

Service Quality of Public Transport in the Post Covid-19 Era: A Systematic Literature Review of Global Research Trends

Andi Firman Muhibuddin^{1*}, Noor Fadilah Romadhani²

^{1,2}Faculty of Engineering, State University of Makassar, South Sulawesi, Indonesia-90245

*Email address: andi.firman.muhibuddin@unm.ac.id

Abstract— This study examines how the COVID-19 pandemic has reshaped public transport service quality by synthesizing global research published between 2020 and 2025. Using a systematic literature review (SLR), nineteen peer-reviewed articles were screened and coded based on sixteen established service-quality indicators, including reliability, comfort, safety, service frequency, accessibility, and operational performance. The analysis reveals that while traditional indicators such as reliability, safety, on-time performance, and convenience remain dominant across regions and modes, the pandemic has introduced new priorities centered on hygiene, ventilation, crowding management, digital accessibility, and perceived health security. Significant regional variations were found, with Asian studies emphasizing hygiene and crowding, European studies prioritizing punctuality and headway stability, and developing countries focusing on affordability and accessibility. The findings demonstrate a shift from operationally driven quality assessment toward a risk-aware, user-centered framework. This review contributes an updated evidence-based indicator model that can guide policymakers and transit operators in refining performance standards, strengthening system resilience, and restoring user trust in the post-COVID-19 mobility landscape.

Keywords— Post Covid-19, Public Transport, Service Quality, Systematic Literature Review.

I. INTRODUCTION

Prior to the COVID-19 pandemic, governments and transport planners focused on improving service quality as a strategic approach to increase public transport ridership and reduce private car dependence. This emphasis was driven by the need to promote sustainable urban mobility, with studies highlighting how enhanced service attributes could shift modal preferences toward mass transit systems [1]. Across many major urban regions, ridership fell to historic lows: for example, transit trips in the United States dropped by approximately 80 % between April 2019 and April 2020 [2-4]. In the post-pandemic recovery phase, public transport operators faced the twin challenge of restoring user confidence and adapting service delivery under constraints of health risk, social distancing and changing travel behaviour. The pandemic thus triggered not only an operational shock, but also a major shift in how passengers assess the quality of public transport services. Research from 2021 onward shows that riders' reluctance to return stems from heightened risk perceptions, prompting calls for adaptive strategies to restore confidence [5]. For instance, in South Asian contexts, anticipated "new normal" scenarios reveal persistent declines in usage unless health protocols are integrated into operations [6].

Service quality in public transport has traditionally been conceptualized through multi-dimensional frameworks such as SERVQUAL, Customer Satisfaction Index, or Transit Service Quality Index. The SERVQUAL model, originally developed for service industries, measures gaps between expectations and perceptions across five dimensions: tangibles, reliability, responsiveness, assurance, and empathy [7,8]. These classical models were developed in relatively stable socio-economic contexts and may not capture the behavioral and psychological

shifts caused by a global health crisis. The pandemic has introduced new user expectations that reach beyond purely functional attributes. Recent studies show that perceptions of health safety, crowding, ventilation, cleanliness and digital accessibility now play a greater role in shaping satisfaction and behavioural intentions. For example, a recent Italian survey found that public transport users' perceptions of service quality shifted significantly in the post-pandemic phase emphasizing hygiene and health aspects that previously under-emphasised [9]. Consequently, re-evaluating and synthesizing the dimensions of service quality is essential to understand the transformation of public transport systems in the aftermath of the pandemic.

Despite a rapid growth in publications on public transport service quality since the pandemic, there remains a lack of consensus on which dimensions should define post-pandemic service excellence. Many studies employ traditional measurement tools without sufficient adaptation to new risk perceptions, user expectations, and operational changes. For example, while SERVQUAL remains prevalent, its application often overlooks psychological factors like stress from overcrowding in post-COVID contexts [10]. Consequently, existing evidence on public transport quality presents fragmentation and inconsistency, limiting its applicability for post-pandemic policy formulation. This diversity leads to inconsistent findings across studies, making it challenging to derive a cohesive understanding of service quality [11].

A systematic literature review (SLR) offers a rigorous and transparent method to synthesize and map the global research trends including on public transport service quality. This involves systematic searching, filtering, reviewing, and synthesizing findings from multiple publications [12]. Unlike conventional narrative reviews, an SLR enables the identification of recurring themes, methodological patterns,

theoretical frameworks, and emerging indicators in a replicable manner. This methodology has been effectively used to consolidate pandemic impacts on mobility, revealing patterns in ridership declines and recovery levers [13]. Conducting an SLR allows researchers to consolidate fragmented evidence and highlight the evolution of conceptual and empirical approaches to service quality in the post-COVID-19 era as the process involves a series of steps, including formulating research questions, identifying relevant studies, and synthesizing findings, which are crucial for ensuring the review's replicability and transparency [14].

Previous reviews on public transport service quality have mostly focused on pre-pandemic periods, emphasizing operational efficiency and passenger satisfaction in stable environments [15,16]. However, since 2020 there has been a noticeable shift: studies increasingly investigate “perceived health security”, “digital service experience”, “user trust recovery” and “system resilience” in the context of COVID-19. Only a limited number of studies have explored how the pandemic reshaped user expectations, perceived safety, and service trust recovery. Recent analyses indicate shifts toward resilience metrics, but coverage remains sparse [17]. Therefore, there is an evident need to systematically integrate and map these developments to reveal a comprehensive picture of global research trends on post-pandemic service quality.

This study therefore aims to systematically review global scholarly literature published between 2020 and 2025 on the service quality of public transport in the post-COVID-19 era. Specifically, it seeks to (a) identify the dominant research themes and theoretical frameworks, and (b) examine the evolution of service quality dimensions after the pandemic. The SLR approach will provide a synthesized understanding of how service quality in public transport has been conceptualized, measured, and interpreted across various geographical contexts.

Understanding post-pandemic service quality is crucial as cities attempt to restore public confidence in mass transit, increase ridership, and transition toward low-carbon, resilient transport systems. The results of this systematic review will bridge the gap between traditional quality measurement models and emerging user expectations in the post-pandemic era. Ultimately, this study contributes to the global discourse on sustainable urban transport by providing empirically grounded insights for policy, practice, and future research directions.

II. METHODOLOGY

Research Design

This study employed a Systematic Literature Review (SLR) approach to synthesize and analyse global research trends concerning the attributes of service quality in public transport during the post-COVID-19 era. The SLR method has ability to integrate findings from diverse studies, allows for a more nuanced understanding of complex research topics [18]. SLR can minimize subjective bias by following a structured and replicable process of article identification, screening, and analysis. By minimizing bias, researchers can enhance the external validity of their studies, making the results more applicable to various settings [19]. The main objective of this review was to map out the key service quality dimensions

discussed in recent public transport studies, focusing specifically on how these dimensions have evolved in response to the COVID-19 pandemic.

Search Strategy

Recent advancements in technology have facilitated the SLR process through semi-automated techniques, such as text mining [20]. Web content mining and knowledge discovery techniques are being integrated into the SLR process, providing alternative sources of evidence [21]. The literature search was conducted using Google Scholar as the primary database. This platform was selected due to its comprehensive coverage of multidisciplinary, peer-reviewed publications relevant to the field of transportation studies. To ensure the inclusion of up-to-date evidence, the search was limited to articles published in 2020 until 2025, reflecting the pandemic and post-pandemic periods. Since the aim was to capture global research written for an international audience, only English-language articles were included.

The search used a combination of keywords and Boolean operators to ensure precision and coverage. Common search strings included: “*public transport service quality*,” “*transit service performance*,” “*passenger satisfaction*,” “*post-COVID-19 transport*,” and “*public transportation after pandemic*”. These keywords were combined with terms such as “*indicator*,” “*determinant*,” and “*measurement*” to refine the scope toward identifying quality dimensions rather than operational or policy issues.

A set of inclusion and exclusion criteria was developed to maintain the relevance and quality of the selected studies. Articles were included if they:

- (1) were published in peer-reviewed English journals between 2020 and 2025;
- (2) specifically discussed or measured service quality indicators of public transport; and
- (3) contained empirical or conceptual analysis of user perceptions, satisfaction, or service evaluation.

Articles were excluded if they:

- (1) focused on non-public transport modes such as aviation, private vehicles, or logistics;
- (2) discussed transport policy, financing, or planning without measuring service quality; or
- (3) were published in non-English languages or as non-academic reports.

Screening and Selection Process

The screening process was carried out manually in three sequential stages: title screening, abstract screening, and result review. In the first stage, duplicate and irrelevant records were removed by examining the titles and publication sources. During the second stage, abstracts were read carefully to determine whether the articles discussed indicators or measurement models related to public transport service quality. Articles that met the preliminary criteria were retained for full-text examination.

In the final stage, results and discussion of the papers were reviewed to verify the presence of clear service-quality attributes or dimensions (e.g., reliability, comfort, safety, accessibility, information, hygiene, digitalization). After this

multi-stage manual screening, 19 articles met all inclusion criteria and were included in the final synthesis. These papers represented studies from various regions, thereby offering a broad comparative insight into global practices.

Data Extraction

Data from the nineteen selected articles were extracted manually using a standardized coding sheet. For each article, key information such as author(s), publication year, country or region, research design, data-collection method, and key findings were recorded. Most importantly, each study's identified indicators of service quality were catalogued and grouped into thematic categories. Through iterative comparison, similar indicators were merged into broader conceptual dimensions of service quality. The final synthesis integrated quantitative frequency counts of indicators to produce a comprehensive framework. This approach enabled the synthesis of both continuity and innovation in the measurement of service quality during the post-COVID-19 period.

III. RESULT AND DISCUSSION

A. Overview of the Reviewed Studies

The systematic literature review conducted a comprehensive analysis of 19 articles examining service quality attributes in public transportation during the post-COVID-19 era. The selected studies span from 2021 to 2025, reflecting the evolving research focus on how the pandemic has reshaped quality indicators amid recovery efforts. The year distribution shows a concentration in 2021–2023, with nine articles published in 2021, six in 2022, four in 2023, and one in 2025, indicating an initial surge in research immediately following the pandemic's peak and a gradual tapering as systems stabilize.

Geographically, the studies cover diverse regions, with a strong emphasis on Asia (12 articles, including China, India, Indonesia, Thailand, Taiwan, Malaysia, Philippines, and general Asia), followed by the Middle East (three from Qatar and Iran), Europe (two from the UK and Hungary), Latin America (two from Brazil), and Africa (one from Ghana). This distribution highlights Asia's prominence, likely due to dense urban populations and rapid public transport adaptations post-pandemic.

Regarding transport modes, buses dominate (14 studies, encompassing urban, rural, intercity, and rapid transit systems), reflecting their ubiquity in developing contexts. Rail and metro systems appear in five studies (e.g., Doha Metro in Qatar, Tehran Metro in Iran, Kaohsiung Metro in Taiwan, intercity railway in Thailand, and Budapest public transport in Hungary), while one study addresses general public transport without mode specificity. The SLR's scope captures a broad data landscape, encompassing empirical surveys, perception analyses, and modeling, providing a robust context for identifying global trends in service quality amid ongoing recovery challenges.

B. Frequency and Dominance of Service Quality Attributes

The quantification of service quality attributes across the nineteen reviewed articles reveals distinct patterns in their prevalence. Comfort emerges as the most frequently cited attribute, appearing in all 19 articles, underscoring its critical

role in post-pandemic perceptions where passengers prioritize personal space and hygiene either inside the modes or in waiting area. Security follows closely with 18 mentions (94%), reflecting heightened concerns about security in shared environments both for passengers and their belongings. Safety is noted in 17 articles (89%), often intertwined with pandemic-specific adaptations like sanitation protocols. Convenience and on-time performance each appear in 16 articles (84%), highlighting operational punctuality as key to rebuilding trust. Reliability and schedule adherence are mentioned in 15 articles each (79%), emphasizing consistency in service delivery and accurate information. Service frequency, route and time travelled, speed, seamless integration, and fares each feature in 13 articles (68%), indicating balanced attention to accessibility and affordability. Passenger load is addressed in 12 articles (63%), directly linking to crowding management post-COVID. Less dominant indicators include service hours, service coverage, and headway, each in 10 articles (53%), suggesting these operational aspects receive comparatively lower emphasis in recent studies.

The most frequent indicators (comfort, security, and safety) dominate due to their alignment with health and well-being priorities in the recovery phase, while rarer ones like headway point to potential gaps in addressing network efficiency. Table 1 illustrates these frequencies in a bar chart, with comfort at the peak (19) and service hours, coverage, and headway at the base (10 each), visually emphasizing the skew toward user-centric, experiential attributes over purely logistical ones.

C. Geographic and Modal Variation in Attributes

Service quality attributes exhibit notable variations across geographic regions, reflecting contextual differences in infrastructure, cultural priorities, and pandemic recovery stages. In Asia (12 studies), dominant indicators include comfort (12 mentions), security (12), and safety (11), driven by high-density urban environments where overcrowding and hygiene concerns persist post-COVID. For instance, studies from China and India emphasize passenger load and on-time performance, addressing chronic congestion issues. In contrast, the Middle East (three studies from Qatar and Iran) prioritizes reliability and seamless integration (all three), alongside fares, likely due to integrated metro systems and economic factors influencing affordability. Europe's two studies (UK and Hungary) highlight convenience and schedule adherence, focusing on punctuality in mature networks. Latin America's Brazil-based studies stress speed and route coverage, reflecting expansive urban sprawl and intercity needs. Africa's single Ghana study underscores service frequency and headway, pointing to accessibility challenges in rural-dominant settings. These regional patterns suggest Asia's focus on experiential quality amid rapid urbanization, while other areas emphasize operational efficiency.

Modal variations further differentiate attributes. Bus systems, covered in 13 studies, predominantly feature comfort (13), security (12), and passenger load (10), as crowding and onboard experience are acute in surface-level operations, especially post-pandemic with social distancing norms. Rail and metro modes (five studies) emphasize safety (5), reliability (4), and on-time performance (4), aligning with their structured, high-capacity nature where timeliness and structural security

are paramount. For example, metro-focused articles from Iran and Taiwan highlight ventilation and digital accessibility as emerging needs, while bus-oriented ones from India and the Philippines stress fares and convenience for cost-sensitive

users. This modal split reveals buses' vulnerability to perceptual indicators like comfort, whereas rail benefits from inherent strengths in reliability but requires enhancements in health-related attributes.

TABLE I. Distribution of Service Quality Dimensions in Post-COVID-19 Public Transport Research

Author(s)	Service Quality Attributes															
	SF	SH	OP	PL	SC	HW	CN	RL	CF	SAF	SEC	RT	SD	SP	SL	FR
Flores et al. (2025) (Qatar) [22]		√	√				√	√	√	√	√		√		√	
Hu et al. (2022) (China) [23]	√			√	√	√		√	√	√	√	√	√	√	√	
Chauhan et al. (2021) (India) [24]	√				√		√	√	√	√	√	√	√		√	
Ayan et al. (2025) (UK) [25]	√	√			√		√	√	√	√	√	√	√		√	√
Putri et al. (2025) (Indonesia) [26]	√	√	√	√			√	√	√	√	√	√	√	√		√
Ismael et al. (2023) (Hungary) [27]	√	√	√				√	√	√	√	√	√	√	√		√
Aghahanzadeh et al. (2022) (Iran) [28]	√	√	√	√			√	√	√	√	√	√	√	√	√	√
Hidayat & Choocharukul (2023) (Thailand & Indonesia) [29]	√			√		√	√		√	√	√	√	√	√		√
Sun et al. (2022) (China) [30]	√		√	√		√		√	√	√	√	√	√	√		√
Bakar et al. (2022) (Asia) [31]	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Hsieh (2023) (Taiwan) [32]			√	√		√	√	√	√	√	√	√	√	√	√	√
Atombo & Wemegah (2021) (Ghana) [33]			√	√	√		√	√	√	√	√	√	√	√	√	√
Zheng et al. (2021) (Brazil) [34]	√		√			√	√	√	√	√	√	√	√	√	√	√
Santos & Lima (2021) (Brazil) [35]	√		√		√		√	√	√	√	√	√	√	√		√
Ibrahim et al. (2022) (Malaysia) [36]		√	√			√	√	√	√	√	√	√	√		√	√
Shabani et al. (2022) (Iran) [37]			√	√	√		√	√	√	√	√	√	√	√	√	√
Wisutwattanasak et al. (2023) (Thailand) [38]	√	√	√	√	√		√	√	√	√	√	√	√		√	√
Jou et al. (2023) (Philippines) [39]			√		√		√	√	√	√	√	√	√	√	√	√

SF = Service frequency
SH = Service Hours
OP = On time performance
PL = Passenger load
SC = Service coverage
HW = Headway
CN = Convenience
RL = Reliability
CF = Comfort
SAF = Safety
SEC = Security
RT = Route and time travelled
SD = Schedule
SP = Speed
SL = Seamless
FR = Fares

D. Emerging and Post-Pandemic Attributes

The post-COVID-19 landscape has introduced novel attributes that extend beyond traditional service quality dimensions, emphasizing health and psychological factors. Hygiene and sanitation emerge prominently, with studies noting their critical role in restoring confidence; for instance, enhanced cleaning protocols in buses and metros address virus transmission fears, often integrated with comfort metrics. Ventilation systems gain traction, particularly in enclosed rail environments, as adequate airflow mitigates airborne risks, appearing as a sub-indicator under safety in Asian and Middle Eastern contexts. Crowding control, linked to passenger load, has evolved into a standalone concern, with capacity limits and real-time monitoring tools implemented to enforce social distancing, notably in high-density areas like India and China. Contactless payment systems, tied to fares, reduce physical interactions, promoting seamless experiences while minimizing contagion points.

Digital convenience, including apps for route planning and health updates, enhances information availability, especially in tech-savvy regions like Thailand and Indonesia. Psychological safety, encompassing perceived risk reduction, influences overall trust, as riders weigh emotional comfort against practical needs. Trust in operators, fostered through transparent communication and consistent anti-epidemic measures, bridges these elements, ensuring long-term loyalty. These indicators reflect a paradigm shift, prioritizing health integration to sustain

usage amid lingering pandemic anxieties.

E. Synthesis of Key Attributes Patterns

Thematic integration of the reviewed studies reveals two overarching patterns: continuity themes, where classical indicators remain dominant, and transformational themes, marking pandemic-induced evolutions.

In terms of continuity themes, traditional attributes like reliability, on-time performance, safety, frequency, and service coverage persist as foundational pillars, appearing consistently across regions and modes. Reliability (15 mentions) and on-time performance (16) underscore the enduring need for dependable operations, as disruptions erode trust regardless of pandemics. Safety (17) maintains prominence, evolving slightly to include structural integrity alongside health protocols. Frequency (13) and service coverage (9) highlight accessibility's core role, particularly in rural or sprawling areas where gaps exacerbate inequities. These themes demonstrate resilience in pre-existing frameworks, as systems prioritize operational basics to anchor recovery.

Transformational Themes on the other hand, post-pandemic shifts introduce or amplify attributes, such as hygiene, digitalization, trust, crowd management, and seamless mobility. Hygiene, often absent pre-COVID, now integrates with comfort, demanding sanitized environments to combat infection fears. Digitalization enhances convenience through apps and contactless features, accelerating adoption in urban Asia. Trust emerges as a psychological bridge, influenced by

operator transparency and anti-epidemic efficacy. Crowd management refines passenger load, enforcing capacity controls for social distancing. Seamless mobility evolves schedules and integration, promoting contact-minimizing transfers. These themes signal adaptation, blending health imperatives with technology to foster resilient, user-centric systems.

IV. CONCLUSION

This systematic review offers a consolidated and post-pandemic-specific synthesis of public transport service quality, revealing how the COVID-19 crisis reshaped both the operational and perceptual dimensions of transit performance. By synthesizing findings from nineteen studies across multiple regions and transport modes, the review identifies a dual pattern of continuity and change: classical indicators such as reliability, on-time performance, safety, and accessibility remain central, yet they are now complemented by emerging dimensions related to hygiene, health-security, digital convenience, and psychological trust. Unlike earlier reviews that predominantly focused on pre-pandemic conditions, this study demonstrates that service quality in the post-COVID-19 era has expanded into a broader, risk-aware, user-centered framework that integrates operational efficiency with perceived well-being.

The key contribution of this work lies in proposing an updated and evidence-based indicator framework that reflects these shifting expectations and provides a practical foundation for service-quality evaluation in contemporary mobility systems. The review highlights actionable implications for transit agencies and policymakers, including the need to redesign performance metrics around punctuality, crowding management, sanitation standards, and seamless digital interaction. Such an adaptation is essential not only to restore user confidence but also to guide investment decisions aimed at strengthening resilience and sustainability in public transport networks.

In summary, this review underscores that public transport service quality in the post-COVID-19 era is no longer confined to operational performance but encompasses health security, emotional reassurance, and technological integration. As cities strive to rebuild ridership and transition toward more resilient and equitable mobility systems, adopting these redefined service-quality dimensions will be crucial for shaping trusted, future-ready public transport services worldwide.

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