

STATISTICAL ANALYSIS OF THE RELATIONSHIP BETWEEN ATTITUDES TOWARD PUBLIC TRANSPORTATION AND USAGE RATES: A REGRESSION APPROACH

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Abstract

Public transportation plays a crucial role in sustainable urban mobility, yet its usage varies significantly among individuals. This study explores the correlation between individuals' attitudes toward public transportation and their usage rates, aiming to determine whether a positive perception influences increased usage. A quantitative, cross-sectional survey design was employed, with data collected from 156 respondents using a structured questionnaire. The study applied Pearson's correlation and linear regression analysis to examine the relationship between attitudes and public transport usage. The results indicate a strong positive correlation ($r = 0.89$, $p < 0.001$) between attitude and usage rates, with regression analysis showing that attitude significantly predicts public transport usage ($\beta_1 = 1.53$, $p < 0.001$). The model's R^2 value of 0.795 suggests that attitude explains 79.5% of the variance in transport usage. The study instrument demonstrated high reliability (Cronbach's $\alpha = 0.98$) and construct validity (0.76).

These findings highlight the importance of public perception in increasing ridership, suggesting that policies aimed at improving attitudes toward public transport—such as better service quality, reduced congestion, and environmental awareness campaigns—could effectively boost usage rates. Future research should explore additional factors, such as pricing, accessibility, and personal convenience, to gain a more comprehensive understanding of public transportation behavior.

Keywords: *Public Transportation, Attitude, Usage Rates, Correlation, Linear Regression, Urban Mobility.*

Introduction

Public transportation plays a critical role in urban development and sustainability, yet its utilization often depends on public attitudes. Understanding the correlation between individuals' perceptions of public transportation and their frequency of use is vital for improving transit systems and encouraging widespread adoption. Factors such as convenience, affordability, reliability, and environmental consciousness significantly influence these attitudes, shaping how often people opt for buses, trains, or subways over private vehicles. Exploring this relationship offers valuable insights for policymakers, transit authorities, and urban planners aiming to create systems that meet users' expectations and promote sustainable transportation solutions.

A positive attitude towards public transportation is typically linked to higher usage rates. When individuals perceive public transit as accessible, efficient, and cost-effective, they are more likely to integrate it into their daily routines. Conversely, negative perceptions—such as concerns about safety, overcrowding, or lack of punctuality—can deter potential users. These attitudes often stem from personal experiences, social norms, and cultural beliefs. By analyzing these factors, researchers can identify barriers to usage and recommend strategies to improve public transit systems, ultimately bridging the gap between perception and practice.

This exploration underscores the importance of aligning public transportation services with user expectations to foster positive attitudes and higher utilization. A thorough examination of the interplay between attitudes and usage can help policymakers implement targeted interventions, such as service enhancements, fare adjustments, and public awareness campaigns. By addressing users' concerns and promoting the benefits of public transit, cities can encourage sustainable travel habits, reduce traffic congestion, and lower carbon emissions, benefiting both individuals and the environment. This research not only contributes to improving public transit systems but also supports broader urban sustainability goals.

Literature Review

The role of public transport in urban and rural settings has been a critical area of research, focusing on user preferences, barriers, and strategies for improvement.

Studies across various geographical and socio-economic contexts highlight diverse factors influencing public transport usage, ranging from service quality and accessibility to user attitudes and socio-demographic characteristics.

Public transport users' preferences and attitudes toward policy measures have been extensively explored in Indonesia, as evidenced by Susilo, Joewono, and Santosa's (2009) study. Their research revealed that user priorities such as safety, security, comfort, and affordability significantly shape policy preferences. Using surveys and cluster analyses, they demonstrated that users are willing to pay for enhanced safety and comfort, suggesting that policymakers must balance affordability with quality improvements to meet user expectations effectively. Similarly, a related study in

Indonesian cities (Jakarta, Bandung, and Jogjakarta) emphasized varying user profiles and preferences across cities, reinforcing the need for location-specific strategies to improve public transport systems.

In rural contexts, transportation challenges are starkly different. A Swedish study employed a time-geographical approach to investigate rural residents' mobility and participation in daily activities. Findings showed that private cars dominate rural transportation due to their flexibility and convenience, while public transport is hindered by poorly coordinated schedules, safety concerns, and limited accessibility. Recommendations for better synchronization and demand-responsive transport highlight the unique needs of rural users and the importance of tailored solutions for enhancing rural mobility.

Urban areas, on the other hand, face challenges of capacity constraints and service efficiency, particularly in high-demand cities like London, Hong Kong, and Tokyo.

Studies focusing on transit systems in these cities have underscored the importance of optimizing infrastructure and providing better information to passengers. For example, simulation models applied to real-world networks revealed that a balanced approach combining service upgrades and understanding user behavior can effectively reduce congestion and improve reliability. These insights are crucial for urban planners aiming to alleviate the high dependency on private vehicles and foster sustainable urban

mobility. In smaller cities, studies such as that by Rasca and Saeed (2022) in Agder, Norway, provide additional dimensions to the discourse. Their findings indicate that car ownership and parking availability are major determinants of public transport usage, with longer commuting distances and parking difficulties driving a shift toward public modes. Policy recommendations from this study emphasize the need for targeted interventions such as fare reductions and creating disincentives for private vehicle use to increase public transport attractiveness.

Intercity travel preferences have also been studied, as demonstrated by research in China's Guanzhong Plain urban agglomeration. Structural equation modeling revealed that perceived accessibility mediates the relationship between service quality and satisfaction, underscoring accessibility as a critical determinant of user satisfaction. Additionally, traveler preferences strongly influence satisfaction levels, pointing to the importance of aligning service improvements with user expectations to foster positive attitudes toward intercity travel.

Attitudes and barriers to bus use have been a particular focus in qualitative studies, such as those conducted in Scotland by Dobbie, McConville, and Ormston (2010). These studies identified key barriers, including negative perceptions of buses, unreliable services, and safety concerns at stops. Participants suggested that improving customer service, enhancing schedule reliability, and offering better route information could encourage greater bus usage. Similarly, thematic analysis in a related study on bus use in Scotland highlighted issues like high fares and insufficient support for disabled individuals, recommending targeted interventions to improve accessibility and infrastructure.

Further, studies in the United States, such as the pilot studies conducted in Baltimore and Philadelphia, provide insights into how demographic factors influence transportation preferences. A trichotomous response pattern emerged, with suburban, affluent individuals prioritizing reliability and convenience, while urban residents valued affordability and accessibility differently. These studies emphasized the complexity of modal choices, noting a modest correlation between attitudes and actual behaviors.

They also highlighted the necessity of integrating user-centric factors into transport planning to design systems that resonate with diverse user needs.

Overall, the literature reveals that enhancing public transport requires a nuanced

understanding of user attitudes, preferences, and socio-demographic influences. Context-specific strategies, such as balancing affordability and quality, improving accessibility, and addressing safety and convenience concerns, are crucial. These findings provide a robust foundation for policymakers to design interventions that align with user expectations and promote sustainable and inclusive transport systems across diverse.

Significance and Research gap

The correlation between attitudes toward public transportation and usage rates is an area that has yet to receive adequate research attention despite its significance in shaping travel behavior and policy effectiveness. While much of the existing research focuses on physical and structural factors such as affordability, accessibility, and infrastructure quality, less emphasis is placed on the psychological and attitudinal dimensions of public transportation use. Attitudes, which encompass individuals' perceptions, beliefs, and emotional responses to public transit, play a crucial role in determining their likelihood of using such services.

Negative attitudes often stem from concerns about safety, reliability, cleanliness, or convenience. For instance, if individuals perceive public transportation as unreliable or unsafe, they may prefer private vehicles, even when public options are readily available and cost-effective. Conversely, positive attitudes can encourage higher usage rates.

Factors such as environmental awareness, social influence, or satisfaction with public transit experiences can foster favorable perceptions, leading to increased adoption.

However, the extent to which these attitudes directly correlate with actual usage rates remains underexplored. Many studies treat usage as a function of external conditions rather than examining the nuanced interplay between subjective attitudes and behavioral patterns.

This research gap is particularly significant because understanding attitudes toward public transit could provide policymakers and urban planners with tools to address barriers to usage. For example, campaigns aimed at improving public perceptions—through better communication about service reliability or highlighting the environmental benefits of transit—might be more effective than merely expanding

infrastructure. Additionally, such insights could help tailor services to meet user expectations, enhancing satisfaction and encouraging repeat usage.

Further research is essential to bridge this gap, particularly in diverse sociocultural and geographical contexts where attitudes toward public transportation vary widely. Studies could focus on identifying specific attitudinal factors that most strongly predict usage rates and exploring interventions that reshape public perceptions. Addressing this gap would not only contribute to the academic understanding of travel behavior but also inform the design of sustainable and user-centered public transportation systems.

Ultimately, leveraging the correlation between attitudes and usage could play a pivotal role in promoting public transit as a viable, attractive alternative to private vehicles, thereby supporting broader goals of urban sustainability and reduced environmental.

Research Methodology

Research Method: This study employs a quantitative research method to explore the correlation between individuals' attitudes toward public transportation and their usage rates. A survey-based approach is used to collect numerical data, which is then analyzed using statistical techniques, including correlation analysis and linear regression.

Research Design: A cross-sectional survey design is used to collect data at a single point in time. This design is appropriate as it allows for the examination of the relationship between attitudes toward public transport and actual usage without manipulating variables. The design enables the identification of statistical patterns and relationships within the sample population.

Sampling Technique: The study utilizes a stratified random sampling technique to ensure that diverse groups of individuals are adequately represented. The population is divided into strata based on factors such as age, occupation, and frequency of public transport use. Random sampling is then conducted within each stratum to minimize selection bias and enhance the generalizability of the findings.

Sample Size: The study includes a sample size of 156 respondents, determined based on statistical power analysis. This sample size is sufficient for conducting Pearson's correlation analysis and linear regression, ensuring reliable and valid results.

Reliability and Validity

- **Reliability:** The study instrument (survey questionnaire) achieves a Cronbach's Alpha

reliability coefficient of 0.98, indicating excellent internal consistency among survey items measuring attitudes and usage rates.

- **Validity:** The questionnaire's construct validity is measured at 0.76, confirming that the survey effectively captures the intended concepts related to public transportation attitudes and usage. The validity was assessed through expert review and exploratory factor analysis (EFA).

Data Analysis

Data analysis for evaluating attitude towards public transportation and usage rates awareness campaigns includes descriptive Statistics (mean, frequency), inferential tests (t-tests, chi-square), regression analysis to

Assess factors, thematic analysis of qualitative data, sentiment analysis from social media,

And behavioral tracking to measure actual changes.

Objective Hypothesis:

There is a significant positive correlation between individuals' attitudes toward public transportation and their usage rates.

Null Hypothesis:

There is no significant correlation between individuals' attitudes toward public transportation and their usage rates.

Term	Estimate	Std. Error	t-value	p-value
Intercept	1.92	0.37	5.18	< .001
Attitude	1.53	0.06	24.47	< .001

Interpretation and Analysis of the Regression Results

The linear regression analysis was conducted to examine the relationship between individuals' attitudes toward public transportation and their usage rates (measured in trips per week). The results indicate that attitude is a significant predictor of public transport usage, meaning that as individuals develop a more positive attitude toward public transportation, their usage rates tend to increase.

The regression equation derived from the model is:

$$\text{Usage Rate} = 1.92 + 1.53 \times \text{Attitude Score}$$

This equation suggests that when an individual's attitude score is zero (hypothetically the lowest possible perception), they are expected to take approximately 1.92 trips per week. Furthermore, for each one-unit increase in attitude score, there is an expected increase of 1.53 trips per week in public transport usage.

The statistical significance of the predictor variable (attitude) was confirmed through a p-value < 0.001 , indicating a very strong correlation that is unlikely to have occurred by chance. Additionally, the t-value (24.47) for attitude suggests a high degree of confidence in the estimated effect.

In terms of model fit, the R^2 value of 0.795 indicates that 79.5% of the variance in public transport usage can be explained by differences in attitude scores. This suggests that attitude plays a major role in influencing public transportation habits, with relatively little unexplained variation. The F-statistic (598.70, $p < 0.001$) confirms that the overall model is highly significant, meaning that attitude, as an independent variable, meaningfully contributes to explaining the variance in public transport usage.

Conclusion

The findings strongly suggest a positive and statistically significant relationship between attitude towards public transportation and its usage rates. Individuals with a more favorable attitude tend to use public transport more frequently. The high R^2 value implies that attitude is a strong determinant of public transport use, though other external factors (such as availability, cost, or convenience) might also contribute to overall usage patterns.

Implications

These results highlight the importance of public perception and awareness campaigns in increasing public transport usage. If policymakers aim to improve ridership, they should focus on enhancing attitudes toward public transport by improving its efficiency, accessibility, and public image. Encouraging positive experiences, reducing negative perceptions (e.g., overcrowding, delays), and promoting environmental benefits may significantly influence commuting behavior.

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