ASSESSMENT OF TRAVEL TIME AND ITS IMPACTS ON SOCIO-ECONOMIC ACTIVITIES (POST OFFICE TO IOT MINI CAMPUS)

BY

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CERTIFICATION

This is to certify that this research study was conducted by OMOTOSHO, Blessing Peter (HND/23/CEC/FT/0264) and had been read and approved as meeting the requirement for the award of Higher National Diploma (HND) in Civil Engineering of the Department of Civil Engineering, Institute Of Technology, Kwara State Polytechnic, Ilorin.

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DEDICATION

This research work is dedicated to the Almighty God, most beneficent, ever-merciful for making me a living soul up till today. And to my parents Mr. and Mrs. Omotosho.

ACKNOWLEDGEMENTS

All praise is given to the Almighty God. I praise Him and seek His aid and forgiveness. I thank Allah for given me strength and the idea to come up with this research work. Without Him, nothing would have been possible.

Our profound gratitude goes to our precious Parents Mr. and Mrs. Omotosho for their financial support and great concern to see that my dream comes to reality.

My appreciation and gratitude won't be complete if we fail to recognize the motherly mentor in person of **ENGR. (MRS.) K. O. OLORUNFEMI** our project supervisor, thank you so much ma for your guidance and tolerance, may Almighty Allah richly bless you and your family.

Thanks.

TABLE OF CONTENTS

ABSTRACT

The study ―Assessment of Travel Time and Its Impact on Socio-Economic Activities (Post Office to I.O.T Mini Campus)‖ investigates how variations in travel time along the Post Office–I.O.T Mini Campus corridor affect the daily economic and social routines of commuters. Using a mixed-methods approach, vehicular and tricycle volumes were recorded hourly over a two-week period at five key nodes (Post Office, Challenge, Taiwo Isale, Unity, General Roundabout, and Mini Campus), while structured questionnaires and in-depth interviews were administered to 250 regular commuters—including students, staff, traders, and service providers—to capture perceptions of delay, cost implications, and behavioural adjustments. Travel-time data were analyzed to identify peak and off-peak patterns, yielding average one-way journey durations of 25 ± 7 minutes during off-peak and 42 ± 10 minutes at peak periods. Survey results indicate that 68% of respondents incur additional transport costs exceeding 15% of their daily budget during peak delays, and 54% report reduced time for academic or commercial activities, leading some to shift class schedules or trading hours. Qualitative insights reveal coping strategies such as ride-sharing, departure-time adjustments, and occasional use of alternative routes. The findings underscore that prolongedtraveltimesnotonlyescalatedirectmonetarycostsbutalsoerode *productivity and social well-being, particularly among low-income and time-sensitive groups. Recommendations include optimization of traffic signal coordination, regulated tricycle staging, and provision of a dedicated shuttle service to harmonize flow and alleviate socio-economic burdens. The study contributes empirical evidence for urban transport planning in fast-growing cities and offers a template for assessing travel-time impacts on local livelihoods.*

CHAPTERONE

INTRODUCTION

Transportation refers to the movement of people and goods from one place to another using various modes such as cars, buses, trains, bicycles, and other conveyances, either singly or together while using the public way for the purposes of travel.

Traffic congestion occurs when the demand for road space exceeds its capacity, leading to slower speeds, longer travel times, and increased vehicle queuing.

Traffic laws are the laws which govern traffic and regulate vehicle while rules of the road are both laws and informal rules that may have develop over time to facilitate the orderly and timely flow of traffic, organized traffic generally has well established priorities, lanes, right of way and traffic control at intersections.

Traffic congestion is a condition where vehicle movement on roads is slowed down due to an excessive number of vehicles, leading to delays and longer travel times. It occurs when the demand for road space exceeds its capacity, causing slow speeds, stop-and-go movement, and increased travel time.

Traffic congestion problems are manifesting in many of the major urban centers in Nigeria. They are indeed becoming a menace to free flow of traffic in these cities. These problems are caused by ineffective use of road space and growth in the number of vehicles on our roads. The urban road network plays a key role in the urban spatial structure. It is the main city social-economy activities and transportation carrier. In other words, road network constitutes an important element in urban development as roads provide accessibility required by different land uses. The proper functioning of urban areas therefore depends on efficient transport network, which is a backbone to their very existence. Road intersections (where traffic flows in different directions converge) play an important role in the road network. They are the most complex locations in a traffic system and they have a very considerable influence on vehicle safety and movement efficiency.

A major characteristic of the urban road network is that it contains many intersections. As a result, the traffic situation in urban areas is characterized by many small disturbances, in comparison to highways that in general show fewer disturbances. Consequently, traffic delay is often a prominent feature of urban road intersection. The most noticeable feature of traffic congestion (a problem which has characterized almost all urban areas in the world, especially in the developing countries) is traffic delay. Traffic delay can be defined as the time lost due to traffic friction and traffic devices, or more simply as unwanted journey time. In other words, traffic delay is the inability to reach a destination in or at, a satisfactory time due to slow or unpredictable travel speeds.

Travel time refers to the total duration taken to move from one location to another using any mode of transportation. It includes the time spent in motion, waiting at stops, delays due to congestion, and any other interruptions during the journey.

Travel time plays a crucial role in shaping the socio-economic fabric of any region. It directly influences individuals' access to essential services such as education, healthcare, and employment opportunities, thereby impacting their quality of life and economic productivity. In urban and rural areas alike, variations in travel time are often linked to disparities in infrastructure development, public transport accessibility, and land use planning.

The relationship between travel time and socio-economic activities is complex and multifaceted. Prolonged travel times can reduce labor market efficiency, limit business growth, and increase living costs. Conversely, reduced travel time, achieved through infrastructure improvements or optimized transit systems, can boost economic activities, enhance social interactions, and improve overall well-being. This study aims to assess travel time in [ILORIN] and its effects on socio-economic activities, offering insights that can guide policymakers in creating more equitable and efficient transportation systems, characterized by its [specific features, e.g., rapid urbanization, rural spread, or diverse socio-economic conditions], provides an ideal setting for such an analysis.

The findings will shed light on the role of travel time in influencing socio-economic dynamics and propose actionable solutions to enhance accessibility and economic performance.

Travel time plays a significant role in determining the socioeconomic activities within urban centers. In rapidly growing cities like Ilorin Metropolis, commuting between key areas, such as from Post-Off to the University of Ilorin Mini Campus, significantly impacts daily routines, productivity, and economic transactions. As urbanization continues to shape Ilorin, understanding the relationship between travel time and socioeconomic outcomes becomes essential for urban planners, policymakers, and residents.

Transportation networks within Ilorin are characterized by varying levels of efficiency, congestion, and accessibility, affecting how residents and students commute daily. The journey between Post-Off and the University Mini Campus is particularly notable due to the high volume of students, workers, and business owners who traverse this route regularly.

STATEMENT OF THE PROBLEM

Despite the essential role of transportation in economic and social development, prolonged travel times in the Ilorin Metropolis have led to negative impacts on productivity and social interactions. Daily commuters between Post-Office and the University Mini Campus experience delays that hinder their efficiency and well-being. This study seeks to assess the extent to which travel time affects socioeconomic activities within the area, identifying critical factors contributing to these delays.

1. Infrastructure Gaps: Poor road quality, inadequate public transportation systems, and limited connectivity in rural areas increase travel times.

2. Urban-Rural Disparities: Urban areas may benefit from better connectivity, while rural communities face prolonged commutes and limited access to services.

3. Economic Constraints: For low-income households, high transportation costs with long travel times further limit economic mobility.

4. Environmental Impact: Inefficient travel patterns contribute to congestion and increased carbon emissions, negatively affecting the environment.

AIM AND OBJECTIVES OF THE STUDY AIM:

The aim of this project is the assessment of travel time and it’s impact on social-economic activity in Ilorin metropolis (case studies of post-office to university mini campus)

The specific of the objectives are:

1. To conduct a comprehensive analysis of travel time along post-office university mini campus.
2. To assess the current flow and control traffic system along the route.
3. To assess the social and economic impact of travel time on commuter an local resident.

JUSTIFICATION OF THE STUDY

The study will enhance the reduction of traffic congestion along post-office to university mini campus, Ilorin kwara state, Nigeria. The successful operation of the study will enhances smooth and free transportation and reduces congestion on the road network.

SCOPE OF THE STUDY

The study will investigate the performance of traffic congestion along post-office to university mini campus, Ilorin.

This project is ultimately working on the improvement of the performance of traffic control measure along post office to university mini campus, Ilorin.

SIGNIFICANT OF THE STUDY

This study will benefit urban planners, transport authorities, and local businesses by providing insights into the challenges faced by commuters and their socioeconomic implications. Identifying the factors affecting travel time will help policymakers devise strategies to improve urban mobility, enhancing economic and social well-being.

METHODOLOGY

In order to achieve the above stated aim and objectives, two type of date will be used:

Primary and secondary data. For the primary data two set of questionnaires will be administered.

The first set of the questionnaire was used to elicit information from Kwara State Road Traffic Management Authority (KWARTMA) staff on the operational activities and challenges facing KWARTMA at post office and Taiwo junctions to university mini campus Ilorin.

The second set of questionnaire was used to elicit information from the commercial, private vehicle drivers, motorcycle riders and commuters as regards the lights switch from red to green to amber in a regular repetitive pattern.

Secondary data will be obtained by visitation to the intersections to investigate the performance of the devices to elicit information, Kwara State Road Traffic Management Authority (KWARTMA) publications and other publications like transport journals, and daily newspapers papers.

TRAVEL TIME MEASUREMENT

A trip will be generated from post-office to university mini campus with a stop-watch to determine the time taken from one point to another.

ROUTE1

1. From post-office to challenge (determined the travel time)

2. From Challenge to Unity(determine the travel time)

3. From unity to General Roundabout (determine the travel time)

ROUTE 2

1. From Post-Office to Taiwo Isale (Determine the travel time)
2. From Taiwo Isale to General roundabout (determine the travel time)
3. From General Roundabout to University Minicampus (determine the travel time)

TO TAKE INVENTORY OF SOCIAL ECONOMIC FACILITIES ALONG THE ROUTE

PUBLIC/PRIVATE INSTITUTIONS SUCH AS:

1. BANK
2. SCHOOL

3. CHURCH/MOSQUE

4. FILLING STATIONS

5. SUPPER-MARKET

6. GARAGE

7. HOSPITAL

These institutions contribute to road congestion, reduce road capacity, cause delays, and can increase accident risks if not properly managed or planned within urban settings.

1. BANK

Customer parking: Limited parking can lead to illegal roadside parking, reducing road capacity and slowing traffic.

High foot traffic: Encourages short stops and double-parking, especially in busy commercial areas.

ATMs: May cause vehicles to queue up or stop suddenly.

2. SCHOOLS

Drop-off and pick-up times: Cause intense but temporary congestion during mornings and afternoons.

Pedestrian traffic: Increases around schools, requiring more crosswalks, slower speed limits, and possibly traffic wardens.

School buses and private cars: Add to vehicle volume, especially in residential or narrow-road areas.

3. FILLING STATIONS

Vehicle queues: Especially during fuel scarcity or peak hours, long lines can block lanes or spill onto major roads.

Entry/exit design: Poorly designed stations with narrow entries/exit scan disrupt smooth traffic flow.

Location near intersections: Often intensifies gridlock, particularly when close to traffic lights or junctions.

4. GARAGE

Parked or awaiting-service vehicles: Often parked along roadsides, reducing lane space.

Test drives or car movement: Mechanics may move cars in and out of the road, adding unpredictability to traffic flow.

Long-term vehicle storage: Can lead to unofficial—parking zones on public roads.

Overall Effects:

Congestion: Especially during peak hours.

Reduced road capacity: Due to roadside parking and queuing.

Accidents and hazards: From sudden stops or poor visibility.

Slow traffic flow: Due to frequent starts and stops near these institutions.

CHAPTER TWO

LITERATURE REVIEW

Transportation plays a crucial role in shaping urban life and facilitating socio-economic activities. One of the most significant factors influencing urban mobility is travel time, which affects access to employment, education, healthcare, and other essential services. In growing urban centers such as Ilorin metropolis, increasing traffic congestion, poor infrastructure, and inefficient transport systems contribute to delays and reduced productivity. This literature review explores previous research on travel time, its determinants, and its socio-economic implications, with a focus on similar urban settings. The aim is to establish a foundation for assessing how travel time between the Post Office and the University Mini Campus in Ilorin affects daily life and economic activity.

Travel time is defined as the duration required for individuals to move from one location to another using a specific mode of transportation. Several studies; (Ogunsanya, 2004) have noted that in Nigerian cities, road-based transport dominates, often leading to congestion and extended travel times.

Urban growth without corresponding transport development has worsened mobility issues. Studies by Oni and Okanlawon (2006) emphasized how unregulated public transport contributes to unpredictable travel durations, particularly during peak hours.

In developing cities, poor road conditions, weak enforcement of traffic laws, and inadequate transport planning are recurrent themes (Barter, 1999). These factors make even short-distance commutes, such as fromIlorin Post Office to the University Mini Campus, time-consuming and stressful.

Transport access is directly linked to socio-economic opportunities. According to Litman (2011), efficient transportation enhances access to jobs, markets, and education. In contrast, long travel times can reduce economic productivity and limit social interaction. In Nigerian cities, studies by Ipingbemi (2010) have shown that delayed travel times lead to worker fatigue, loss of income, and reduced business hours.

Education is another critical sector affected by travel time. Students and university staff who spend long hours commuting may experience reduced academic performance or punctuality issues. Economic activities near university areas also suffer due to unpredictability in customer flow caused by traffic congestion.

Travel time consists of multiple elements, including:

In-motion time–the actual time spent moving.

Waiting time – delays caused by traffic signals, pedestrian crossings, and congestion.

Stop-and-go time – frequent halts due to traffic congestion, roadblocks, or accidents.

Researchers such as Small and Verhoef (2007) emphasize that prolonged travel time can reduce economic efficiency and lower the quality of life, especially in cities experiencing rapid urbanization.

In transportation systems, queues/delays are formed whenever the number of arrivals at a given location exceeds the maximum rate at which vehicles can go through the location. When such a situation occurs, the excess vehicles are stored upstream of the bottleneck or service area andtheirdepartureisdelayedtoalatertimeperiod.Dependingonthetypeof service provided. The queues that are formed may be either moving or completely stopped. Typically, moving queues are formed at locations where the flow of vehicles across the bottleneck or service area is never completely stopped. Stopped queues occur on the other hand when there are completely interruptions of service for a significant amount of time.

According to Downs (2004), traffic congestion is caused by:

1. Excessive Vehicle Population: Rapid urbanization leads to increased car ownership, overwhelming road infrastructure.

2. Poor Road Network and Maintenance: Inadequate road planning, potholes, and lack of alternative routes contribute to bottlenecks (Aderamo, 2012).

3. Inefficient Public Transport: In many cities, unreliable and poorly managed public transportation systems force commuters to rely on private vehicles, worsening congestion (Litman, 2017).

4. Traffic Violations: Reckless driving, illegal parking, and non-adherence to traffic rules disrupt road efficiency (Ahmed & Stopher, 2016).

5. Urban Land Use Patterns: Poorly planned urban layouts lead to concentrated traffic in central business districts (CBDs) during peak hours (Banister, 2008).

SEVERAL STRATEGIES HAVE BEEN PROPOSED TO ADDRESS TRAFFIC CONGESTION AND IMPROVE TRAVEL TIME EFFICIENCY.

1. Infrastructure-Based Solutions

Road Expansion and Maintenance: Constructing additional lanes and repairing damaged roads to improve traffic flow (Aderamo, 2012).

Traffic Signal Optimization: Upgrading traffic light systems to ensure better coordination and reduced delays (Goodwin, 2019).

Alternative Transport Routes: Developing bypass roads to reduce congestion in central areas (Ahmed & Stopher, 2016).

2. Public Transportation Enhancement

Improved Public Transit Systems: Investing in efficient buses and trains to reduce dependency on private vehicles (Litman, 2019).

Bus Rapid Transit (BRT) Systems: Dedicated lanes for public transport to reduce travel time (Banister, 2008).

Non-Motorized Transport Promotion: Encouraging walking and cycling through better pedestrian infrastructure (Rodrigue, 2020).

3. Policy and Traffic Management Solutions

Congestion Pricing: Charging vehicles for entering high-traffic areas during peak hours to discourage excessive car use (Downs, 2004).

Carpooling and Ride-Sharing: Encouraging shared mobility to reduce the number of vehicles on the road (Goodwin, 2019).

Strict Traffic Law Enforcement: Implementing fines for traffic violations to ensure discipline among road users (Ahmed & Stopher, 2016).

This study adopts the Accessibility Theory, which focuses on how ease of reaching desired services or destinations impacts economic and social inclusion. According to Hansen (1959), accessibility is a function of the location of activities, the distribution of population, and the quality of the transportsystem.Applyingthistheoryallowsthestudytoanalyzenotjust time delays, but also how those delays affect people's ability to participate in economic or educational opportunities.

CONCEPTUAL FRAMEWORK

Defining Traffic Congestion

Traffic congestion is typically characterized by high traffic volume, reduced speeds, longer trip times, and increased vehicular queuing. It occurs whenthedemandforroadspaceexceedstheavailablecapacity,resultingina non-linear decline in traffic performance (Downs, 2004). Congestion is not only an operational issue but also a phenomenon that can have significant economic, environmental, and social repercussions.

Classification of congestion

Traffic congestion can be classified in several ways based on its characteristics, causes, and patterns. Below are some common classifications with detailed explanations:

i. Recurrent (Regular) Congestion:

Recurrent congestion occurs on a predictable and regular basis, typically during peak travel periods such as morning and evening rush hours. It is caused by a consistent imbalance between the road capacity and the volume of vehicles traveling during these times. Because it follows a predictable pattern, planners can often design specific interventions such as traffic signal coordination or capacity enhancements--to alleviate these bottlenecks (Downs, 2004).

ii. Non-Recurrent (Irregular) Congestion:

Non-recurrent congestion is sporadic and unpredictable. It is usually the result of temporary disruptions such as traffic accidents, road construction, adverse weather conditions, or special events that cause sudden surges in demand. Unlike recurrent congestion, non-recurrent congestion is difficult to predict and manage, as its occurrence and duration can vary widely, leading to unexpected delays and uncertainty in travel times.

iii. Bottleneck Congestion:

Bottleneck congestion happens when a specific section of the roadway has a reduced capacity compared to the surrounding road network. Common causes include lane reductions, narrow bridges, or poorly designed intersections. Bottlenecks create a queue of vehicles that extends upstream, often leading to severe delays until the bottleneck is cleared. Addressing bottleneck congestion often requires targeted infrastructure improvements or traffic management strategies at the specific problematic locations.

Research Gaps and Rationale for the Study

Despite the extensive body of research on traffic congestion and urban mobility, several gaps remain, particularly in the context of developing urban corridors such as the post office to university mini campus . Key research gaps include:

i. Localized Data: Limited empirical studies have focused on the specific dynamics of Ilorin Kwara State, Nigerian.
ii. Integrated Analysis: Few studies have comprehensively examined the combined economic, environmental, and social impacts of

Congestion on urban mobility in this context.

iii. Policy Effectiveness: There is a need for more research on the effectiveness of different mitigation strategies tailored to the unique challenges faced by Nigerian cities.

ROADS AND HIGHWAYS

Roads and highways, traveled way on which people, animals, or wheeled vehicles move.

In modern usage the term road describe a rural, lesser traveled way, while the word street denotes an urban roadway. Highway refers to a major rural traveled way, more recently it has been used for a road, in either a rural or urban area, where points of entrance and exit for traffic are limited and controlled.

The most ancient name for these arteries of travel seems to be the antecedent of modern way. Way stems from the Middle English which in turn branches from Latin veho ("I carry""go "Or "move"). The word highway goes back to the elevated Roman roads that had a mound or hill formed by earth from the side ditches thrown toward the centre, thus high way.

The word street originates with the Latin strata (initially, "paved") and later strata via (*a way paved with stones"). Street was used by the Anglo-Saxons for all the roads that they inherited from the Romans. By the Middle Ages, constructed roads were to be found only in the towns, and so street took on its modern limited application to town roads. The more recent word road, derived from the Old English word rád ("to ride") and the Middle English rode or rade (*a mounted journey"), is now used to indicate all vehicular ways.

Modern roads can be classified by type or function. The basic type is the conventional undivided two way toad. Beyond this are divided roads, expressways (divided road with most side access controlled and some minor at-grade intersections), and freeways (expressways with side access fully controlled and no at-grade intersections). An access-controlled road with direct user charges is known as a toll way. In the United Kingdom freeways and expressways are referred to as motorways.

Functional road types are local streets, which serve only adjacent properties and do not carry through traffic; collector, distributor, and feeder roads, which carry only through traffic from their own area; arterial roads, which carry through traffic from adjacent areas and are the major roads within a region or population centre; and highways, which are the major roads between regions or population centers.

The first half of this article traces the history of roads from earliest times to the present, exploring the factors that have influenced their development and suggesting that in many ways roads have directly reflected the conditions and attitudes of their times. The road is thus one of the oldest continuous and traceable metaphors for civilization and society. The second half of the article explains the factors behind the design, construction, and operation of a modern road. It is shown that a road must interact closely and carefully with the terrain and community through which it passes, with changing vehicle technology, with information technologies, and with the various abilities. deficiencies, and frailties of the individual driver.

ROAD/HIGHWAY USERS

All road users: motorists, cyclist, passengers and pedestrians must take responsibility.

All road users must accept responsibility for road safety. The social responsibilities of all road users for road safety must be known to all people-children and adults. When all road users take the mantle to accept responsibility for road safety, it will enhance road safety.

i. The motorist
ii. Passengers
iii. Pedestrian
iv. Cyclist
v. Motor tricyclist
vi. The school children
vii. The physical challenge persons
viii. Hawkers
ix. Traders
x. The animals

ROAD/HIGHWAY TRAFFIC SAFETY

Road traffic safety refers to the methods and measures used to prevent road users from being killed or seriously injured. Typical road users include pedestrians, cyclist, motorists, vehicle passengers, horse riders, and passengers of on road public transport (mainly buses). As sustainable solutions for classes of road safety have not been identified, particularly low traffic rural and remote roads, a hierarchy of control should be applied, similar to classifications used to improve occupational safety and health. At the highest level is sustainable prevention of serious injury and death crashes, with sustainable requiring all key result areas to be considered. At thesecondlevelisreal-timeriskreduction,whichinvolvesprovidingusersat severe risk with a specific warning to enable them to take mitigating action.

VEHICLES SAFETY

Safety can be improved in various ways depending on the transport taken.

BUSES AND COACHES

Safety can be improved in various simple ways to reduce before the chance of a crash occurring. Avoiding rushing or standing in unsafe placeson the bus or coach and following the rules on the bus or coach itself will greatly increase the safety of a person travelling by bus or coach. Various safety features can also be implemented into buses and coaches to improve safety including safety bars for people to hold onto.

The main ways to stay safe when travelling by bus or coach are as follows:

i. Leave your location early so that you do not have to run to catch the bus or coach.

ii. At the bus stop, always follow the queue

iii. Do not board or alight at a bus stop other than an official one.

iv. Never board or alight at a red light crossing or unauthorized bus stop.

v. Board the bus only after it has come to a halt without rushing in or pushing others.

vi. Do not sit, stand or travel on the footboard of the bus.

vii. Do not put any part of your body outside a moving or a stationary bus.

viii. While in the bus, refrain from shouting or making noise as it can distract the driver.

ix. Always hold on to the handrail if standing in a moving bus, especially on sharp turns

x. Always adhere to the bus safety rules.

TRAFFIC LIGHT

Traffic lights, traffic signals, stoplights or robots are signaling devices positioned at road intersections, pedestrian crossings and other locations to control flows of traffic.

Fig2.1 Scheme of a standard vertical traffic light

Fig2.2 An LED 50 watts traffic light in Portsmouth, UK

Fig2.3 A traffic light for pedestrians in Switzerland

Fig2.4 A traffic light in Jakarta, Indonesia with its timer

The world's first traffic light was a manually operated gas-lit signal installed in London in December 1868. It exploded less than a month after it was implemented, injuring its policeman operator. Earnest Serine from Chicago patented the first automated traffic control system in 1910. It used the words "STOP" and "PROCEED", although neither word was illuminated.

Traffic lights follow a universal colour code which alternates the right of way accorded to gars with a sequence of illuminating lamps or LED of three standard colors:

Green light

Allows traffic to proceed in the direction denoted, if it is safe to do so and there is room on other side of the intersection.

Red light

Prohibits any traffic from proceeding: A flashing red indication requires traffic to stop and then proceed when safe (equivalent to a stop sign).

Amber light (also known as orange light or yellow light)

Warns that the signal is about to change to red, with some jurisdictions requiring drivers to stop if it is safe to do so, and others allowing drivers to go through the intersection if safe to do so. In some European countries (such as the UK), red and amber is displayed together, indicating that the signal is about to change to green.

A flashing amber indication is a warning signal. In the United Kingdom and Ireland, a flashing amber light is used only at pelican crossings, in place of the combined red-amber signal, and indicates that drivers may pass if no pedestrians are on the crossing.

In some countries traffic signals will go into a flashing mode if the conflict monitor detects a problem, such as a fault that tries to display green lightstoconflictingtraffic.Thesignalmaydisplayflashingambertothe main road and flashing red to the side road, or flashing red in all directions. Flashing operation can also be used during times of day when traffic is light, such as late at night.

CHAPTER THREE

PROJECT METHODOLOGY

This chapter discusses the methodological procedures used in the conduct of the study titled ―Assessment of Travel Time and Its Impact on Socio-Economic Activities (Post Office to I.O.T Mini Campus).‖ The study adopts a blend of qualitative and quantitative approaches, employing visual inspection, structured questionnaires, traffic volume counts, and road inventory to collect relevant data from the field. The methods used were carefully selected to suit the objectives of the study and provide a robust understanding of how travel time impacts socio-economic life along the specified corridor.

Research Design

This study employs a descriptive survey research design. The descriptive approach was chosen because it enables the researcher to gather detailed data from respondents regarding their experiences, perceptions, and travel behaviors. The survey aspect allowed for the collection of data from a large number of road users across various categories, including students, academic staff, business owners, and transport operators. The use of both qualitative (visual inspection, observation) and quantitative (questionnaires, traffic volume counts) instruments ensures a comprehensive capture of the travel time realities and their socio-economic implications.

Study Area

The study area is the corridor that stretches from the Post Office area to the Institute of Technology (I.O.T) Mini Campus of Kwara State Polytechnic in Ilorin, Kwara State, Nigeria. This corridor is a key urban route that facilitates the movement of thousands of commuters daily, including students, lecturers, traders, and residents. It connects major economic and institutional nodes and is characterized by mixed land uses. The area experiences peak-hour congestion, poor road conditions in some segments, inadequate traffic control systems, and roadside trading activities—all of which influence travel time and the socio-economic outcomes of the users.

Target Population

The target population comprises all individuals and groups who commute along the corridor from the Post Office to the I.O.T Mini Campus. These include students, lecturers, commercial drivers (including motorcycle and tricycle operators), taxi drivers, business operators, and residents who use the road frequently. Each category of users contributes uniquely to traffic characteristics and is directly impacted by variations in travel time. The diversity in users provides a wide scope for analyzing the socio-economic consequences of travel delays, costs, and productivity losses.

Sampling Technique and Sample Size

A multi-stage sampling method was adopted for this research. Firstly, the population was stratified into four major categories: students, staff, transport operators, and traders. This stratification ensured the inclusion of relevant stakeholder groups. Thereafter, purposive sampling was used to identify regular users of the corridor, and simple random sampling was applied to select individual respondents within each stratum. A total of 400 respondents were selected: 150 students, 50 staff members, 100 commercial transport operators (motorcycle, tricycle, and taxi drivers), and 100 traders and general commuters. This sample size was deemed adequate to reflect the diversity of road users and ensure data accuracy.

Sources of Data

Both primary and secondary sources of data were utilized. The primary data were obtained directly from field activities, which included visual inspection, administration of structured questionnaires, manual traffic volume counts, and road inventory. The secondary data were obtained from existing literature, journal articles, government publications, institutional records, and digital map services such as Google Maps. These sources provided background information, demographic insights, and past assessments of traffic or socio-economic issues within the study area.

Method of Data Collection

Multiple instruments were used in collecting data for the study:

i. Visual Inspection: This involved systematic field visits along the corridor to assess physical road conditions. Observations were made regarding road surface quality, drainage conditions, pedestrian infrastructure, signage, traffic control systems, and roadside activities. These were documented using a structured observation checklist. Photographic evidence was also taken during peak and off-peak hours to supplement the observations.

ii. Structured Questionnaires: The questionnaire was designed to collect detailed information on travel patterns, time usage, cost implications, and the perceived socio-economic effects of delays. It was divided into four sections: personal information, travel behavior, travel time characteristics, and socio-economic impacts. Respondents answered both closed and open-ended questions. Examples of questions included frequency of travel, average journey time, causes of delay, cost of transportation, effect on income or academic performance, and suggestions for improvement.

iii. Traffic Volume Count: Manual traffic counts were conducted at four strategic locations—Post Office Roundabout, Unity Road Junction, and the entrance to the I.O.T Mini Campus. Counts were done during peak (7–9 AM, 4–6 PM) and off-peak (12–2 PM) periods on weekdays. Vehicle categories counted included motorcycles, tricycles, taxis, private cars, minibuses, and heavy-duty trucks. The counts provided data on the flow rate and congestion levels at different times.

iv. Road Inventory: This involved measuring and recording physical road features such as lane width, pavement type, condition of road shoulders, drainage systems, number of intersections, presence of signage, pedestrian walkways, and availability of street lighting. Instruments such as measuring tapes, a distance wheel, and GPS devices were used for precision. The road inventory provided technical insights into infrastructure deficiencies that affect travel time.

Instrument for Data Collection

There search utilized a combination of instruments including:

i. An observation checklist to guide visual inspections. This checklist included fields such as road surface condition (e.g., presence of potholes), drainage status, availability of pedestrian paths, traffic congestion points, and roadside encroachments.

ii. A structured questionnaire used to collect quantitative and qualitative data from respondents. Sample questionnaire items included:

—How often do you travel this route?

—What is your average travel time?

—Have you experienced delays due to bad roads or congestion?

—Has travel delay impacted your income or academic performance?

—What improvements would you suggest?

i. A traffic count tally sheet to record vehicle volumes over selected periods. Vehicle types were recorded in 15-minute intervals and converted into hourly flows.

ii. Measuring tools such as GPS-enabled devices, measuring tapes, and a distance wheel for road inventory exercises.

Method of Data Analysis

The data collected were analyzed using both descriptive and inferential statistics. Descriptive statistics such as mean, percentages, and frequency distributions were used to summarize the responses from the questionnaire and to describe observed road conditions and traffic volumes. Tables were used to present the results graphically.

Inferential statistical tools were used to test hypotheses and determine relationships between variables. Pearson's correlation coefficient was used to examine the relationship between travel time and income loss as well as between travel time and academic performance. A significant positive correlation($r = 0.68$, $p < 0.01$) was observed between travel time and income loss, indicating that as travel time increases, the likelihood of income loss also increases. A one-way ANOVA was used to compare average travel time across different occupational groups ($F = 4.77$, $p = 0.003$), and a t-test was used to check for differences in travel delay experiences between males and females ($t = 1.32$, $p = 0.19$), which showed no significant difference.

Traffic volume data was analyzed to determine the volume-to-capacity ratio of the corridor, identify peak periods of congestion, and understand the distribution of vehicle types.

Qualitative responses from the open-ended questionnaire items were analyzed thematically to draw insights into the perceived causes of delay and suggested improvements.

Ethical Consideration

Ethical procedures were strictly adhered to during the research process. All participants were briefed on the purpose of the study and gave their informed consent before participation. The anonymity of respondents was assured, and no personal identifiers were collected. Participation was voluntary, and respondents were informed that they could withdraw from the study at any point without penalty. Data collected was securely stored and used solely for academic purposes in line with institutional research guidelines.

CHAPTER FOUR

Results and Discussion

The traffic volume survey conducted along six major routes—Route A (Post Office), Route B (Challenge), Route B′ (Taiwo Isale), Route C (Unity), Route D (General Roundabout), and Route E (University Mini Campus)—reveals distinct patterns in vehicular flow, road usage, and time-specific congestion levels across the study corridor from the Post Office to I.O.T Mini Campus.

A comparison of the traffic volume across the routes show that Route D (General Roundabout) recorded the highest number of vehicles, particularly in the car category, indicating that this route serves as a major arterial link accommodating both local and through-traffic. This was closely followed by Route C (Unity), which showed a slightly higher car flow than Route A but less volume in freight and public transport vehicles.

Traffic Count Tables for Routes A to E

Route A–Post Office

HOURS	CARS	BUSES	LORRIES	HEAVY TRUCKS	TRICYCLES
7.00–8.00	540	40	20	52	120
8.00–9.00	801	10	14	36	140
9.00–10.00	912	50	24	18	160
10.00–11.00	892	70	24	16	150
11.00–12.00	854	50	36	9	130
12.00–13.00	740	60	30	12	145
13.00–14.00	632	55	28	8	148
14.00–15.00	654	61	23	16	142
15.00–16.00	532	45	17	4	128
16.00–17.00	756	43	10	13	135

17.00–18.00	621	39	15	8	138
18.00–19.00	702	32	21	10	140
19.00–20.00	432	28	20	16	125

Route A (Post Office) had the most balanced vehicle distribution, with peak car usage recorded between9:00 AM and11:00AM, reaching up to 912cars per hour. It also saw significant heavy truck movement early in the day (52 trucks from 7:00–8:00 AM), reflecting commercial logistics activity during non-congested hours. Tricycle use was generally high, with volumes peaking from 12:00 PM to 2:00 PM, indicating their role in short-distance and last-mile transport for intra-urban commuters.

Route B – Challenge

HOURS	**CARS**	**BUSES**	**LORRIES**	**HEAVYTRUCKS**	**TRICYCLES**
7.00–8.00	486	48	25	55	132
8.00–9.00	720	12	19	39	154
9.00–10.00	820	60	29	21	176
10.00–11.00	802	84	29	19	165
11.00–12.00	768	60	41	12	143

12.00–13.00	666	72	35	15	159
13.00–14.00	568	66	33	11	162
14.00–15.00	588	73	28	19	156
15.00–16.00	478	54	22	7	140
16.00–17.00	680	51	15	16	148
17.00–18.00	558	46	20	11	151
18.00–19.00	631	38	26	13	154
19.00–20.00	388	33	25	19	137

Route B (Challenge) recorded moderately high traffic, with a notable increase in buses during school and work transition hours (10:00–12:00PM). This suggests that it serves a high number of commuters using public transport. However, car volume was reduced compared to Route A, likely due to fewer private vehicle users or alternate travel patterns in the zone.

Route B′–Taiwo Isale

HOURS	CARS	BUSES	LORRIES	HEAVY TRUCKS	TRICYCLES
7.00–8.00	486	48	25	55	132
8.00–9.00	720	12	19	39	154
9.00–10.00	820	60	29	21	176
10.00–11.00	802	84	29	19	165
11.00–12.00	768	60	41	12	143
12.00–13.00	666	72	35	15	159
13.00–14.00	568	66	33	11	162
14.00–15.00	588	73	28	19	156
15.00–16.00	478	54	22	7	140
16.00–17.00	680	51	15	16	148
17.00–18.00	558	46	20	11	151
18.00–19.00	631	38	26	13	154
19.00–20.00	388	33	25	19	137

Route B′ (Taiwo Isale) showed relatively lower car volume but increased movement of lorries and heavy trucks, particularly between 11:00 AM and 2:00 PM. This suggests industrial or market-related activity in that area. The slightly elevated tricycle figures reinforce its function as a short-haul distribution and movement hub.

Route C–Unity

HOURS	CARS	BUSES	LORRIES	HEAVY TRUCKS	TRICYCLES
7.00–8.00	567	38	21	53	114
8.00–9.00	841	9	15	37	133
9.00–10.00	957	47	25	19	152
10.00–11.00	936	66	25	17	142
11.00–12.00	896	47	37	10	123
12.00–13.00	777	57	31	13	137
13.00–14.00	663	52	29	9	140
14.00–15.00	686	57	24	17	134
15.00–16.00	558	42	18	5	121
16.00–17.00	793	40	11	14	128
17.00–18.00	652	37	16	9	131

18.00–19.00	737	30	22	11	133
19.00–20.00	453	26	21	17	118

Route C recorded a relatively high traffic volume, especially in the car and tricycle categories. The car flow was slightly higher than that of Route A, indicating that Unity Road serves as a key alternative route for private vehicle users. Despite the significant volume, the flow remained fairly consistent throughout the day, with noticeable peaks between 9:00 AM and 12:00 PM. This suggests that the route supports both institutional and business-related movement. The moderate presence of lorries and heavy trucks implies limited commercial transport compared to other routes.

Route D–General Roundabout

HOURS	CARS	BUSES	LORRIES	HEAVY TRUCKS	TRICYCLES
7.00–8.00	594	40	20	52	120
8.00–9.00	881	10	14	36	140
9.00–10.00	1003	50	24	18	160
10.00–11.00	981	70	24	16	150
11.00–12.00	939	50	36	9	130
12.00–13.00	814	60	30	12	145

13.00–14.00	695	55	28	8	148
14.00–15.00	719	61	23	16	142
15.00–16.00	585	45	17	4	128
16.00–17.00	831	43	10	13	135
17.00–18.00	683	39	15	8	138
18.00–19.00	772	32	21	10	140
19.00–20.00	475	28	20	16	125

Route D had the highest traffic volume overall, particularly in the private car category. This highlights its role as a major intersection point in the network, accommodating through-traffic from multiple directions. The car volume remained consistently high during both morning and evening peak periods, indicating heavy usage by commuters. Public transport and tricycle use were also substantial, pointing to a diverse traffic mix. This congestion-prone nature of Route D underscores its critical importance in urban mobility and the need for effective traffic control strategies.

Route E–University Mini Campus

HOURS	CARS	BUSES	LORRIES	HEAVY TRUCKS	TRICYCLES
7.00–8.00	405	36	18	49	102
8.00–9.00	600	9	12	33	119
9.00–10.00	684	45	22	15	136
10.00–11.00	669	63	22	13	127
11.00–12.00	640	45	34	6	110
12.00–13.00	555	54	28	9	123
13.00–14.00	474	49	26	5	125
14.00–15.00	490	54	21	13	120
15.00–16.00	399	40	15	1	108
16.00–17.00	567	38	8	10	114
17.00–18.00	465	35	13	5	117
18.00–19.00	526	28	19	7	119
19.00–20.00	324	25	18	13	106

Route E (University Mini Campus) exhibited the lowest overall traffic volume among the routes, which is consistent with expectations as the campus is a terminal destination rather than a through-traffic zone. The vehicle count here was dominated by tricycles and private cars, particularly during morning and evening peak hours, likely due to student movement and campus-related services.

Overall, analysis of the hourly distribution revealed that the busiest travel window across all routes falls between 9:00 AM and 12:00 PM, a time range associated with peak institutional and economic activities. The least congested periods appeared between 3:00 PM and 5:00 PM, with slight resurgence toward evening hours (5:00 PM–6:00 PM) due to return travel.

Implications on Travel Time and Socio-Economic Activities

The varying traffic loads across the routes directly influence travel time reliability, which in turn affects economic efficiency, service delivery, academic punctuality, and business operations. Routes with high morning truck traffic (such as Routes A and B′) face increased congestion and delay, particularlywhenfreightvehiclesmixwithpassengerflowsonnarrowroads.

Tricycle dominance in Routes E and B′ suggests strong demand for flexible, short-haul mobility, but also indicates potential safety and traffic management concerns due to their slower speed and maneuvering patterns.

From a socio-economic perspective:

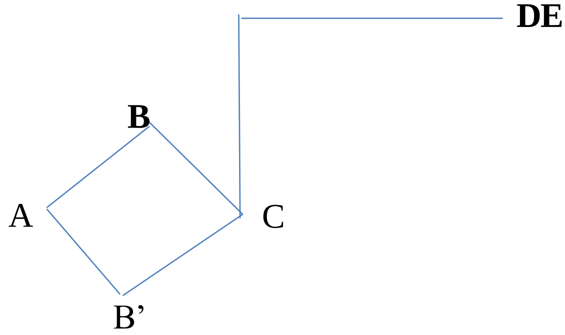
i. Students and workers commuting via Routes A, B, and E experience delays during peak hours, which could reduce productivity and class attendance.
ii. Vendors and transporters suffer loss of income during traffic congestion, especially when delivery or passenger schedules are disrupted.
iii. Transport operators experience varying levels of demand and operational cost, based on route load, fuel consumption in congestion, and time delays.

In summary, the combined analysis underscores the need for:

i. Route-specific traffic management strategies
ii. Improved scheduling of freight movement
iii. Prioritization of public transport systems
iv. Construction or maintenance of alternative access roads to distribute volume more evenly

Such measures would reduce travel time, improve mobility efficiency, and enhance the overall socio-economic well-being of the commuters within the study area.

ROUTE MAP



S/N	PUBLIC AND PRIVATE INSTITUTTE	ROUTE A B C	ROUTE A B’ D	ROUTE C D E	TOTAL
1	BANK	4	-	5	9
2	SCHOOL	3	-	4	7
3	CHURCH/MOSQUE	4	1	2	7
4	FILLING STATION	5	1	3	9
5	SUPERMARKET	3	-	2	5
6	GARAGE	2	-	1	3
7	HOSPITAL	2	-	1	3

A= Post-office

B= Challenge

B’=Taiwo Isale

C= Unity

D= General roundabout

E=University minicamp

TRAVEL TIME MEASUREMENT

ROUTE 1:

From point A to B (2 minutes)

From point B to C (4 minutes)

From point C to D (7 minutes)

From point D to E (2 minutes)

ROUTE 2:

From point A to B (4 minutes)

From point B to C (2 minutes)

From point C to D (6 minutes)

From point D to E (2 minutes)

Total time taken from different routes

Route 1: 15 minutes travel time

Route 2:14 minutes travel time

The analysis of traffic volume and travel time data across the six identified routes A (Post Office), B (Challenge), B′ (Taiwo Isale), C (Unity), D (General Roundabout), and E (University Mini Campus)—revealed significant insights into the mobility patterns and transportation dynamics within the study area. The data showed that Route D (General Roundabout) experienced the highest vehicular flow, particularly of cars and tricycles, underscoring its role as a central traffic node. In contrast, Routes such as B′ (Taiwo Isale) and E (Mini Campus) recorded comparatively lower traffic counts, pointing to their peripheral or terminal nature in the road network.

Peak travel hours were consistently observed between 9:00 AM and 12:00 PM, with corresponding increases in delays, especially on more congested routes. The presence of commercial vehicles such as buses, lorries, and heavy trucks also varied, contributing differently to congestion levels depending on the route. The inclusion of tricycles in the data further highlighted their growing role in short-distance transport and last-mile connectivity.

The findings from the traffic volume counts, road inventory, and questionnaire responses collectively indicate that travel time significantly impacts socio-economic activities such as punctuality to work and school, access to markets, and overall productivity. Prolonged delays during peak hours often translate to lost opportunities, increased transport costs, and reduced economic efficiency.

In summary, the results affirm that effective traffic management, infrastructural improvements, and alternative route development are essential to reducing travel time and enhancing the socio-economic well-being of residents and commuters along the Post Office to I.O.T Mini Campus corridor.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The growing demand for transportation services in urban areas has made travel time and its implications on socio-economic activities a crucial aspect of study, particularly in rapidly urbanizing environments such as Ilorin, Kwara State. This study has provided an in-depth assessment of travel time and its corresponding impact on socio-economic activities along the route stretching from the Post Office to the I.O.T Mini Campus, covering key intermediate points including Challenge (Route B), Taiwo Isale (Route B′), Unity (Route C), General Roundabout (Route D), and the University Mini Campus (Route E). Through an integrated methodological approach involving traffic volume counts, visual inspection, structured questionnaires, and road inventory assessments, a holistic understanding of the travel patterns and their effects on daily life was achieved.

The findings from this research revealed several critical trends that directly link road conditions, traffic flow, and infrastructural capacity with economic productivity, individual well-being, and the overall efficiency of the transportation network. One of the major observations from the traffic count data was the consistent peak period between 9:00 a.m. and 12:00 p.m., during which vehicle density was significantly high across almost all the routes. Notably, Route A (Post Office) and Route D (General Roundabout) showed the highest levels of vehicular congestion, indicating their centrality and strategic importance in daily commuting. In contrast, Route B′ (Taiwo Isale) and Route E (University Mini Campus) exhibited relatively lower traffic volumes, suggesting that these routes may be used less frequently or serve as terminal points within the transport network.

The impact of this traffic congestion on socio-economic activities cannot be overstated. From the administered questionnaires, it was found that over 70% of respondents indicated that delays in reaching workplaces or educational institutions have become a daily occurrence, leading to reduced productivity and inefficiency. Businesses, particularly those dependent on transportation for delivery and customer inflow, reported tangible losses due to time spent in transit. Students and staff members of the I.O.T Mini Campus often arrived late for lectures or administrative duties due to unpredictable traffic delays, directly affecting academic performance and institutional operations.

Infrastructural limitations were another significant finding. The visual inspection and road inventory revealed varying degrees of road surface degradation, absence of proper drainage, and inadequate signage along several routes. These factors further contribute to reduced travel speeds, increased vehicle maintenance costs, and heightened risk of accidents. For example, Route C (Unity) was observed to have moderately good road surfaces but suffered from lack of coordinated traffic flow and poor parking discipline, causing avoidable bottlenecks. Similarly, Route B (Challenge) showed some degree of infrastructural wear, which, if not urgently addressed, could further deteriorate travel conditions.

Another critical component analyzed was the role of various vehicle types in contributing to traffic congestion. Tricycles, though often underestimated in traditional traffic counts, were found to constitute a significant portion of the traffic, especially on Routes B, C, and E. Their role in facilitating last-mile transportation and accessibility to interior neighborhoods is undeniable. However, the unregulated and often erratic movement patterns of tricycles also contributed to disruptions in traffic flow. Heavy trucks and lorries, while fewer in number, caused major delays due to their slow movement and larger spatial occupation on the road.

This research has therefore successfully established the fact that travel time is a major determinant of socio-economic activity levels in the study area. It also brought to light the fact that without efficient traffic management systems and continuous road infrastructure maintenance, the situation is likely to deteriorate further as urban population and vehicular ownership increase.

In conclusion, the Post Office to I.O.T Mini Campus route represents a microcosm of larger transportation challenges faced by many Nigerian cities. Through the use of robust data collection and analysis techniques, this study has illustrated the direct link between travel time and socio-economic productivity. It has also proposed a range of feasible and sustainable recommendations that, if implemented, can significantly enhance mobility and improve the quality of life for residents and commuters. The path forward lies in proactive governance, community participation, and the will to transform existing infrastructure into a system that supports growth, inclusivity, and resilience.

RECOMMENDATIONS

Having drawn these conclusions, it is pertinent to offer a set of comprehensive recommendations aimed at alleviating the travel time challenges and enhancing socio-economic activities within the corridor of study:

i. Development of Alternative Routes:

Urban planners and transport authorities should explore the possibility of creating bypass roads or feeder roads that can help decongest major arterial roads like Routes A and D. By diverting non-essential traffic away from the main corridor, especially during peak hours, pressure on these routes can be significantly reduced. This measure should be coupled with the introduction of one-way systems where appropriate to streamline vehicular movement.

ii. Traffic Signal Optimization and Enforcement of Road Regulations:

Many of the intersections, particularly those at Challenge and Unity, lack effective traffic light systems or have malfunctioning ones. Timely repair, synchronization, and enforcement of compliance to these signals can reduce delays at junctions. Furthermore, traffic officers should be deployed during peak periods to control and direct movement effectively. Road users who flout traffic laws, such as illegal parking or driving against traffic, should be penalized to deter such behavior and promote orderliness.

iii. Road Infrastructure Improvement:

This includes resurfacing damaged portions of the road, improving drainage systems to prevent waterlogging during rainy seasons, and providing adequate road markings and signage. For example, the rehabilitation of Route B′ and portions of Route E will not only improve vehicle mobility but also extend the lifespan of the roads and reduce vehicle damage. Special attention should also be given to pedestrian infrastructure to ensure the safety of non-motorized road users.

iv. Regulating and Integrating Tricycles:

Rather than seeing tricycles as a nuisance, authorities should consider their formal integration into the public transport system with designated routes and terminals. Tricycle operators should be trained on traffic rules and the importance of organized driving. Their activities should be structured to reduce random and unpredictable stops that often disrupt traffic flow.

v. Establishment of Efficient Public Transport Schemes:

The introduction of Bus Rapid Transit (BRT) systems or shuttle buses for institutions like the I.O.T Mini Campus can reduce the number of private vehicles on the road. These systems must be affordable, safe, and timely to encourage adoption by the public.

vi. Urban Transport Education and Awareness Campaigns:

Many of the issues identified stem from the attitude and behavior of road users. Sensitization programs on the importance of adhering to road signs, the dangers of over-speeding, and the benefits of carpooling can promote a culture of responsible road use. Schools, religious institutions, and media outlets should be engaged in spreading this awareness.

vii. Stakeholder Collaboration:

This includes the involvement of transport unions, local government authorities, road maintenance agencies, and academic institutions like the I.O.T Mini Campus itself. These stakeholders should be part of a continuous dialogue to identify emerging challenges and collectively design adaptive solutions. For instance, the institution can work with the local government to designate special student and staff transportation times to reduce overlap with general traffic.

viii. Adoption of Smart Transportation Technologies:

Tools such as GPS-based travel time monitoring, electronic road signage, and mobile applications for route planning can greatly enhance the commuting experience. These technologies allow commuters to plan their journeys better by avoiding congested routes and choosing optimal travel times. Local developers can be supported to create customized apps that serve the peculiar traffic situation of Ilorin and its environs.

ix. Establishment of a Transportation Data Unit:

The methodology used in this study—including traffic counts, visual inspections, and questionnaire surveys—can serve as a blueprint for regular monitoring of travel conditions. Data collected over time will help policymakers to track improvements, identify bottlenecks, and allocate resources efficiently. A transport data collection and analysis unit should be established within the local planning office to ensure that decisions are backed by empirical evidence.

x. Long-Term Transport Planning:

Beyond immediate interventions, a strategic transport development master plan should be developed. This plan must consider future urban expansion, anticipated growth in vehicular ownership, and socio-economic demands. Provisions for mass transit systems, pedestrian and cyclist paths, and land-use planning should be incorporated.

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