

Evaluation of Tricycle as a Public Transportation System in Osogbo Town

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ARTICLE INFORMATION	ABSTRACT
<p>Article History: Published on 21st Jan 2026</p> <hr/> <p>Keywords: Tricycle Transport Public Transportation Urban Mobility Osogbo Metropolis Socio-Economic Impact Usage Frequency Transport Operations Urban Transport Challenges Informal Transport System Sustainable Urban Transport</p>	<p>This study investigates the role of tricycles as a public transport system in Osogbo metropolis, with emphasis on usage frequency, socio-economic impacts, operational patterns, and challenges faced by both patrons and operators. Using a structured questionnaire, data was collected from 400 respondents—comprising tricycle users and operators across key terminals in Osogbo. The sample size was determined using Cochran’s formula, ensuring statistical reliability at a 95% confidence level and 5% margin of error. The findings reveal that 48.4% of respondents use tricycles daily, indicating their vital role in daily mobility for work, education, and market-related trips. Their affordability, accessibility, and flexibility make them especially valuable to low- and middle-income residents. Tricycle operations also support the local economy by creating employment opportunities for riders, mechanics, and parts vendors. Economically, tricycles support diverse users—students, traders, and civil servants—while providing jobs for operators, mechanics, and spare parts dealers. However, challenges persist: 87% of operators cited poor roads, 79.5% mentioned high fuel costs, and others noted issues like lack of parking (43.8%), extortion (37.8%), and traffic congestion (33.9%). Patrons also complained about rider behavior (40.7%), slow speeds (31%), and frequent stops (29.6%). Despite these limitations, tricycles remain a reliable and indispensable mode of transport in Osogbo. Their continued relevance and sustainability, however, will depend on the implementation of targeted interventions such as road infrastructure improvements, provision of designated parking, regulatory reforms, and enhanced service standards. This study provides actionable recommendations to guide policy and improve tricycle operations within Osogbo’s urban transport framework.</p>

1. Introduction

1.1 Background Study

Urban transportation is a critical component of city infrastructure, facilitating the movement of people and goods within urban areas. As cities grow, the demand for efficient, affordable, and sustainable transportation increases (Rodrigue, 2020). Urban transportation systems typically include a mix of public and private modes, such as buses, trains, cars, bicycles, and in many developing countries, informal modes like tricycles and motorcycles.

Transportation refers to the movement of people, goods, and services from one place to another using different modes and systems. It is a fundamental component of economic development and social interaction, as it enables access to jobs, education, healthcare, and markets. In urban areas, transportation plays a particularly vital role because of high population density and the constant demand for mobility. Efficient transportation systems help reduce travel time, lower costs, and improve overall quality of life, while poor systems contribute to congestion, pollution, and reduced productivity.

Transportation can be broadly classified into several types. Road transportation includes cars, buses, motorcycles, bicycles, and tricycles, and is the most common form in many cities due to its flexibility and door-to-door access. Rail transportation, such as trains, metros, and light rail, is efficient for moving large numbers of people over fixed routes and is often used in densely populated urban corridors. Water transportation involves the movement of goods and people via rivers, canals, and seas, playing a key role in trade and coastal cities. Air transportation is the fastest mode and is mainly used for long-distance travel and high-value goods. Together, these transportation types form integrated systems that support urban growth and economic activities.

Urban transportation systems are essential for the efficient functioning of cities, facilitating the movement of people and goods, promoting economic activity, and enhancing the quality of life. The evolution of urban transportation has been influenced by various factors, including population growth, urbanization, technological advancements, and changing socio-economic dynamics. In 1800, the global urbanization rate was only 2%, and it reached 50.16% in 2007 for the first time. It is predicted to be as high as

68.36% in 2050. Every year, more than 20 million people worldwide move from rural to urban areas, equivalent to the entire population of Romania in 2020 (Gao et al, 2022).

In recent decades, rapid urbanization has put significant pressure on transportation systems worldwide. According to the United Nations (2018), 55% of the world's population lived in urban areas in 2018, a figure expected to increase to 68% by 2050. This urban growth has led to challenges such as traffic congestion, air pollution, and inadequate public transportation infrastructure in many cities (Pojani & Stead, 2015).

In Nigeria, urban transportation faces particular challenges due to rapid urbanization, inadequate infrastructure, and economic constraints. Nigeria's urban population grew from 15% in 1960 to 51.2% in 2020, with projections reaching 70% by 2050 (World Bank, 2021). This rapid urbanization has outpaced the development of transportation infrastructure in many Nigerian cities.

The Nigerian urban transportation system is characterized by a mix of formal and informal modes. While there are efforts to develop formal public transportation systems in major cities like Lagos and Abuja, a significant portion of urban mobility needs are met by informal transportation modes, including tricycles (commonly known as "Keke NAPEP") and motorcycles ("Okada"). Tricycles, in particular, have gained popularity in Nigerian cities as a means of public transportation. They were introduced as part of the National Poverty Eradication Programme (NAPEP) in 2001 to create employment and provide affordable transportation (Raji & Waziri, 2016). However, their widespread adoption has led to both benefits and challenges in urban mobility and safety.

1.1.1 Challenges in Nigerian Urban Transportation

Nigeria, the most populous country in Africa, faces unique challenges in its urban transportation systems due to rapid urbanization, population growth, and economic development. Cities like Lagos, Ibadan, Abuja, and Port Harcourt are particularly affected by these issues (Ogunbodede, 2016).

- i. Congestion: Traffic congestion is a severe problem in Nigerian cities, especially in Lagos, Ibadan and Port Harcourt. The city's infrastructure struggles to keep up with the growing number of vehicles, leading to gridlock and long commute times. This congestion results in significant economic losses and increased fuel consumption (Ogunbodede, 2016).
- ii. Inadequate Infrastructure: Nigerian urban transportation suffers from inadequate and poorly maintained infrastructure. Many roads are in disrepair, and there is a lack of comprehensive public transportation networks. The existing infrastructure is often unable to support the high volume of traffic, leading to frequent breakdowns and delays (Oyesiku, 2018).
- iii. Environmental Impact: The environmental impact of urban transportation in Nigeria is significant. High levels of air pollution and greenhouse gas emissions are major concerns, exacerbated by the use of older, less efficient vehicles. Efforts to promote cleaner transport options, such as electric vehicles and improved public transportation, are still in the early stages (Akinyemi & Zuidgeest, 2016).
- iv. Regulatory and Policy Issues: Regulatory challenges, including inadequate policies and enforcement, hinder the development of efficient urban transportation systems in Nigeria. Informal transport modes, such as minibuses (danfo) and motorcycles (okada), operate with minimal regulation, contributing to safety and congestion issues (Olawole & Aloba, 2018).

Safety Concerns: Road safety is a critical issue in Nigerian urban transportation. High accident rates are due to factors such as poor road conditions, lack of traffic enforcement, and the prevalence of informal transport operators. Efforts to improve road safety through better infrastructure and stricter regulations are ongoing but face significant challenges (Ogunbodede, 2016).

Case Study: Tricycle Transport Systems

In many Nigerian cities, informal modes of transport, such as tricycles (keke), play a crucial role in urban mobility. These vehicles, often operating in semi-regulated or unregulated environments, provide affordable and flexible transport options. Studies have shown that tricycles are particularly effective in areas with narrow streets and high population density, offering first- and last-mile connectivity (Adeniji, 2017).

The role of tricycles in urban mobility cannot be overstated. They are particularly popular for short-distance trips and provide essential first- and last-mile connectivity in urban and peri-urban areas. Tricycles have adeptly filled a significant gap in the urban transportation network in Nigeria by navigating congested streets and narrow pathways where larger vehicles are less effective. This flexibility makes them a preferred choice for many commuters, particularly in densely populated and low-income neighborhoods (Adewumi & Allopi, 2019).

However, the integration of tricycle transport into the broader urban transportation system presents several challenges, including regulatory issues, environmental impact, and infrastructural inadequacies. Addressing these challenges requires a comprehensive approach that considers local contexts and leverages technological and policy innovations (Cervero & Golub, 2017).

1.2 Statement of Research Problem

The dynamics of urban transportation in rapidly growing cities within developing countries have undergone significant transformation in recent years. In Osogbo metropolis, the increasing demand for efficient, accessible, and affordable intra-city mobility has led to the proliferation of informal transport modes, notably motorized tricycles (commonly referred to as Keke NAPEP). While tricycles have become an integral part of daily commuting for a significant portion of the population, their operational efficiency, regulatory framework, environmental implications, and overall impact on urban transport systems remain inadequately studied. The absence of empirical data and critical evaluation of this mode of transport limits the capacity of policymakers and urban planners to make informed decisions. This study, therefore, seeks to investigate the role, effectiveness, and implications of tricycles as a mode of transportation in Osogbo metropolis, with a view to informing sustainable urban mobility strategies.

Firstly, the regulatory landscape surrounding tricycle operations in these areas is marked by ambiguity and inconsistency. This lack of clear regulatory frameworks often leads to operational uncertainties, fare disputes, and safety concerns among operators and commuters alike.

Secondly, the infrastructural deficiencies in these areas exacerbate the challenges faced by tricycle transport systems. Inadequate road networks, lack of designated parking areas, and absence of infrastructure for alternative fuel sources hinder operational efficiency and contribute to congestion and safety hazards.

Furthermore, financial instability represents another critical challenge confronting tricycle operators in these areas. High operational costs, including fuel, maintenance, and insurance, coupled with fluctuating demand and competition from other modes of transport, often render tricycle operations economically unsustainable.

Moreover, tricycle transport systems may inadvertently perpetuate socio-economic disparities within urban communities. While they serve as vital lifelines for some residents, providing affordable and accessible transportation options, others, particularly marginalized groups, may face barriers to access due to factors such as location, affordability, and physical accessibility. Addressing these multifaceted challenges requires a holistic understanding of the intricate interplay between socio-economic profiles of operators and patrons and the operational patterns and modes of tricycle transport system. Only through comprehensive research and targeted interventions can meaningful progress be made towards fostering inclusive, efficient, and environmentally sustainable tricycle transport systems in these urban areas.

Study Area: Urban Transportation in Osogbo

Osogbo, the capital of Osun State in southwestern Nigeria, serves as a vital administrative and cultural hub in southwestern Nigeria. It has experienced significant urban growth in recent decades. This expansion has placed considerable pressure on the city's transportation infrastructure, leading to challenges such as inadequate road networks, congestion, and a reliance on informal transport modes.

The primary modes of transportation in Osogbo include motorcycles (commonly known as "okada"), minibuses (referred to as "korope"), and tricycles ("keke NAPEP"). A study by Adedotun (2015) revealed that a majority of commuters depend on motorcycles and minibuses for their daily movements, primarily for commuting to workplaces and educational institutions. These modes are favored for their affordability and ability to navigate congested or poorly maintained roads.

The inadequacies in Osogbo's transportation system have socio-economic ramifications. The lack of reliable and safe transport options can limit access to employment, education, and healthcare, thereby affecting the overall quality of life for residents. Moreover, the dependence on informal transport modes, which often operate without strict regulatory oversight, can lead to issues related to safety and service reliability.

Addressing the transportation challenges in Osogbo requires a multifaceted approach. Adedotun (2015) emphasizes the need for an enabling policy environment that encourages public-private partnerships in the provision and maintenance of transport facilities. Such collaborations can lead to improved infrastructure, better regulation of informal transport modes, and enhanced service delivery.

1.3 Aim and Objectives

The aim of this project is to comprehensively evaluate tricycle as a public transport system in Osogbo metropolis.

The following are the objectives of the study:

- i. To identify and select tricycle terminals within Osogbo metropolis.
- ii. To evaluate the socio-economic profile of tricycle operators and patrons in Osogbo metropolis.
- iii. To investigate the operational patterns and modes of tricycle transport within the metropolis.

1.4 Justification of the Study

Urban mobility remains a critical challenge in many Nigerian cities, including Osogbo, due to the inadequacy of formal public transportation systems and the growing pressure from increasing population and urban sprawl. Tricycles (Keke NAPEP) have emerged as a dominant informal mode of transport, offering flexible and relatively affordable alternatives to the commuting public. Despite their prevalence, there is a noticeable lack of empirical research and academic literature assessing their contribution to urban transportation systems, particularly in mid-sized cities like Osogbo.

This study is therefore justified by the need to understand the socio-economic, environmental, and operational dynamics associated with tricycle usage in Osogbo metropolis. The findings will provide valuable insights for stakeholders—including policymakers, urban planners, and transport authorities—on how to integrate informal transport systems into broader urban mobility plans. Furthermore, the study will contribute to the growing body of knowledge on sustainable urban transport in developing contexts, helping to shape more inclusive, efficient, and context-appropriate transport policies.

This study is crucial for several reasons:

- i. **Policy Formulation and Urban Planning:** Understanding the operational patterns and socio-economic roles of tricycles will provide a foundation for formulating policies to improve urban transportation systems.
- ii. **Sustainability and Efficiency:** Evaluating the efficiency of tricycles can identify potential areas for optimization, ensuring they continue to meet the mobility needs of the populace.
- iii. **Economic Significance:** Tricycles support livelihoods for operators and affordable transportation for patrons. Investigating these socio-economic dynamics is critical for enhancing their contributions to the local economy.

- iv. **Filling Knowledge Gaps:** The absence of existing data on tricycle operations in Akure underscores the need for this research. The findings will serve as a reference for stakeholders, including urban planners, policymakers, and transport researchers.

1.5 Scope of the Project

This study is designed to focus on the evaluation of tricycles as a public transport system within Osogbo metropolis. Specifically, the scope of the research will include the following:

- i. **Identification and Selection of Terminals:** The research will map and document the major tricycle terminals across Osogbo metropolis, which serve as critical nodes in their operation. This will provide a spatial understanding of their distribution and usage patterns.
- ii. **Socio-economic Profile Analysis:** The study will gather information about tricycle operators and patrons, including their demographics, income levels, and the socio-economic benefits they derive from tricycle transport services.
- iii. **Operational Patterns and Modes:** The research will examine operational aspects such as routes, schedules, peak periods, trip frequencies, fare structures, and the challenges encountered by both operators and passengers.
- iv. **Recommendations for Optimization:** Based on the findings, practical recommendations will be proposed to improve the efficiency, sustainability, and integration of tricycle operations within the broader urban transport system in Osogbo.

2. Literature Review

Urban transportation systems are vital to the functionality and development of cities, facilitating mobility, economic activity, and access to essential services. The efficiency of these systems plays a crucial role in reducing congestion, improving air quality, and enhancing the overall quality of life for urban residents, as highlighted by Rodrigue et al. (2020). In many developing countries, where formal public transport systems are often inadequate, tricycles, including auto-rickshaws and cycle rickshaws, serve as a significant mode of paratransit. These vehicles are particularly effective in densely populated areas with narrow streets, offering a flexible and affordable transport solution (Cervero, 2020; Kumar et al., 2016).

Urban transportation systems worldwide face numerous challenges, including traffic congestion, pollution, and inadequate infrastructure. According to Rodrigue, Comtois, and Slack (2020), traffic congestion is a significant issue in many cities, leading to increased travel times, higher fuel consumption, and greater emissions of greenhouse gases. This problem is exacerbated by the rapid growth of urban populations and the proliferation of private vehicles.

In the context of developing countries, the challenges are even more pronounced. Cervero (2020) highlights the prevalence of informal transport systems in many developing cities. These systems, while essential for mobility, often operate outside formal regulatory frameworks, leading to issues of safety, reliability, and environmental impact. The informality of these systems also complicates efforts to integrate them into broader urban transportation planning.

David Banister (2016) is a prominent advocate for the sustainable mobility paradigm. Banister argues that traditional transportation planning, which focuses on increasing road capacity, often leads to induced demand and exacerbates traffic congestion. Instead, he promotes strategies that reduce the need for travel, enhance public transport, and encourage non-motorized modes of transport such as walking and cycling. According to Banister, focusing on accessibility rather than mobility can lead to more sustainable urban transport systems.

Todd Litman (2021) of the Victoria Transport Policy Institute also supports the idea of prioritizing accessibility. Litman suggests that the goal of transportation planning should be to improve people's ability to access goods, services, and activities, rather than simply increasing vehicular mobility. He highlights that improving public transit, promoting mixed-use development, and enhancing pedestrian and cycling infrastructure can significantly enhance accessibility.

Anthony Downs (2017) argues against the strategy of expanding road infrastructure to solve congestion problems. He posits that increasing road capacity often leads to a phenomenon known as "induced demand," where the added capacity is quickly filled by additional traffic, ultimately leading to the same or even greater levels of congestion.

Peter Newman and Jeffrey Kenworthy (2015) in their book "The End of Automobile Dependence" argue that cities should move away from car-oriented transport policies. They emphasize the need to develop urban environments that support public transit, walking, and cycling, thereby reducing dependence on automobiles and improving overall accessibility.

On the other side of the debate, some authors argue that improving road infrastructure is essential for enhancing mobility and supporting economic growth. Robert Cervero (2020) acknowledges the importance of informal transport systems in developing countries but suggests that formalizing and improving infrastructure can lead to better safety, efficiency, and reliability.

2.1 Challenges in Nigerian Urban Transportation

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Regulatory and Policy Issues: Regulatory challenges, including inadequate policies and enforcement, hinder the development of efficient urban transportation systems in Nigeria. Informal transport modes, such as minibuses (danfo) and motorcycles (okada), operate with minimal regulation, contributing to safety and congestion issues (Olawole & Aloba, 2018).

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However, the integration of tricycle transport into the broader urban transportation system presents several challenges, including regulatory issues, environmental impact, and infrastructural inadequacies. Addressing these challenges requires a comprehensive approach that considers local contexts and leverages technological and policy innovations (Cervero & Golub, 2017).

2.2 Tricycles as a Public Transport System

The tricycle, as a form of paratransit, has a global presence, particularly thriving in developing regions where it fills the gap left by traditional public transport. It gained popularity due to its affordability, accessibility, and adaptability to urban environments with limited infrastructure. In Nigeria, the "keke NAPEP" was introduced through government initiatives aimed at creating jobs and improving urban mobility (Owolabi & Akinwumi, 2011). Tricycles were introduced to urban transport systems in Nigeria in the 1990s as an alternative mode of transportation, addressing gaps left by buses and taxis (Olaiya, Aderinlewo, & Olukanni, 2024).

Regulation of tricycle operations is critical for their integration into urban transport systems. In Kano Metropolis, regulatory frameworks are either weak or poorly enforced, leading to issues such as extortion from traffic agents and a significant number of operators lacking valid licenses. To enhance the efficiency and safety of tricycle operations, it is recommended that there be a formal registration process and continuous training programs for operators, conducted by agencies like the Federal Road Safety Corps (FRSC) (Ibrahim, 2020). In Lokoja (Nigeria), a study found that the presence of regulatory bodies and enforcement of rules were pivotal in ensuring orderly tricycle operations (Ismail et al., 2018). Strengthening regulatory frameworks and ensuring strict enforcement can help address these challenges, providing a safer and more reliable mode of transportation.

Tricycles have both positive and negative environmental impacts. On the positive side, they provide a more sustainable alternative to private cars due to their lower fuel consumption and reduced emissions. However, issues arise from the lack of modern, eco-friendly tricycles, which means many of the tricycles in use contribute to pollution due to outdated engine technologies. There is a need for policies encouraging the use of environmentally friendly tricycles to mitigate these impacts (Buba, 2018). The assessment of tricycles in Ibadan also highlights the importance of transitioning to newer models to reduce environmental pollution (Obioma, 2018). Implementing policies that encourage the adoption of newer, cleaner tricycles can help mitigate negative environmental impacts.

The infrastructure for tricycle operations is often inadequate. Common issues include poor road conditions, lack of designated stops or terminals, and the encroachment of roadside traders on transportation routes. For example, in Lokoja, the designation of specific routes and terminals has been recommended to streamline operations and improve efficiency (Ismail et al., 2018). Additionally, proper maintenance of roads and urban infrastructure is essential for the smooth operation of tricycles. In Kano, infrastructure challenges such as congested roads and inadequate parking facilities were noted as significant barriers to effective tricycle transport (Ibrahim, 2020). Ensuring well-maintained roads and clear transportation routes are vital for the successful integration of tricycles into urban transport systems.

The socio-economic impact of tricycle operations in Akure is significant, as they provide a sustainable source of employment for operators, helping many support their families and contribute to the local economy. Tricycles also play a vital role in poverty alleviation, offering a livelihood for those without formal employment opportunities. Moreover, tricycles support secondary industries such as mechanics and spare parts dealers, thus broadening their contribution to the urban economy (Owolabi & Akinwumi, 2011).

Tricycles play a significant role in addressing unemployment and providing affordable transportation. They are especially important for low-income populations who cannot afford private vehicles. Studies in Kano and Lokoja highlight that tricycles help reduce unemployment and provide an essential service to the community by facilitating mobility and access to economic activities (Ibrahim, 2020; Ismail et al., 2018). However, the socio-economic benefits can be maximized through better regulation and support from the government. Tricycles significantly reduce unemployment and offer essential transport services, particularly benefiting low-income groups. Enhancing regulatory support and government backing can amplify these socio-economic benefits.

Several case studies illustrate the diverse challenges and opportunities associated with tricycle transport in different urban contexts. For example, studies in Manila (Soh, 2011), Lagos (Ogunleye, 2015), and Dhaka (Rahman, 2017) provide insights into the dynamics of these systems and underscore the importance of context-specific interventions. These case studies demonstrate that tailored approaches are necessary to address the unique needs and circumstances of different urban areas effectively.

In conclusion, the existing literature underscores the multifaceted role of tricycle transport systems in urban areas, highlighting their importance in providing flexible and affordable transportation. However, challenges related to regulation, environmental impact, infrastructure, financial viability, and socio-economic implications must be addressed to enhance their effectiveness and sustainability. This study aims to build on the existing body of knowledge by evaluating tricycle transport systems in Osogbo metropolis providing context-specific insights and recommendations for improving urban mobility in the metropolis.

3. Methodology

This section outlines the materials and methodology employed for this study, detailing the processes from the selection of study locations to the collection and analysis of data on the socio-economic profiles of tricycle operators and patrons, as well as the operational patterns of tricycles in Osogbo metropolis.

3.1 Study Locations

To achieve the first objective-Identification and selection of tricycle terminals, eleven strategic locations within Osogbo Metropolis were selected as study sites. The identification process involved field surveys, observational visits, and mapping of key transit points across the city. These surveys helped pinpoint areas with high tricycle activity and significant passenger movement, which are critical to understanding the dynamics of tricycle operations in Osogbo.

The selected terminals include:

Oke-Fia, Bolanle, Okinni, Igbona, Iyana Camp Park, Power Line Park, MDS-Market, Testing Ground, Otaefun Park, Ilesa Garage, and Bovas - Ogo Oluwa Area.

These locations were chosen based on the following criteria:

- i. High Traffic Volume: Each terminal consistently records a high volume of passengers, making them central to daily tricycle operations.
- ii. Geographical Representation: The terminals are spread across various parts of Osogbo to ensure a representative sample of the city's transport landscape.
- iii. Accessibility and Usage Patterns: The selected locations are easily accessible and frequently used by both operators and commuters, reinforcing their relevance as transit hubs.
- iv. Relevance to Study Objectives: These areas include a mix of residential, commercial, and institutional zones, which aligns with the goal of evaluating the role of tricycles in facilitating urban mobility in Osogbo.

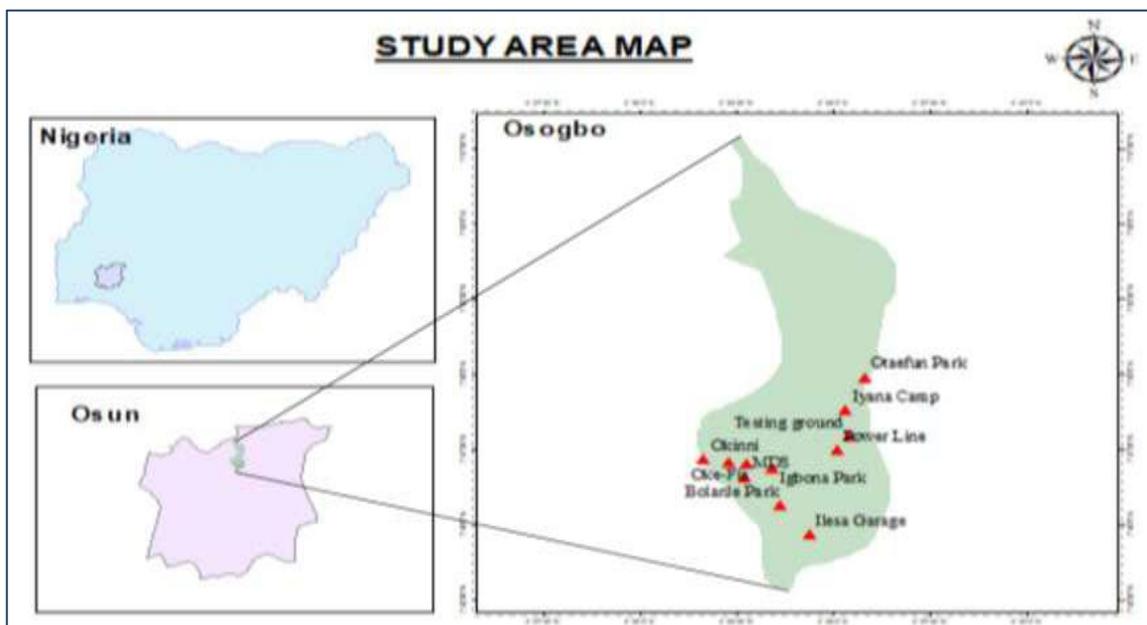


Figure 3.1 Map of Osogbo pointing out the eleven study locations

3.2 Data Collection Methods

Structured questionnaires had been administered to tricycle operators and passengers. The questionnaires will include both closed and open-ended questions to gather quantitative data on the socio-economic profiles of tricycle operators and patrons as well as the operational patterns of tricycle transport in Osogbo metropolis. The surveys will be conducted at different times of the day to capture variations in travel patterns. The survey questionnaire to be used for data collection is provided in the appendix of this report.

3.2.1 Sampling Techniques

In this study, a sample size of 400 respondents have been selected to ensure statistical significance and representativeness of the tricycle user and operator populations in Osogbo metropolis. The sample comprised 300 tricycle patrons (users) and 100 tricycle operators (drivers). This sample size was determined using Cochran’s Sample Size Formula to achieve a 95% confidence level with a 5% margin of error. Cochran’s formula is widely used for estimating an appropriate sample size when aiming to represent a large population.

The formula is as follows:

$$n_0 = \frac{Z^2 \cdot p \cdot (1 - p)}{e^2} \dots\dots\dots \text{Equation 1}$$

Where:

n_0 = sample size

Z = Z-score for a 95% confidence level (1.96)

p = estimated population proportion (assumed at 0.5 for maximum variability)

e = margin of error (0.05)

For this study:

$$n_0 = \frac{(1.96)^2 * 0.5 * (1 - 0.5)}{(0.05)^2} = 384 \dots\dots\dots \text{Equation 2}$$

Using this formula with the above parameters, the calculated sample size was approximately 384 respondents. This was then rounded up to 400 to further minimize sampling error and ensure broader coverage of the target population. This stratified sampling approach allowed for a balanced representation of both user and operator perspectives, critical for assessing the socio-economic impact and operational viability of tricycles as a public transport mode in Osogbo metropolis.

3.3 Data Analysis Methods

The data analysis for this research have been conducted through a detailed process using quantitative method. This comprehensive approach ensured a thorough understanding of the socio-economic profiles of tricycle operators and patrons, as well as the operational patterns of tricycles as a public transport system in Osogbo metropolis, focusing on the selected locations.

3.3.1 Quantitative Data Analysis

The data collected from the survey responses has been analyzed using the Statistical Package for the Social Sciences (SPSS) software. SPSS was chosen for its robust capabilities in handling a variety of data types and conducting complex statistical analyses. The software enabled the organization, coding, and computation of descriptive statistics such as frequencies, percentages, and measures of central tendency, which provided a clear overview of the demographic characteristics and responses of both tricycle patrons and operators.

In addition, SPSS facilitated the execution of inferential statistical tests to examine relationships and potential differences within the data, ensuring a deeper understanding of patterns and trends in tricycle usage. This approach not only allowed for a comprehensive analysis of the factors influencing tricycle patronage and operational sustainability but also ensured accuracy and reliability in interpreting the socio-economic impact on Osogbo’s transport system.

3.4 Ethical Considerations

This research adhere to ethical standards to ensure the protection of participants' rights and well-being. Informed consent will be obtained from all participants prior to data collection. Participants are assured of the confidentiality and anonymity of their responses. To avoid copyright infringement and plagiarism, all textbooks, journals, and conference proceedings consulted online and offline during the course of this research are appropriately acknowledged.

4. Results and Discussion

This section presents the findings from the data analysis and discusses their implications in relation to the research objectives. It highlights the socio-economic profiles of tricycle operators and patrons, the operational patterns of tricycle transport within Osogbo metropolis, and key challenges identified. The discussion integrates these findings with existing literature and provides insights into optimizing tricycles as an effective public transport system.

4.1 Identification of Tricycle Terminals in Osogbo Metropolis

The study identified eleven key tricycle terminals in Osogbo, highlighting their strategic role in connecting major commercial, residential, and institutional areas. These terminals serve as critical operational hubs, ensuring mobility for commuters and economic opportunities for operators. However, challenges such as congestion, limited parking facilities, and unauthorized parking were observed, emphasizing the need for infrastructural improvements to enhance their efficiency and functionality.

4.1.1 Patrons and Operators Most Used Terminals

Table 4.1 shows that Power Line Park is the most frequented terminal by patrons, while MDS-market is most used by operators. Terminals like Iyana Camp Park and Okinni also see high patron activity, suggesting their importance in daily commuting. However, the low operator presence at high-demand terminals like Power Line Park points to possible access or congestion issues. Overall, the results reveal a mismatch between user demand and operator supply, underscoring the need for better terminal coordination and planning

Table 4. 1 Most used terminals by operators and patrons

Terminal	Patrons (%)	Operators (%)
Oke-fia	33.3	6.9
Bolanle	39.7	11.9
Okinni	48.3	6.0
Igbona	38.0	9.4
Iyana Camp Park	48.7	7.9
Power Line Park	65.3	4.1
MDS-market	54.7	16.2
Testing Ground	38.7	9.1
Otaefun Park	35.3	6.0
Ilesa Garage	14.7	14.6
Bovas - Ogo Oluwa Area	37.3	7.9

Source: field survey, 2025.

4.1.2 Availability of parking terminals within Osogbo

Table 4.2 shows that while a majority of operators (64.6%) report the availability of parking terminals, a notable 35.4% indicate otherwise. Field observations revealed that those without designated terminals often resort to parking by the roadside to attract passengers. This informal practice can disrupt traffic flow and contribute to increased congestion, especially along busy corridors, highlighting the need for better terminal infrastructure and enforcement.

Table 4. 2 Availability of tricycle parking terminals

Response	No. of Respondents	Percentage (%)
Terminals are available	65	64.6
Terminals are not available	35	35.4
Total	100	100

Source: field survey, 2025

4.2 Socio – Economic Profile of Tricycle Patrons and Operators

The socio-economic profile examines the demographic and economic characteristics of tricycle patrons and operators. For patrons, it includes details such as age, gender, occupation, income level, and reasons for using tricycles, providing insights into their transportation preferences and dependency. For operators, the profile captures information like age, education level, years of experience, daily earnings, and challenges faced in the profession. This analysis highlights the social and economic factors influencing tricycle usage and operation, offering a deeper understanding of their role in Osogbo’s transportation system and the livelihoods they support.

4.2.1 Demographics of Patrons and Operators

Table 4.3 shows a clear gender divide between tricycle patrons and operators. While patronage is fairly balanced, with 55% male and 45% female, the operator population is predominantly male (68.5%), indicating that tricycle driving remains male-dominated. In terms of age, the majority of patrons (52.5%) fall within the 18–25 age group, suggesting that tricycles are a preferred mode of transport for younger, likely more mobile individuals. On the other hand, most operators (44.4%) are aged 36–45, showing that tricycle operation serves as a stable occupation for middle-aged adults. The absence of operators under 18 also reflects compliance with minimum age requirements. These differences point to generational and gendered roles in Osogbo’s public transport ecosystem, with youth relying more on the service and older men dominating the supply side.

Table 4. 3 Demographics of patrons and operators

Demographics	No. of Patrons	Percent (%)	No. of Operators	Percent (%)
Gender				
Male	165	55.0	68	68.5
Female	135	45.0	32	31.5
Total	300	100	100	100
Age Range				
< 18	14	4.9	–	0.0
18 – 25	160	52.5	11	11.1
26 – 35	53	18.3	24	24.1

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36 – 45	44	14.5	44	44.4
46 – 60	24	8.2	19	18.5
> 60	5	1.6	2	1.9
Total	300	100	100	100

Source: field survey, 2025.

4.2.2 Marital Status of Respondents

While the majority of tricycle users are single (54.6%), most operators are married (70.4%), revealing a contrast in life stages between those who rely on the service and those who provide it. This gap may reflect the role of tricycle operation as a source of livelihood for older, family-responsible individuals, while younger, single adults—possibly students or early-career workers—make up a large portion of daily commuters. As shown in Table 4.4, this occupational-demographic link reinforces the idea that tricycle operation isn't just a job but a means of sustaining households. On the other hand, single patrons' reliance on this mode of transport may point to affordability and flexibility as key factors influencing their mobility choices in Osogbo.

Table 4. 4 Marital status of respondents

Marital Status	No. of Patrons	Percent (%)	No. of Operators	Percent (%)
Single	164	54.6	30	29.6
Married	136	45.4	70	70.4
Total	300	100	100	100

Source: field survey, 2025.

4.2.3 Educational Status of Patrons and Operators

Education plays an interesting role in shaping both the users and providers of tricycle transport in Osogbo. As shown in Table 4.5, a striking 60% of patrons hold university degrees, highlighting a highly educated commuter base. This suggests that tricycles are not just a low-income option but a practical choice for educated urban dwellers, possibly due to their affordability and ease of access. On the operator side, educational levels are more evenly spread, with the largest share (29%) also holding university degrees. This points to a shift in employment dynamics where even graduates are turning to informal sectors like tricycle operation—possibly due to underemployment or the flexible income it offers. The presence of diploma holders and those with secondary education also reflects the accessibility of the trade to a wide range of educational backgrounds.

Table 4. 5 Educational Status of Patrons and Operators

Education Level	No. of Patrons	Percent (%)	No. of Operators	Percent (%)
No Formal Education	10	3.3	4	4.0
Primary Education	13	4.4	7	7.0
Secondary Education	42	14.0	25	25.0
NCE	10	3.3	13	13.0
Polytechnic	45	15.0	22	22.0
University Degree	180	60.0	29	29.0
Total	300	100	100	100

Source: field survey, 2025.

4.2.4 Count of dependents among patrons and operators

Table 4.6 shows the distribution of dependents among both patrons and operators. The results reveal that a significant portion of patrons (37.5%) had no dependents, whereas 46.3% of operators had between 1 and 3 dependents. This suggests that operators are more likely to have family responsibilities compared to patrons, potentially indicating that tricycle operation serves as a primary source of income for individuals supporting families.

Table 4. 6 No. of dependents among patrons and operators

No. of Dependents	No. of Patrons	Percent (%)	No. of Operators	Percent (%)
0	113	37.5	9	9.3
1 – 3	108	36.1	46	46.3
4 – 6	59	19.8	36	35.2
> 6	20	6.6	9	9.3
Total	300	100	100	100

Source: field survey, 2025.

4.2.5 Occupational Status and Monthly Income of Tricycle Patrons

Tricycle usage in Osogbo appears to cut across a broad occupational and income range. Students (27.3%) and business owners (26.3%) make up the largest user groups, followed by the self-employed. This indicates that tricycles serve both the educational population and those engaged in flexible or informal economic activities. On the income side, nearly half of patrons (45.6%) earn less than ₦100,000 monthly, suggesting that affordability is a key factor in their transport choices. Still, a good number of users (about 22.9%) earn ₦200,000 and above, showing that tricycles are not exclusive to low-income earners. These figures (Table 4.7

& 4.8) reinforce the view that tricycles offer a convenient and adaptable transport option for diverse social classes in the metropolis.

Table 4. 7 Occupational Status of Tricycle Patrons

Occupation	No. of Respondents	Percentage (%)
Civil Servant	43	14.3
Student	82	27.3
Unemployed	29	9.7
Business Owner	79	26.3
Retired	14	4.7
Self-Employed	53	17.7
Total	300	100

Source: field survey, 2025.

Table 4. 8 Monthly Income of Tricycle Patrons

Monthly Income (₦)	No. of Respondents	Percentage (%)
Less than 100,000	137	45.6
100,000 – 149,000	65	21.5
150,000 – 199,900	42	13.9
200,000 – 299,900	27	9.1
300,000 and Above	29	9.9
Total	300	100

Source: field survey, 2025.

4.2.6 Operators Years of Experience and Daily Income

From Table 4.9, most operators have been in the business for 6–10 years (39.5%), while the income bracket with the highest concentration (29.6%) falls between ₦10,001 and ₦15,000 per day. This overlap suggests that with time, operators are able to establish stable earnings, even if income growth doesn't scale dramatically with experience. Notably, only 7.4% of operators report daily earnings above ₦20,000, and these cases are likely linked to peak periods—such as weekends, holidays, or market days—when passenger demand is unusually high. On regular days, income tends to remain within predictable limits. Overall, the pattern reflects tricycle operation as a trade where experience brings moderate financial stability, but daily income is often shaped by fluctuations in passenger traffic.

Table 4. 9 Operators Years of Experience and Daily Income

Years of Experience	No. of Respondents	Percentage (%)	Daily Income (₦)	No. of Respondents	Percentage (%)
Less than 1 year	8	7.9	Less than 5,000	13	16.7
1 – 3 years	10	10.1	5,001 – 10,000	28	24.1
3 – 6 years	24	24.3	10,001 – 15,000	35	29.6
6 – 10 years	40	39.5	15,001 – 20,000	18	22.2
10 years and above	18	18.2	Above 20,000	6	7.4
Total	100	100	Total	100	100

Source: field survey, 2025.

4.2.7 Employment Opportunities and Economic Benefits of Tricycle Services

Beyond mobility, tricycle services are seen as a vital pillar of Osogbo's informal economy. As shown in Table 4.10, an overwhelming 87.3% of respondents identified tricycle operation as a major source of employment for operators, underscoring its role in livelihood sustenance. Additionally, 68.7% recognize it as an alternative means of mobility—especially for routes underserved by conventional public transport. The ripple effect on other trades is also evident: nearly half (49.7%) link it to job creation for mechanics, while others see its impact on spare part dealers (22.7%) and even government revenue generation (33.6%). This highlights the broader economic ecosystem sustained by the tricycle sector, making it more than just a transport mode, but a tool for income distribution and urban resilience.

Table 4. 10 Benefits of Tricycle Services

Benefit of Tricycle Service	No. of Respondents	Percentage (%)
Employment for operators	262	87.3
Alternative means of mobility	206	68.7
Employment for mechanics	149	49.7
Revenue for government	101	33.6
Employment for spare part dealers	68	22.7

Source: field survey, 2025.

4.2.8 Reasons for Operating Tricycles

Availability and convenience seem to define the public’s preference for tricycles in Osogbo. As shown in Table 4.11, more than half of the respondents (57.1%) cited ready availability and accessibility as their top reason for choosing this mode. This is closely followed by comfort and safety (52.3%), which challenges the perception that informal transport is always unsafe or chaotic. Affordability also plays a major role, with 47.4% selecting tricycles due to their cost-effectiveness. While fewer people emphasized speed (31.3%) and door-to-door service (24.8%), these features still contribute to the growing appeal. Overall, tricycles are favored not just for what they offer economically, but for how well they meet everyday mobility needs with flexibility and ease.

Table 4. 11 Reasons for Operating Tricycles as public transport system

Reasons for Choosing Tricycle	No. of Respondents	Percentage (%)
Readily available and accessible	171	57.1
Cheaper and available	142	47.4
Comfortable and safe	157	52.3
Door-to-door service	74	24.8
Faster	94	31.3

Source: field survey, 2025.

4.3 Operational Patterns and Modes of Tricycle Transport

The operational patterns and modes of tricycle transport explore how tricycles function within Osogbo’s transportation system. This includes their routes, trip frequencies, fare structures, and peak operational hours. For operators, it examines factors such as vehicle maintenance practices, compliance with traffic regulations, and route allocation. For patrons, it evaluates accessibility, affordability, and satisfaction with tricycle services. This analysis provides a comprehensive understanding of how tricycles meet the mobility needs of Osogbo’s residents while highlighting challenges and opportunities for optimizing their efficiency and functionality.

4.3.1 Type of Tricycle and Cost of maintenance

TVS tricycles clearly dominate the roads in Osogbo, used by 68% of the operators surveyed (see Table 4.12). Their popularity may be linked to factors such as fuel economy, durability, and availability of spare parts. Bajaj follows with 22%, while Piaggio holds a much smaller share (10.1%). Interestingly, Napep models were not reported among respondents, possibly indicating they’ve fallen out of favor due to age, inefficiency, or unavailability.

On the financial side, maintenance costs vary widely. The highest proportion of operators (40.7%) spend between ₦15,000 and ₦20,000 monthly, while 24.1% fall within the ₦10,000–₦15,000 range. A significant 22.2% report costs above ₦20,000, hinting at the cumulative burden of repairs, servicing, and spare parts. These figures suggest that while tricycles offer daily income, maintenance remains a major operational expense, which may influence the type of tricycle operators choose over time.

Table 4. 12 Type of Tricycle used by Operators and their Cost of maintenance

Type of Tricycle	No. of Respondents	Percentage (%)	Monthly Maintenance Cost (₦)	No. of Respondents	Percentage (%)
Bajaj	22	22.0	Less than 5,000	2	1.9
TVS	68	68.0	5,000 – 10,000	11	11.1
Piaggio	10	10.1	10,000 – 15,000	24	24.1
Napep	–	–	15,000 – 20,000	41	40.7
			Above 20,000	22	22.2
Total	100	100	Total	100	100

Source: field survey, 2025.

4.3.2 Operators Daily Fuel Consumption and Numbers of Trips per day

Fuel consumption among tricycle operators in Osogbo falls mostly within the moderate range. Over half of the respondents (53.7%) use between 6 and 10 litres of fuel daily, indicating a fairly standard operation level across the city. This is followed by 24.1% who consume between 11 and 15 litres, likely those covering longer distances or working peak hours. Only a few operators (1.9%) exceed 20 litres daily, which could be due to either high-demand days or poor fuel efficiency. On the lower end, 9.3% consume just 1–5 litres, possibly part-time operators or those covering shorter routes. Overall, fuel usage appears to be manageable for most operators, striking a balance between earning potential and operational costs.

The number of daily trips made by tricycle operators reveals a busy yet structured routine. The largest share (33.3%) of operators make between 6–10 trips per day, which seems to represent the standard workload. Close behind are those doing 11–15 trips (29.6%), likely working full days or focusing on high-demand routes. Only 1.9% exceed 20 trips daily, which might occur during peak seasons or for exceptionally active drivers. Meanwhile, 18.5% conduct just 1–5 trips, possibly due to part-time engagement, health limitations, or mechanical issues. These figures show that while work patterns vary, most operators fall within a practical range that balances effort, time, and income.

Table 4. 13 Daily Fuel Consumption and Numbers of Trips per day

Daily Fuel Consumption (Litres)	No. of Respondents	Percentage (%)	Number of Trips Per Day	No. of Respondents	Percentage (%)
1 – 5 litres	9	9.3	1 – 5 trips	19	18.5
6 – 10 litres	54	53.7	6 – 10 trips	33	33.3
11 – 15 litres	24	24.1	11 – 15 trips	30	29.6
16 – 20 litres	11	11.1	16 – 20 trips	16	16.7
Above 20 litres	2	1.9	Above 20 trips	2	1.9
Total	100	100	Total	100	100

Source: field survey, 2025.

4.3.3 Operators scheduled start and close time

The operational schedule of tricycle operators in Osogbo reflects a structured yet flexible pattern. As shown in Table 4.13, most operators (49.6%) start their day between 7:00am and 8:00am, positioning themselves to serve the early morning rush of workers, students, and traders. A smaller portion (16.7%) begin even earlier, while others (27.8%) delay their start until mid-morning. Closing time trends reveal that a significant number of operators (41.1%) end their operations between 7:00pm and 8:00pm, with another 32.1% pushing on till 8:00pm–9:00pm. This indicates a strong evening presence to cater to return commutes. Only a few operators (5.4%) close as early as 5:00pm–6:00pm. The majority therefore work between 10 to 13 hours daily, showcasing both the intensity and dedication within the informal transport sector. This schedule supports passenger demand across different hours of the day while allowing operators to maximize income.

Table 4. 14 Operators scheduled starting and closing time

Start Time	No. of Respondents	Percentage (%)	Close Time	No. of Respondents	Percentage (%)
6:00am – 7:00am	17	16.7	5:00pm – 6:00pm	5	5.4
7:00am – 8:00am	49	49.6	6:00pm – 7:00pm	13	12.5
8:00am – 9:00am	28	27.8	7:00pm – 8:00pm	41	41.1
9:00am – 10:00am	6	5.9	8:00pm – 9:00pm	22	32.1
			9:00pm – 10:00pm	9	8.9
Total	100	100	Total	100	100

Source: field survey, 2025.

4.3.4 No. of passengers carried

Most tricycle operators in Osogbo tend to carry four passengers per trip, as reported by 46.2% of respondents in Table 4.14. This aligns with the typical seat capacity of many commercial tricycles while still allowing for minimal crowding. About 31.7% carry between one and three passengers—possibly due to shorter trips, off-peak periods, or personal comfort preferences. A smaller share (22.1%) accommodate five passengers, likely during high-demand times or in situations where squeezing in an extra passenger is allowed. These figures indicate that while tricycles generally operate within capacity limits, occasional overloads may occur based on route or urgency, which could have implications for comfort and safety enforcement.

Table 4. 15 No. of passengers carried by operators

No. of Passengers Carried	No. of Respondents	Percentage (%)
1 – 3	32	31.7
4	46	46.2
5	22	22.1
Total	100	100

Source: field survey, 2025.

4.3.5 Mode of Trip to and from Tricycle Stops

The majority of tricycle users in Osogbo rely on walking as a connecting mode both before and after their tricycle trips. As shown in Table 4.15, 65% of patrons walk from their origin to the terminal, and an even higher percentage (67.4%) continue on foot after alighting. This indicates that most terminals are within a convenient walking distance of both homes and destinations. Motorcycle usage slightly increases after drop-off (10.5%), suggesting it serves as a secondary link to less accessible areas. On the other hand, taxi use drops from 10.6% before boarding to just 3.1% after, likely due to cost considerations. Overall, the pattern shows strong integration between tricycles and low-cost, short-distance modes, reinforcing their role as a flexible and accessible urban transport option.

Table 4. 16 Mode of Trip from origin to Tricycle terminal and to final destination

Mode of Trip From Origin to Terminal	No. Respondents	%	Mode of Trip From Terminal to Final Destination	No. Respondents	%
Walk	195	65.0	Walk	202	67.4
Taxi	32	10.6	Taxi	9	3.1
Private Car	10	3.4	Private Car	8	2.6

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Motorcycle	24	8.0	Motorcycle	32	10.5
Others (e.g. bicycle)	5	1.7	Others (e.g. bicycle)	14	4.6
No Response	34	11.3	No Response	35	11.8
Total	300	100	Total	300	100

Source: field survey, 2025.

4.3.6 Waiting Time, Reaching Time and Dropping Time of Patrons

The results in Table 4.16 highlight the efficiency of tricycle operations in Osogbo. Most users (62.3%) reach a tricycle terminal within 5 minutes, while 63.2% wait no longer than 5 minutes to board. Similarly, over half (54.3%) arrive at their final destinations within 5 minutes of dropping. These figures show that the system is quick and well-integrated, minimizing delays for passengers. Extended wait or travel times are rare, with only about 3% experiencing over 25 minutes of waiting. Overall, the data suggests that tricycles provide a timely and convenient transport option for short-distance urban travel.

Table 4. 17 Waiting Time, Reaching Time and Dropping Time of Patrons

Time to Tricycle Stop (mins)	Freq.	%	Waiting Time for Boarding (mins)	Freq.	%	Time to Final Destination (mins)	Freq.	%
0 – 5	186	62.3	0 – 5	190	63.2	0 – 5	163	54.3
10 – 15	69	22.7	10 – 15	68	22.7	5 – 10	88	29.3
11 – 20	30	10.0	16 – 25	24	8.4	11 – 20	39	13.1
Above 20	15	5.0	Above 25	10	3.2	Above 20	10	3.3
No Response	–	–	No Response	8	2.5	No Response	–	–
Total	300	100	Total	300	100	Total	300	100

Source: field survey, 2025.

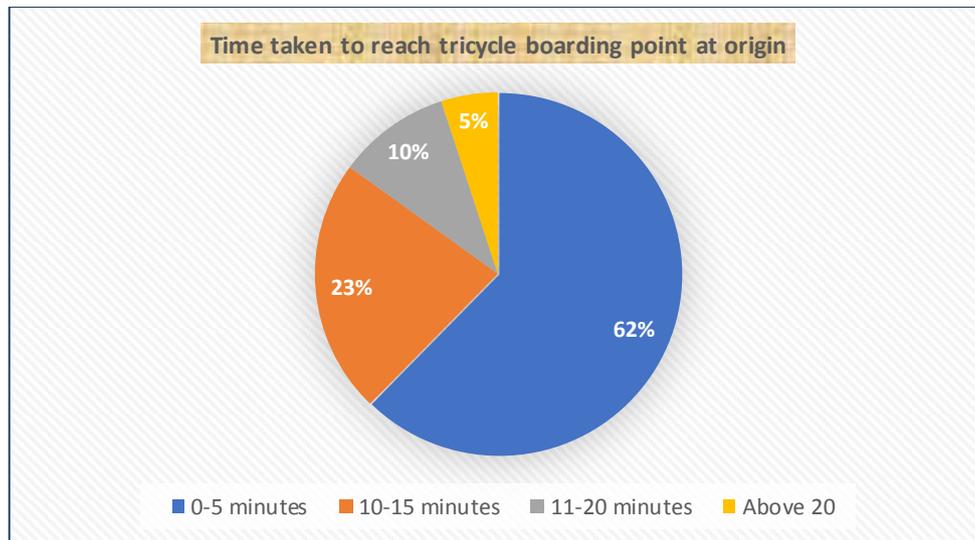


Figure 4. 1 chart of time taken to reach tricycle boarding point from origin

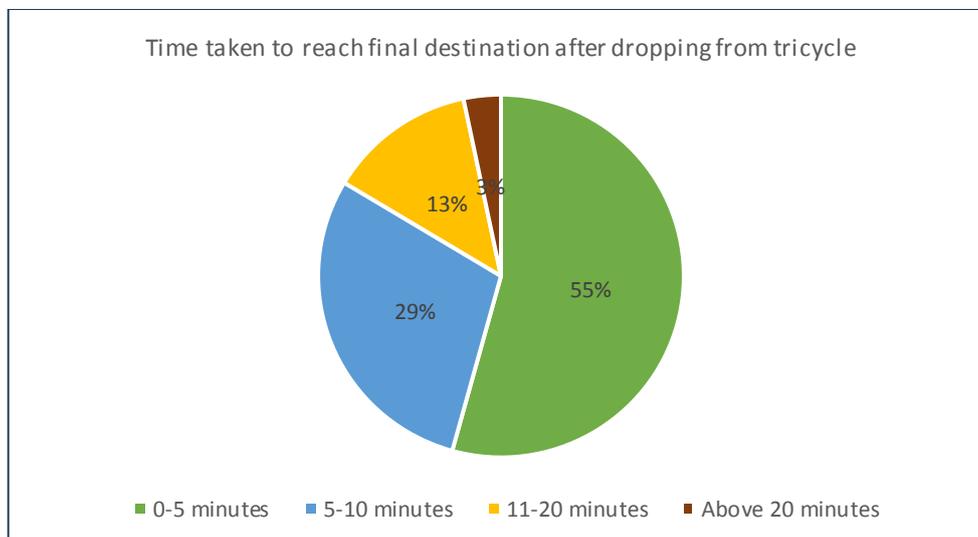


Figure 4. 2 chart of time taken to reach final destination after dropping from tricycle

4.3.7 Frequency of Tricycle Usage

As shown in Table 4.17, tricycles play a central role in the daily movement of residents in Osogbo. Nearly half of the respondents (48.4%) use them every day, reflecting their reliability and affordability for short, routine trips. Weekly users also make up a significant portion (30.6%), likely combining tricycles with other transport modes. A smaller share uses them monthly (9.7%) or only on occasion (11.3%), possibly based on need or proximity to terminals. Notably, no respondent indicated never using tricycles, which further confirms their widespread acceptance. These findings suggest that tricycles are not just supplementary—they're a mainstay in the city's public transport system.

Table 4. 18 Frequency of Tricycle Usage by Patrons

Frequency of Use	No. of Respondents	Percentage (%)
Daily	145	48.4
Weekly	92	30.6
Monthly	29	9.7
Rarely	34	11.3
Never	–	–
Total	300	100

Source: field survey, 2025

4.3.8 Average Distance Traveled by Patron Using Tricycle

Half of the respondents (50.3%) reported covering between 1 km and 5 km on a typical tricycle trip, suggesting that tricycles are most commonly used for medium-range urban travel (Table 4.18). Another 26.1% travel between 6 km and 10 km, while 17% take shorter trips under 1 km—likely for quick errands or access to other transport modes. Only a small share (6.6%) use tricycles for longer journeys above 10 km, which may be due to rising costs or route limitations. These results affirm the role of tricycles as ideal for short to moderate intra-city trips where convenience, speed, and affordability matter most.

Table 4. 19 Average Distance Traveled by Patron Using Tricycle

Average Distance	No. of Respondents	Percentage (%)
Less than 1 km	51	17.0
1 km – 5 km	151	50.3
6 km – 10 km	78	26.1
10 km and above	20	6.6
Total	300	100

Source: field survey, 2025

4.3.9 Challenges faced by operators

Table 4.19 highlights a range of operational and systemic challenges faced by tricycle operators in Osogbo. Poor road conditions (87%) and high fuel costs (79.5%) top the list, both of which directly affect vehicle maintenance and daily profits. A significant number (43.8%) also identified the lack of designated parking spaces—a challenge that not only creates inconvenience for operators but also contributes to road congestion, especially during peak hours when demand and traffic volume are high. Other concerns such as extortion from law enforcement (37.8%), traffic congestion (33.9%), and multiple levies (29.9%) reflect the regulatory and infrastructural hurdles operators must navigate. Issues like low passenger turnout and competition from other transport options such as the widely used mini bus (koro) further strain their income. Though fewer in number, complaints about police harassment and unfavourable policies still underscore gaps in institutional support. Overall, the data points to the need for government intervention in areas like road repair, parking infrastructure, and fair regulation to improve operator welfare and transport efficiency.

Table 4. 20 Challenges faced by operators using Tricycles

Challenges	No. of Respondents	Percentage (%)
Poor roads	87	87.0
High fuel cost	80	79.5
Lack of designated parking space	44	43.8
Extortion from law enforcement	38	37.8
Traffic congestion	34	33.9
Multiple levies	30	29.9
Low passenger numbers	26	25.9
Competition from other transport options	23	23.3
Police harassment	15	14.8
Unfavorable government policies	7	7.4
<i>Total Responses (Multiple Options Allowed)</i>		

Source: field survey, 2025

4.3.9.1 Problems associated with Tricycle Operation

As shown in Table 4.20, the most common issue reported by tricycle users is the attitude of riders (40.7%), suggesting a need for better customer service and conduct among operators. Complaints about slower speed (31%) and frequent stopovers (29.6%) reflect user frustration with delays and longer travel times, especially for those commuting during busy hours. The small size of seats (26%) was also noted as a comfort concern, particularly for longer trips or larger passengers. Although overloading was less frequently mentioned (10%), it still points to safety risks in some areas. Interestingly, 14% of respondents indicated no major problem, suggesting a generally acceptable experience for some users. Overall, the data reveals that while tricycles serve as a convenient mode, operational and behavioral issues could hinder user satisfaction if not properly addressed.

Table 4. 21 Problems associated with Tricycle Operation

Problem	No. of Respondents	Percentage (%)
Attitude of rider	122	40.7
Slower speed	93	31.0
Frequent stop over	89	29.6
Smaller seats	78	26.0
Overloading	30	10.0
No problem	42	14.0
Total (Multiple Responses Allowed)		

Source: field survey, 2025.

5. Conclusion and Recommendations

5.1 Summary of Findings

This study successfully evaluated the role of tricycles as a public transport system within Osogbo metropolis. It identified the most frequently used terminals by both patrons and operators, underscoring their strategic positions in linking key residential, commercial, and institutional zones. The socio-economic profiles of users revealed that tricycles predominantly serve low- and middle-income earners, offering an affordable and accessible means of daily commute. For operators, tricycles provide a source of stable livelihood, despite facing challenges such as high fuel costs, poor road infrastructure, and lack of designated parking spaces. The study also examined operational patterns including trip frequency, fuel consumption, income levels, waiting times, and passenger loads. Furthermore, user perception highlighted both the benefits and limitations of tricycle services. Overall, the findings affirm the critical role tricycles play in Osogbo’s urban mobility system and provide a basis for policy recommendations aimed at improving efficiency, safety, and sustainability.

5.2 Conclusion

The study concludes that tricycles play a vital role in Osogbo’s public transportation system, providing an affordable and accessible mode of transport, particularly for lower-income individuals who depend on them for daily commuting. Tricycles also contribute significantly to the local economy by creating employment opportunities not only for operators but also for mechanics, spare part dealers, and other service providers within the transport sector. The data reveals that tricycles serve a broad spectrum of socio-economic groups, including students, traders, and civil servants, making them a preferred mode of transport for many residents. The relatively low cost of operation makes them attractive to users, even though some operational issues—such as frequent stops and the attitudes of some riders—can affect overall user satisfaction.

However, key challenges remain, including poor road conditions, high fuel costs, multiple levies, and the absence of designated parking areas, which often leads to traffic congestion, especially during peak hours. These factors reduce operational efficiency and limit income potential for operators. Addressing these issues through infrastructure development, policy support, and improved regulation will be crucial to strengthening the role of tricycles in Osogbo’s urban mobility system and ensuring their long-term viability and effectiveness.

5.3 Recommendations

To enhance the effectiveness and sustainability of tricycles as a public transportation mode in Osogbo metropolis, the following recommendations are proposed:

- i. Improvement of Road Infrastructure: A significant number of operators identified poor road conditions as a major challenge. Government efforts should focus on rehabilitating and maintaining roads, especially in tricycle-dominated routes, to reduce vehicle wear and tear, improve safety, and enhance operational efficiency.
- ii. Provision of Fuel Support or Subsidies: With high fuel costs affecting over 79% of operators, government authorities should consider introducing fuel subsidies or financial assistance programs. These would help reduce operational expenses and improve profitability for operators, while also ensuring that fares remain affordable for passengers.
- iii. Establishment of Designated Parking Areas: Over 43% of operators reported lack of designated parking as a challenge, which contributes to roadside congestion. The government should construct structured terminals or designated stops to reduce obstruction on roads, especially during peak periods.
- iv. Training and Regulation of Tricycle Operators: Many passengers expressed concerns about rider attitude and overloading. Organizing periodic training on traffic rules, passenger relations, and safe driving practices would help improve service delivery. Enforcing strict regulations will also help reduce extortion, harassment, and multiple levies.

- v. Incentivizing Modernization of Fleet: To reduce maintenance costs and environmental impact, incentives such as low-interest loans or part-exchange schemes should be offered to operators for upgrading to newer, more efficient tricycle models.
- vi. Public Education and Sensitization Campaigns: Campaigns should be launched to educate both operators and the public on safety, proper boarding practices, and respect for traffic regulations. Promoting tricycles' value as a reliable and affordable transport option can boost public confidence and usage.
- vii. Monitoring and Policy Evaluation: A regulatory framework should be established for regular monitoring of operations, fare structures, and compliance with safety standards. This would support continuous improvement, respond to emerging issues, and ensure long-term system sustainability.

References

- [1] Adedotun, S. B. (2015). A study of urban transportation system in Osogbo, Osun State, Nigeria. *European Journal of Sustainable Development*, 4(3), 93. <https://doi.org/10.14207/ejsd.2015.v4n3p93>
- [2] Adewumi, E., & Allopi, D. (2013). Rea Vaya and Keke Napep: An exploration of the possibilities that exist between bus rapid transit (BRT) and the informal transport sector. *Procedia - Social and Behavioral Sciences*, 104, 836-846. <https://doi.org/10.1016/j.sbspro.2013.11.183>
- [3] Akinyemi, E. O., & Zuidgeest, M. H. P. (2016). Sustainable urban transportation in Nigeria: Performance, challenges, and prospects. *Transport Reviews*, 36(4), 499-516. <https://doi.org/10.1080/01441647.2015.1137655>
- [4] Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73-80. <https://doi.org/10.1016/j.tranpol.2007.10.005>
- [5] Buba, I. B. (2018). Tricycle as a mode of public transportation: Assessment of environmental impact. *Federal University of Technology, Minna*.
- [6] Busari, A. O., Olufemi, A. D., & Olagunju, K. O. (2015). An assessment of the effectiveness of tricycle as a mode of urban transportation in Kano metropolis, Nigeria. *Unpublished Master's Thesis, Ahmadu Bello University, Zaria*.
- [7] Cervero, R. (2000). Informal transport in the developing world. *United Nations Centre for human settlements (Habitat)* Retrieved from <https://unhabitat.org/sites/default/files/download-manager-files/Informal%20Transport%20in%20the%20Developing%20World.pdf>
- [8] Cervero, R., & Golub, A. (2007). Informal transport: A global perspective. *Transport Policy*, 14(6), 445-457. <https://doi.org/10.1016/j.tranpol.2007.04.011>
- [9] Downs, A. (2004). Still stuck in traffic: Coping with peak-hour traffic congestion. *Brookings Institution Press*.
- [10] Gao, Y., & Kenworthy, J. (2022). Characteristics, impacts and trends of urban transportation. *Encyclopedia*, 2, 1168-1182. <https://doi.org/10.3390/encyclopedia2020078>
- [11] Ibrahim, S. (2020). An assessment of the effectiveness of tricycle as a mode of urban transportation in Kano Metropolis. *Bayero University, Kano*.
- [12] Ismail, H., Abubakar, M., & Sani, A. (2018). Assessment of tricycles operations as an alternative means of urban transport in Lokoja, Kogi State. *Kogi State University, Anyigba*.
- [13] Ismail, N. A., Adeniji, T. A., & Paul, O. J. (2018). Assessment of tricycles operations as an alternative means of urban transport in Lokoja, Kogi State. *Confluence Journal of Environmental Studies*, 12(1), 53-62.
- [14] Litman, T. (2021). Evaluating accessibility for transport planning: Measuring people's ability to reach desired goods and activities. *Victoria Transport Policy Institute*. Retrieved from <https://www.vtpi.org/access.pdf>
- [15] Maitri, V., & Sarkar, P. K. (2010). Theory and applications of economics in highway and transport planning. *Standard Publishers Distributors, Delhi*.
- [16] Newman, P., & Kenworthy, J. (2015). The end of automobile dependence: How cities are moving beyond car-based planning. *Island Press*.
- [17] Obioma, A. (2018). Tricycles in Ibadan: Evaluating financial viability and socio-economic implications. *University of Ibadan*.
- [18] Ogunbodede, E. F. (2008). Urban road transportation in Nigeria from 1960 to 2006: Problems, prospects, and challenges. *Ethiopian Journal of Environmental Studies and Management*, 1(1), 7-18. <https://doi.org/10.4314/ejesm.v1i1.41541>
- [19] Ogundahunsi, D. S., Oyeniyi, A. S., & Adedotun, S. B. (2016). Assessment of road transport infrastructure in Osogbo, Osun State, Nigeria. *WIT Transactions on the Built Environment*, 164, 61-72. <https://doi.org/10.2495/UT160061>
- [20] Olawole, M. O., & Aloba, O. (2014). Mobility characteristics of the elderly and their associated level of satisfaction with transport services in Osogbo, Southwestern Nigeria. *Transport Policy*, 35, 105-116. <https://doi.org/10.1016/j.tranpol.2014.05.018>
- [21] Oluwaseyi, S. O., Eke, E., Chukwuemeka, A. E., & Okoko, E. (2014). Performance assessment of motorcycle operation as a means of urban mobility in Lokoja, Nigeria. *Journal of Transportation Technologies*, 4, 343-354.
- [22] Owolabi, A. O., & Akinwumi, D. O. (2011). Operational characteristics of para-transit modes in Akure, Nigeria. *FUTY Journal of the Environment*, 6(2), 110-116. <https://doi.org/10.4314/fje.v6i2.10>
- [23] Oyesiku, K. (2002). *From Womb to Tomb*. 24th Inaugural Lecture, Olabisi Onabanjo University, Ago-Iwoye, Nigeria.
- [24] Pojani, D., & Stead, D. (2015). Sustainable urban transport in the developing world: Beyond megacities. *Sustainability*, 7(6), 7784-7805. <https://doi.org/10.3390/su7067784>
- [25] Raji, B. A., & Waziri, O. O. (2008). Analysis of intra-urban traffic problems in Nigeria: A study of Lagos metropolis. *Indonesian Journal of Geography*, 40(1), 31-51.

- [26] Rodrigue, J. P., Comtois, C., & Slack, B. (2020). *The geography of transport systems* (5th ed.). Routledge. <https://doi.org/10.4324/9780429346323>
- [27] Ubani, O. (2009). An intra urban assessment of motorcycle transport services in Enugu metropolis. *Faculty of Environmental Sciences, Nnamdi Azikiwe University Awka, Anambra State.*
- [28] United Nations, Department of Economic and Social Affairs, Population Division. (2018). World urbanization prospects: The 2018 revision.
- [29] World Bank. (2021). Urban population (% of total population) - Nigeria [Data set]. <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=NG>

Appendices

Questionnaire for Data Collection

Section A: General Demographic Information

1. Sex: Male Female
2. Age: Less than 18 18-25 26-35 36-45 46-60 Above 60
3. Level of Education: No formal education Primary Education Secondary Education NCE Polytechnic Diploma University Degree
4. Marital Status: Single Married
5. Number of Dependents: 1-3 4-6 Above 6

Section B: Tricycle Operator Information

1. Daily Income: 5,000 Below 5,001-10,000 10,001-15,000 15,001-20,000 20,000 Above
2. What are your reasons for driving Tricycles: Unemployment Low income from primary job Family sustenance Quick savings Others: _____
3. How many years of experience do you have riding tricycle: Less than one year 1-3 years 3-6 years 6-10 years 10 years and Above
4. What type of tricycle do you use: Bajaj TVS Piaggio Napep Others: _____
5. Daily Fuel Consumption: 1-5 liters 6-10 liters 11-15 liters 16-20 liters Above 20 liters
6. Number of Trips per day: 1-5 6-10 11-15 16-20 Above 20
7. Are parking terminals available for tricycles? Yes No
8. Trip Length Covered: 1-5km 6-10km 11-15km 16-20km Above 20km
9. Numbers of Passenger Carried: 1-3 passengers 4 passengers 5 passengers
10. What is your scheduled start time for work per day? 6:00am – 7:00am 7:00am – 8:00am 8:00am – 9:00am 9:00am – 10:00am
11. What is your scheduled close time for work per day? 5:00pm – 6:00pm 6:00pm – 7:00pm 7:00pm – 8:00pm 8:00pm – 9:00pm 9:00pm – 10:00pm
12. What are the challenges you face as an operator? Extortion from law enforcement agents Lack of designated parking space Poor roads Multiple levies Unfavorable government policies on procurement Traffic congestion Police harassment High fuel costs Low passenger numbers Competition from other transportation options
13. Select the Terminal you park most: Oke fia Okinni Ilesa garage Bolanle park Power line Bovas-ogo oluwa area MDS- Market Otaefun park Testing ground Iyana camp Igbona park

Section C: Patrons Demographics

PART 1:

1. Occupation: Civil Servant Student Unemployed Self-employed Business Owner Others: _____
2. Income: Less than 100,000 100,000-149,900 150,000-199,900 200,000-299,900 300,000 Above
3. Trip purpose: School Market or Shop Workplace Religious Recreational Centers Shopping Center Friend's House Relations' house Wandering
4. Reasons for choosing tricycle: Readily available and accessible Cheaper and Available Comfortable and Safe Door to door service Faster

PART 2: Patrons Perspective about the use of Tricycle

1. How often do you use tricycles for transportation? Daily Weekly Monthly Rarely Never
2. What factors affect your choice of mode of public transport? Cheaper Faster Readily available Absence of alternative Comfortable and convenient Safe
3. What is the average distance of your trips using tricycles? Less than 1km 1km – 5km 5km – 10km More than 10km

4. What is the mode of trip from origin to tricycle terminal? Walk Taxi Motorcycle Private car
Others _____
5. Time taken to reach tricycle boarding point at origin (in minutes) 0-5 6-10 10-15
 16-20 20 Above
6. What is the mode of trip to final destination after dropping? Walk Taxi Motorcycle Private car
Others _____
7. Time taken to reach final destination after dropping from tricycle (in minutes) 0-5 6-10 10-15 16-20 20 Above
8. What are the problem you encounter while using tricycle for transportation?
 Frequent stop over Slower speed Attitude of riders Smaller seats Overloading
9. What are the benefit of tricycle services? Employment for riders Alternative means of mobility Employment for mechanics Revenue for government Employment for spare parts dealers
10. Select the Tricycle Terminal you use most: Oke fia Okinni Ilesa garage Bolanle park Power line Bovas-Ogo Oluwa area MDS- Market Otaefun park Testing ground Iyana camp Igbona park