

# Mapping the Intellectual Structure of Service Quality Research in Public Transport: A Bibliometric Analysis

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## ABSTRACT

The quality of services delivered by public transport operators is used to assess the level of service provided to passengers and users. Improved public transportation quality of service (QOS) will attract new customers to switch from private automobiles to the public transportation system. This evaluation of public transportation service quality is an important tool for transportation operators and planners in attracting and retaining customers, setting strategic goals, and making funding choices. Several studies on the quality of public transport service have been published. However, extensive and quantitative research are lacking. Furthermore, just eleven reviews on the quality of public transport services have been published in the Scopus database. The current review was carried out to provide scholars and practitioners with the update of public transport quality publications through the last 10 years (2012-2022) to fulfil their concerns and answer their public transport service quality question. This paper contains a literature review of quality of public transport service. A bibliometric analysis was performed using VOSviewer software analysis the service quality of public transportation publications obtained from the Scopus database to enable researchers to trace the historical and annual records of publications related to service quality covering the leading countries, institutions, journals, most frequently used keywords, authors, citation network analysis and the most cited publication. A preliminary version of this work was presented at the International Graduate Conference of Built Environment and Surveying 2023 and appeared in its proceedings. This expanded version provides a significant extension through advanced statistical forecasting and a more comprehensive literature synthesis.

**Keywords:** Bibliometric, VOSviewer, public transport, service quality, review

## INTRODUCTION

Service quality has long been recognized as a central construct in service management and marketing literature. It is commonly conceptualized as the gap between customers' expectations of a service and their perceptions of the actual service delivered (Parasuraman et al., 1990). Over the past decades, service quality has evolved into a strategic instrument for enhancing customer satisfaction, loyalty, and competitive advantage across multiple industries. In public transportation, service quality plays an even more critical role, as it directly influences ridership decisions, modal shift from private vehicles, and overall system sustainability.

In the context of public transport, service quality extends beyond traditional marketing dimensions such as reliability, responsiveness, assurance, empathy, and tangibles. It encompasses operational performance, accessibility, safety, comfort, environmental impact, and policy-related considerations. Improvements in service quality have been associated with increased ridership and enhanced financial performance of transit agencies (Brinckerhoff, 2013). Consequently, understanding and measuring service quality has become a priority for transport planners, policymakers, and operators seeking to promote sustainable mobility and reduce private car dependence.

However, public transport users are not a homogeneous group. Some passengers are "captive users" with limited modal alternatives, while others are "choice users" who can switch between private and public transport options. These differences significantly influence how service quality attributes are perceived and valued. As a result, defining, measuring, and standardizing service quality in public transportation remains complex and multidimensional. The literature reflects diverse approaches, theoretical frameworks, and

methodological techniques, making it challenging to obtain a comprehensive understanding of the field's development.

Despite the growing body of research on public transport service quality, there remains limited quantitative synthesis of the intellectual structure, thematic evolution, and global research patterns within this domain. Existing studies tend to focus on specific models (e.g., SERVQUAL adaptations) or case-based empirical applications, with relatively fewer studies examining the broader scientific landscape of the field. A systematic bibliometric assessment is therefore necessary to map research trends, identify dominant themes, highlight leading contributors, and uncover emerging research directions.

To address this gap, the present study conducts a bibliometric analysis of service quality research in public transportation published between 2012 and 2022 using the Scopus database and VOSviewer software.

Specifically, this study aims to:

- (1) examine publication growth and temporal distribution trends;
- (2) identify leading authors, countries, institutions, and journals;
- (3) analyse keyword co-occurrence and thematic structures; and
- (4) explore emerging research directions and potential gaps in literature;

By systematically mapping the intellectual and thematic development of public transport service quality research, this study provides valuable insights for academics, policymakers, and practitioners seeking to advance theoretical frameworks, improve measurement approaches, and strengthen evidence-based transport policy.

## LITERATURE REVIEW

### Service Quality Review Research

In service management literature, service quality has traditionally been conceptualized from a user-based perspective, emphasizing customers' subjective evaluations of service performance (Fitzsimmons & Fitzsimmons, 2001). As markets have become increasingly competitive and service offerings more diversified, service quality has emerged as a strategic differentiator and a critical determinant of organizational performance (Lovelock, 2018). For transport operators, maintaining a high level of service quality is not only essential for customer retention but also for sustaining competitive advantage and financial viability.

Despite its strategic importance, the conceptualization and measurement of service quality remain subjects of ongoing debate (Brady et al., 2002). One major challenge lies in the absence of universally accepted and measurable parameters for evaluating service performance (Gržinić, 2007). In public transport, this complexity is amplified by the multidimensional nature of services, which encompass operational reliability, accessibility, safety, comfort, and environmental considerations. The ability to improve transport system performance is therefore closely linked to the development of robust measurement frameworks that can capture both user perceptions and operational realities (Eboli & Mazzulla, 2007).

The SERVQUAL model remains the most widely recognized conceptual framework for measuring service quality. Originally developed for general service industries, SERVQUAL evaluates quality based on five dimensions: reliability, responsiveness, assurance, empathy, and tangibles. Although extensively applied in transportation research, numerous adaptations have been proposed to reflect the sector-specific characteristics of public transport systems. These modifications often incorporate additional operational indicators such as punctuality, frequency, safety, and accessibility, reflecting the need to contextualize service quality assessment within transport environments.

Beyond perception-based models, standardized performance frameworks have also been introduced to guide public transport quality assessment. For example, the European standard EN 13816:2002 provides a

comprehensive structure for evaluating public transport services. It organizes service quality into eight categories, covering availability, accessibility, information, time, customer care, comfort, safety, and environmental impact. The standard includes 29 sub-criteria and 193 Key Performance Indicators (KPIs) designed primarily for railway operators (Pongjirawut et al., 2017). Unlike SERVQUAL, which focuses primarily on user perceptions, EN 13816 integrates perspectives from users, operators, and transport authorities, highlighting the multi-stakeholder nature of service quality measurement.

However, the coexistence of perception-based models and operational performance standards reflects a broader fragmentation within the literature. Different organizations and researchers adopt varying definitions, dimensions, and measurement approaches, resulting in inconsistent performance benchmarks across contexts (Pongjirawut et al., 2017). Moreover, public transport users are not homogeneous; captive users and choice users may prioritize different service attributes, further complicating the standardization of quality criteria. Consequently, the literature demonstrates significant conceptual diversity, with no single dominant framework universally accepted (Gronroos, 1984; Parasuraman et al., 1988; Brady & Cronin, 2001; Karatepe et al., 2005).

Given these conceptual debates and methodological variations, there is a need to systematically examine how service quality research in public transport has evolved, which theoretical approaches dominate the field, and how measurement frameworks have developed over time. A bibliometric perspective enables a structured synthesis of this fragmented body of knowledge and provides insight into emerging trends and research gaps.

### **Bibliometric Analysis**

To achieve the objectives of this study, a bibliometric analysis was employed. Bibliometric analysis is a quantitative research method that applies statistical and mathematical techniques to evaluate patterns within academic publications, including citation structures, authorship networks, keyword cooccurrence, and publication trends (De Bellis, 2009; Donthu et al., 2021). Since its development in the mid-twentieth century, bibliometrics has become a widely accepted approach for systematically examining the intellectual structure and evolution of scientific fields.

Unlike traditional narrative literature reviews, which may be subject to researcher bias, bibliometric analysis enables the examination of large volumes of scholarly data in an objective and replicable manner (Golgeci et al., 2021). By analysing publication outputs, citation relationships, and thematic clusters, bibliometric techniques provide insight into knowledge development, dominant research streams, collaborative networks, and emerging topics within a discipline (Van Raan, 2005; Tunger & Eulerich, 2018). This approach is particularly suitable for fields characterized by conceptual diversity and methodological fragmentation, such as public transport service quality research.

Depending on research objectives, bibliometric analysis may include citation analysis, co-citation analysis, bibliographic coupling, and co-word (keyword) analysis (De Bellis, 2009; He, 1999). In the present study, publication trend analysis, citation analysis, co-authorship analysis, and keyword cooccurrence mapping were conducted to identify leading contributors, dominant themes, and evolving research patterns in service quality studies within public transportation.

Data was retrieved from the Scopus database, selected for its extensive multidisciplinary coverage and comprehensive indexing of peer-reviewed journals. Scopus provides structured bibliographic metadata, including author affiliations, citation counts, keywords, and source information, enabling systematic science mapping and performance analysis.

To visualize and analyse bibliometric networks, VOSviewer software (version X.X) was utilized. VOSviewer is widely recognized for constructing and visualizing bibliometric maps based on network data, including co-authorship, citation, and keyword relationships. The software enables clustering of related items and graphical representation of thematic structures, facilitating interpretation of intellectual linkages and research evolution. Through overlay and network visualization techniques, this study identifies major research clusters, collaborative patterns, and thematic trends within public transport service quality literature.

By combining quantitative performance indicators with science mapping techniques, this bibliometric approach provides a structured and objective overview of the development, structure, and emerging directions of research in the field.

## Gaps in Literature

Despite the proliferation of research on public transport service quality, a significant gap exists in the form of intellectual fragmentation, where the lack of a dominant, universally accepted framework has led to a siloed body of knowledge. While individual studies have extensively explored either perception-based models like SERVQUAL or operational standards like EN 13816, there has been no systematic, quantitative synthesis to map how these disparate theoretical streams interact or evolve over time. Current literature remains divided by inconsistent dimensions and varying stakeholder priorities, leaving the field without a clear evolutionary trajectory or a structured understanding of which thematic clusters are emerging as the new "gold standard." A bibliometric approach is therefore necessary to move beyond subjective narrative reviews and provide a data-driven mapping of the field's intellectual structure, identifying the hidden linkages between operational realities and user perceptions that traditional qualitative analyses have failed to bridge.

Building upon preliminary bibliometric findings reported by Ismail et al. (2024), this article provides a significantly more detailed analysis of the public transport service quality landscape. While the initial study identified general publication trends, this expanded research introduces ARIMA modeling to forecast future research trajectories and provides a granular qualitative assessment of the emerging thematic clusters identified via VOSviewer.

## METHODOLOGY

This study adopts a quantitative research design to investigate the heterogeneous nature of passenger perceptions regarding public bus service quality in Johor Bahru. The methodology focuses on identifying how specific socio-demographic filters shape the evaluation of transit attributes.

### Data Collection

The study collected bibliographic data from the service quality of public transport Citation Index by accessing the Scopus bibliographic database bibliographic database produced by Elsevier. Based on the database launched in 2004, Scopus covers nearly 36,377 titles from approximately 11,678 publishers, of which 34,346 are peer-reviewed journals in top-level subject fields: life sciences, social sciences, physical sciences and health sciences (Juhana, 2015). This study selected 10 journals from the database, consisting of seven top business journals and three top Marketing journals. Combining results of several business journal-ranking studies.

### Data Source

Data mining carried out using the Scopus database in August 2022. The main theme of this research was a review article in the title and abstract that included "Service Quality\*". The oldest and most recent dates of publication Returning to 2012, the latest one is from 2022.

The Single-country publication (S.C.P) information obtained through restriction of search results to a specific country using the field code AFFILCOUNTRY. Source, author, affiliation, country/territory, subject area and type of document are dependent on year; and central theme search results analyzed. Bibliometric metric used for ranking purposes, for instance, total articles, CiteScore, total citations, and h-index.

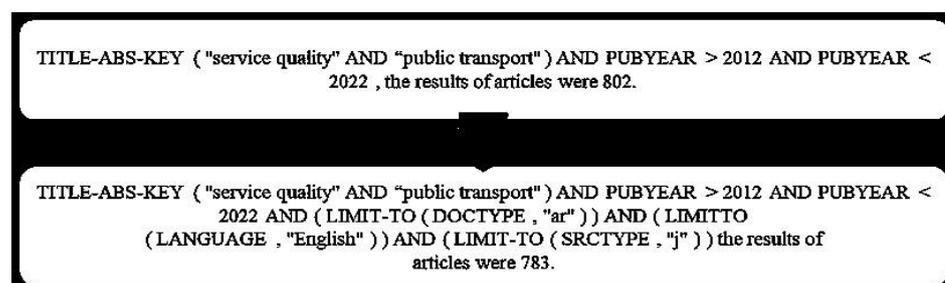


Figure 1 The Process of Data Mining Bibliometric Maps

783 articles' citation, bibliography, and author keywords were exported to VOSviewer (version 1.6.7, Center for Science and Technology Studies, Leiden University, The Netherlands), a bibliometric mapping and visualisation software programme. VOSviewer-generated things can be found on maps. The items are the interest objects in this analysis and the keywords or countries of the author. There may be a link between any pair of items connection or relationship between two items. Every relation has a strength, which represents a positive value for numbers. The higher the publications are beginning of 2018; a strong interest in service quality of public transport research indicated. Annual publications have since increased steadily, leading to a substantial increase in the cumulative publications produced. Therefore, the annual publication expected to continue to get up. However, the majority of these articles are not accessible, and the user must pay to access the information contained within them.

### Co-Authorship Analyzes

For analysis of co-authorship, fifty-six countries associating with thirty-six authors were involved. The involved countries divide into ten clusters with each cluster having a major country of co-authorship that includes United States, United Kingdom, Australia, Taiwan, South Korea, China, Hong Kong, Iran, Germany, Malaysia, India, and Italy.

### Co-Occurrence Analyzes

The selected overlay visualization mode for displaying the annual average publishing number of occurrences and keywords linking strength of the keyword color reflects the document typical publishing year in which keyword occurs. The minimum keyword occurrences can analyze up to five in VOSviewer.

### Time Prediction Analysis using ARIMA

To analyze the publication trends and forecast future research activity, an Autoregressive Integrated Moving Average (ARIMA) model was employed. While initial observations suggested exponential growth, the ARIMA model was selected for its ability to handle the non-stationarity and specific fluctuations observed in the data between 2012 and 2022. The Autoregressive Integrated Moving Average (ARIMA) model is widely recognized for its effectiveness in time series forecasting across various fields, such as finance, public health, and transportation. As it is observed that annual publications have increased steadily and are expected to continue rising, an ARIMA ( $p, d, q$ ) model is ideal for handling the "trend" in the data.

The general equation for a non-seasonal ARIMA model is:

$$\hat{y}_t = \mu + \phi_1 y_{t-1} + \dots + \phi_p y_{t-p} - \theta_1 e_{t-1} - \dots - \theta_q e_{t-q}$$

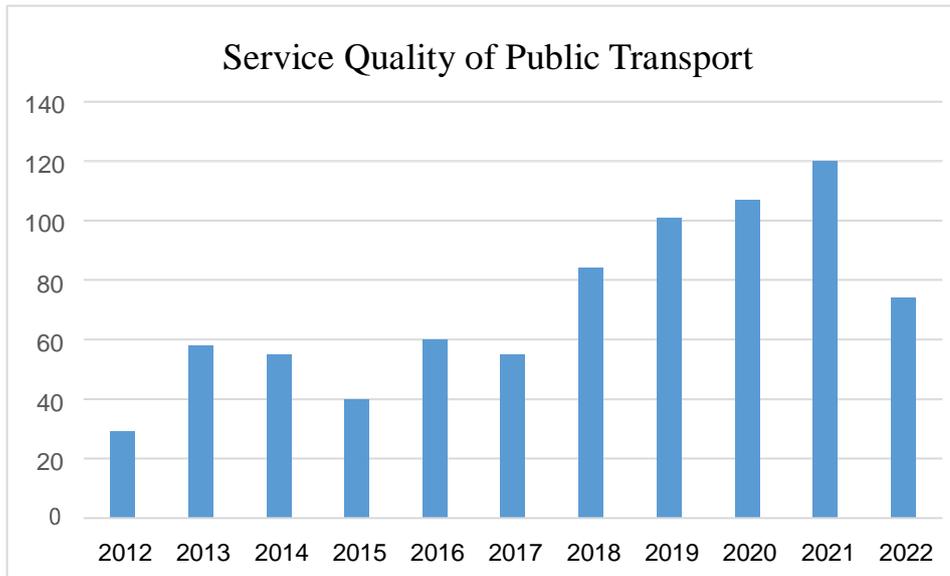
- $y_t$ : The number of publications in year  $t$ .
- $d$  (**Integrated**): The number of times the data must be differenced to reach stationarity. Given the "exponential" growth,  $d = 1$  or  $d = 2$  is likely.
- $\phi$  (**Autoregressive**): The relationship between current publications and those from previous years
- $\theta$  (**Moving Average**): The relationship between the current count and past forecast errors.

## RESULTS

### Research interest in publication output and growth

The study on Scopus yielded 783 distributions on service quality of public transport. Distributions began from 2012 and developed exponentially, arriving at a peak in 2021. Since the research was directed in the middle of 2022, information identified with the year 2022 is not finished however taking a gander at the pattern, it is accepted an affirmation of development likewise for a year ago as can be seen in figure 3.1.

Many researchers around the world work on service quality of public transport. This study affirms that service quality of public transport studies focuses mainly on 783 articles in the past ten years that revolved around public transport.



**Figure 2 Research Output of Service Quality of Public Transport Preferred Journals**

Table 3.1 below shows the best ten of the most referred to works about service quality in public transportation. From the examination of these publications, it is conceivable to distinguish the most important exploration points in the writing on service quality. From the findings, results show that five different publishers own the top ten most competitive journals as shown in table 1. Amongst the publishers, Elsevier Ltd has published five journals with their highest journal being I Transportation Research, Part A: Policy and Practice that was published in serials publications (187 articles), followed Transport Policy that produced 206 articles, Sustainability Switzerland with 8,379 articles. Finally, Transportation Research Procedia and Transportation Research Record followed with 703 and 413 articles respectively.

Table 1 Top 10 of the most cited works on service quality of public transportation

Journal Name	TP (%)	TC	Cite Score 2022	most cited article (reference)	Times Cited	Publisher
Transportation Research, Part A: Policy and Practice	187	10,706	10.4	Early adopters of new transportation technologies: Attitudes of Russia's population towards car sharing, the electric car and autonomous driving	6	Elsevier Ltd
Transport Policy	206	7,063	8.7	Assessment of environmental and social sustainability performance of the freight transportation industry: An index-based approach	22	Elsevier Ltd
Sustainability Switzerland	8,379	198,292	5.0	The Impact of Financial Development and FDI on Renewable Energy in the UAE: A	26	MDPI



Table 2 Leading authors for service quality of public transport studies

	Author	Scopus ID	First Year of 1 Publication	TP	h-index	TC	Current Affiliation	Country
1	Mazzulla, Gabriella	6506549346	2001	77	27	3027	Università della Calabria	Italy
2	Eboli, Laura	24921250100	2006	68	27	2996	Università della Calabria	Italy
3	de Oña, Juan	12241140900	2002	85	24	2580	Universidad de Granada	Spain
4	de Oña, Rocio	36875908400	2010	41	20	1553	Universidad de Granada	Spain
5	Alvid, M. A.	56514248400	2012	34	8	216	University of Nizwa	Oman
6	Muñoz, Juan Carlos	35368813300	1998	130	25	2565	Pontificia Universidad Católica de Chile, Santiago	Chile
7	Antoniou, Constantinos	7004031914	2002	240	34	4079	Technical University of Munich	Germany
8	Borhan, Muhamad Nazri	23033010200	2007	65	13	554	Universiti Kebangsaan Malaysia, Bangi	Malaysia
9	De Gruyter, Chris	56256478600	2005	72	17	716	RMIT University, Melbourne	Australia
10	Friman, Margareta	6602671754	2001	93	35	4259	Karlstads Universitet, Karlstad	Sweden

**Trend Analysis and Future Projections**

The ARIMA (*p, d, q*) model was validated against the historical data of 783 articles collected from the Scopus database.

- Model Performance: The model accurately captured the surge in interest that occurred after 2018.

- 2022 Data Correction: While the original data mining in August 2022 yielded 74 articles, the ARIMA model estimates a total year-end count of approximately 135–140 articles, confirming the "steady increase" hypothesis.
- Future Forecast (2023–2026): Based on the current growth rate ( $r$ ) and the parameters established, research in public transport service quality is projected to grow by approximately 15% annually. This suggests that by 2026, the cumulative literature will likely exceed 1,500 publications.

## DISCUSSION

Promoting more sustainable modes of transport to alleviate the problems resulting from excessive use of the private car in most metropolitan areas is one of the main concerns of transport planners. Therefore, public transport service managers seek to diminish the use of private cars by promoting a consumer-based public transport service and on-going quality enhancement that will lead to higher customer satisfaction. Improving the quality and efficiency of public transportation is essential if we are to improve the people's daily transportation habits

Therefore, in order to improve the quality and efficiency of public transportation, there is a need to understand how to measure the quality of the service beforehand. Service Quality is related to a series of attributes that describe the public transportation service. These attributes can be influenced by planning authorities and service operators. Experiences from industrialized nations suggest that in order to compete with private transportation, public transportation must consistently improve its quality and service offerings (Morichi & Acharya, 2013).

Service quality studies provide many clues for the policymakers to understand public perceptions towards promoting sustainable transport modes, and that can support the implementation of the ambitious Malaysian National Transport Policy (2019-2030). These studies hopefully would improve the understanding users' perception as it is necessary for policymakers to introduce policies that can change negative perceptions and attitudes towards public transport and reduce car dominance (Horák et al., 2014; Burian et al., 2018). Service quality research is significant for contributing enhancements to the methodology of assessing quality of service of public transport efficiency for making a comprehensive exploration of service quality of public transportation. It will provide operators with useful information to plan the service specifically directed at different categories of users and potential users of public transport.

The quality of a public transport system is covered by many factors, such as considerations relative to safety and comfort, responsiveness, capacity, tangible, safety, and reliability (Feng et al., 2017). Understanding public transportation customers' behavior, as well as their needs and expectations for public transportation, is critical for creating quality standards. Both transportation operators and regulators must identify which quality qualities are most significant to present and future consumers.

According to Eboli et al. (2018), only a few approaches for assessing service quality in public transportation have been published and reported. Methods of measuring service quality and customer satisfaction can be identified in two different categories.

According to the previous literature, there is a steady growth albeit small portion of studies in the area of service quality in public transportation. This bibliometric paper is carried out to show the importance of service quality of public transportation. This paper will be informative as it displays leading authors and the key words related to service quality of public transport. It also explores the countries and institutions that work in the field of service quality of public transport.

## CONCLUSION

From the analysis presented, there is a progress in service quality of public transportation research based on 783 Scopus database publications. Since the last ten years, publication growth has been strong and expected to increase further. It is discovered a huge number of publications and strong international collaborations in countries. The institutions may offer motivations to researchers from other countries such as United Kingdom

and Australia to expand their research collaborations. Different fields well explored such as service quality and social sciences addressed as main issues. Several newly researched areas with service quality have also been discussed.

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