Multimodal Connectivity and Last-Mile Accessibility

One of the principal challenges identified by respondents concerns accessibility beyond metro stations. Improving multimodal connectivity should therefore be regarded as a strategic priority. Transport authorities should strengthen coordination between Metro Line 1 and complementary transport services, including feeder buses, electric shuttle buses, taxis, ride-hailing services, cycling infrastructure, and pedestrian walkways. Expanding park-and-ride facilities and improving bicycle parking at stations would further enhance convenience for commuters travelling from surrounding residential areas.

Greater integration between transport modes would reduce journey interruptions, improve travel efficiency, and encourage more residents to transition from private motorcycles to public transportation.

6.2 Enhance Passenger Information and Wayfinding Systems

The findings indicate that passengers require clearer guidance regarding station layouts, ticketing procedures, transfer points, and onward travel options. Metro operators should therefore invest in comprehensive multilingual wayfinding systems incorporating improved directional signage, interactive digital information displays, real-time service announcements, and integrated journey-planning information.

Clear and accessible passenger information is particularly important for first-time users, tourists, elderly passengers, and individuals with disabilities, contributing to a more inclusive and user-friendly transport environment.

6.3 Introduce the SmartExit Passenger Navigation Application

A significant outcome of this study is the proposed development of the **SmartExit** mobile application as an integrated passenger navigation platform. The application could provide real-time guidance from station platforms to surrounding destinations while simultaneously identifying optimal exit points, connecting bus routes, taxi stands, bicycle-sharing facilities, and nearby public amenities.

Additional functions may include live service updates, digital ticket integration, accessibility information for passengers with reduced mobility, and personalised journey recommendations. By simplifying station navigation and improving multimodal coordination, SmartExit has the potential to enhance passenger convenience and reduce uncertainty throughout the travel experience.

6.4 Explore Artificial Intelligence for Passenger Assistance

The study also supports the gradual introduction of artificial intelligence (AI) to improve customer service within Metro Line 1 stations. Rather than replacing frontline staff, AI-powered passenger assistance systems could complement existing services by providing multilingual information, responding to frequently asked questions, assisting with ticket purchases, offering navigation guidance, and directing passengers to appropriate facilities or connecting transport services.

Carefully implemented AI technologies could improve service efficiency while enabling staff to concentrate on more complex passenger needs requiring personal assistance.

6.5 Promote Public Awareness and Community Engagement

Despite the generally positive perceptions of Metro Line 1, the findings suggest that some passengers remain unaware of available supporting services, particularly electric feeder buses and integrated transport connections. Metro operators should therefore expand public communication strategies through digital media, educational campaigns, community outreach programmes, universities, and local organisations.

Increasing public awareness of the environmental, economic, and practical benefits of metro travel may encourage greater ridership and contribute to long-term behavioural change towards sustainable urban mobility.

6.6 Adopt a Passenger-Centred Approach to Continuous Service Improvement

Passenger expectations evolve as transport systems mature. Metro operators should therefore establish regular mechanisms for monitoring passenger satisfaction through periodic surveys, digital feedback platforms, mobile applications, and stakeholder consultations. Continuous evaluation will enable operators to identify emerging service issues promptly and implement evidence-based improvements that reflect passengers' changing needs and expectations.

Embedding passenger feedback within operational planning will contribute to higher service quality, stronger public confidence, and sustained growth in metro usage.

6.7 Support Future Research and Policy Development

As Metro Line 1 continues to expand and additional urban railway lines become operational, further research should examine passenger satisfaction using larger and more representative samples drawn from diverse demographic groups. Future investigations could incorporate advanced statistical analyses, comparative studies across multiple metro systems, and longitudinal research examining changes in passenger perceptions over time.

Such studies would provide policymakers and transport planners with stronger empirical evidence for evaluating transport policies, improving service quality, and supporting the continued development of sustainable urban mobility in Vietnam.

7. Conclusion

This exploratory study examined passenger satisfaction, service challenges, and user experiences associated with Ho Chi Minh City's Metro Line 1 during

its early period of commercial operation. As the City's first operational urban railway, Metro Line 1 represents a significant milestone in the country's transition towards a more sustainable, efficient, and integrated urban transportation system. The findings indicate that passengers generally hold favourable perceptions of the metro, particularly with respect to punctuality, operational reliability, cleanliness, safety, comfort, and the overall travelling experience. These positive evaluations suggest that Metro Line 1 has established a strong operational foundation capable of supporting long-term growth in public transport utilisation.

At the same time, the study identified several operational and infrastructural challenges that require continued attention. Respondents consistently highlighted issues relating to last-mile connectivity, limited station parking, insufficient awareness of feeder transport services, and the need for clearer passenger information and wayfinding systems. These findings demonstrate that the long-term success of an urban railway system depends not only on efficient rail operations but also on the seamless integration of complementary transport services, effective communication, and a passenger-centred approach to service delivery.

From a theoretical perspective, this study extends the growing body of literature on passenger satisfaction and public transport service quality by applying established service quality concepts to the context of Ho Chi Minh City's first urban metro system. The findings reinforce the view that passengers evaluate metro services through multiple interconnected dimensions, including operational performance, accessibility, safety, comfort, information quality, and overall travel experience. The study therefore contributes new empirical evidence from an emerging urban rail environment where scholarly research remains relatively limited.

The study also provides several practical contributions for transport authorities, metro operators, and urban planners. The recommendations relating to multimodal integration, enhanced passenger information systems, expanded park-and-ride facilities, and improved wayfinding offer practical strategies for strengthening service quality and encouraging greater public transport adoption. Furthermore, the proposed **SmartExit** mobile navigation application and AI-assisted passenger support services illustrate how digital innovation can complement physical transport infrastructure by improving accessibility, passenger convenience, and the overall travel experience. These initiatives align with broader smart-city objectives and demonstrate how technology may contribute to more responsive and user-oriented public transport services.

More broadly, the findings highlight the importance of viewing urban rail systems as components of an integrated mobility ecosystem rather than as isolated transport infrastructure. Achieving sustainable behavioural change requires coordinated investment not only in railway construction but also in multimodal connectivity, passenger information, digital technologies, and continuous service improvement. As Ho Chi Minh City expands its metro network, lessons learned from Metro Line 1 may provide valuable guidance for future railway development throughout Vietnam and other rapidly urbanising cities seeking to promote sustainable urban mobility.

Although exploratory in nature, this study offers timely empirical insights into passengers' early experiences with Metro Line 1 and establishes an important foundation for future research on urban rail transportation in Vietnam. By identifying both the strengths of the current system and the areas requiring further enhancement, the study contributes to ongoing efforts to improve passenger satisfaction, strengthen public confidence in mass transit, and support the long-term development of efficient, inclusive, and sustainable urban transportation.

7.1 Limitations of the Study

Several limitations should be acknowledged when interpreting the findings of this study. First, the research employed an exploratory design based on a relatively modest sample of 90 respondents. While appropriate for an initial investigation of a newly operational metro system, the sample does not permit broad statistical generalisation to the entire population of Ho Chi Minh City.

Second, the respondents were predominantly younger passengers and students, whose travel behaviours, technological familiarity, and perceptions may differ from those of older commuters, working professionals, tourists, or individuals with disabilities. Consequently, the findings primarily reflect the experiences of early metro users rather than the full diversity of Metro Line 1 passengers.

Third, the quantitative analysis was intentionally limited to descriptive statistics because the study sought to provide preliminary empirical insights into passenger experiences during the metro's initial operational phase. Future investigations employing larger and more representative datasets may incorporate more advanced statistical techniques to examine relationships among service quality dimensions and passenger satisfaction.

Finally, this study focused exclusively on Metro Line 1 during its early period of commercial operation.

Passenger perceptions are likely to evolve as the metro network expands, operational procedures mature, and users become more familiar with the system. The findings should therefore be interpreted within the specific temporal and operational context in which the study was conducted.

7.2 Future Directions

This exploratory investigation provides several opportunities for future research. Subsequent studies should employ larger and more representative samples encompassing a broader range of passenger groups, including commuters, older adults, tourists, persons with disabilities, and residents from different districts of Ho Chi Minh City. Such studies would provide more comprehensive evidence regarding passenger satisfaction across diverse user populations.

Future research may also incorporate advanced quantitative techniques, including reliability analysis, exploratory and confirmatory factor analysis, structural equation modelling, or regression analysis, to examine the relationships between service quality dimensions, passenger satisfaction, behavioural intention, and long-term public transport adoption. Longitudinal studies tracking passenger perceptions over time would further enhance understanding of how satisfaction evolves as Metro Line 1 becomes more established and additional metro lines commence operation.

Comparative studies involving other urban railway systems within Southeast Asia or internationally would provide valuable insights into best practices in metro management, service quality enhancement, and sustainable urban mobility. Such comparative research could assist policymakers in benchmarking Metro Line 1 against established international standards while identifying opportunities for continuous service improvement.

Finally, future investigations should evaluate the practical implementation and effectiveness of digital innovations such as the proposed **SmartExit** navigation platform, AI-assisted passenger information systems, integrated mobility applications, and other smart-city technologies. Examining how these innovations influence passenger behaviour, accessibility, travel efficiency, and overall service satisfaction would make an important contribution to the growing literature on intelligent urban transportation systems and digital mobility solutions.

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