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Impact of Road Side Friction on Traffic Congestion in Ijebu-Ode, Ogun State

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Abstract

Traffic congestion is a major issue in Ogun State, affecting travel time, safety, and mobility. A key but under regulated cause is roadside friction, including illegal parking, street trading, pedestrian movement, and informal bus stops, which reduce road space and slow traffic. Despite concerns, their exact impact on traffic flow remains understudied. This research aims to examine these effects and provide insights for effective transportation planning and congestion management in Ogun State. The study focuses on road users in Ijebu-Ode Local Government, specifically along Lagos Garage Road and Ibadan Garage Road. The population is considered infinite, and a sample size of 100 was determined using the infinite population formula. Cluster sampling divided the area into two major road clusters, while random sampling selected respondents. Data analysis involved descriptive statistics (frequencies, percentages) and inferential statistics, including multiple regression and correlation matrix. Most road users agree that side friction reduces travel speed and restricts movement, impacting road capacity and congestion. Regression analysis revealed that pedestrians waiting on road shoulders and street sellers significantly affect urban traffic flow in Ijebu-Ode. Additionally, a strong positive relationship exists between vehicle flow and motorcycle flow, with a correlation coefficient of 0.955, highlighting the interconnected impact of different traffic elements influenced by roadside activities. The study concludes that side friction significantly affects speed, capacity, and traffic flow on urban roads in Ijebu-Ode. It was therefore, recommended to enforce strict regulation on roadside parking to reduce lane obstruction.

Keywords: *Illegal Parking, Pedestrian Activity, Road side friction, Traffic congestion, Urban Mobility*



Assessing the Impact of Urban Transportation Systems on Air Quality and Public Health in Kano Metropolis, Kano State Nigeria

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Abstract

This study examines the impact of urban transportation systems on air quality and public health in Kano Metropolis, Nigeria. The aim of the work is to assess current air quality levels and identify major pollution sources in transportation corridors, evaluate the public health impacts of transportation-related air pollution on residents, examine the relationship between different transport modes and their contribution to air quality degradation, and recommend integrated policy measures for improving air quality and protecting public health through sustainable transportation. Relevant literature were reviewed in relation to the work. The methodology used a mixed-methods approach, data were collected through longitudinal air quality monitoring at 20 fixed and mobile stations, health surveys of 350 residents stratified by exposure zones, and semi-structured interviews with 20 key stakeholders including environmental health officials, healthcare professionals, and transport agency representatives. Findings reveal severe air quality degradation, with $PM_{2.5}$ levels reaching $101.4 \mu\text{g}/\text{m}^3$ at Bompai Industrial Zone (exceeding WHO limits by 676%), and significant health impacts including 4.2 times higher odds of persistent cough among high-exposure residents. The study identified tricycles as the dominant pollution source (44% of $PM_{2.5}$), emitting 38 times more $PM_{2.5}$ per kilometer than CNG buses. It also demonstrated strong public support for CNG tricycle retrofits (Policy Feasibility Index = 0.84) with potential to reduce $PM_{2.5}$ by 42%. The study recommended implementing enhanced real-time air monitoring networks, phased vehicle emission control programs with mandatory Euro IV standards, health protection measures for vulnerable populations including air-filtered clinics and pollution alert systems, accelerated fleet modernization to CNG/electric alternatives, and establishing an integrated Transport-Health-Environment Nexus authority for coordinated governance.

Keywords: Air Quality, Environmental Policy, Public Health, Sustainable Transport, Urban Transportation, Vehicle Emissions



Feasibility of Compressed Natural Gas (CNG) Adoption in Kano Urban Transport Sector: A Sustainable Fuel Transition Strategy

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Abstract

With growing environmental concerns and volatile petrol prices, the transition to cleaner fuels has become a pressing policy imperative globally and nationally. Despite Nigeria's vast natural gas reserves and the launch of the Presidential Compressed Natural Gas Initiative (P-CNGi), adoption in northern cities such as Kano has remained minimal. This study investigates the feasibility of adopting Compressed Natural Gas (CNG) in Kano State's urban transport sector, which heavily depends on petrol and diesel, contributing to rising air pollution and economic stress. Using surveys of 183 transport operators, stakeholder interviews, and cost benefit analysis, the research assesses economic viability, infrastructure readiness, regulatory frameworks, and public perception of CNG. Results reveal that 65.6% of respondents consider CNG cheaper than petrol and diesel, 49.7% are willing to convert their vehicles if supported financially, but 33.5% identify lack of fueling infrastructure as the greatest barrier. The study situates its findings within Diffusion of Innovation Theory and Energy Transition Theory, highlighting that adoption is at an early stage and requires deliberate regulatory and policy action. The paper concludes with a roadmap for policymakers and investors to actualize a sustainable, inclusive, and cost-effective transition to clean transport in Kano.

Keywords: Compressed Natural Gas (CNG), Kano, Regulatory Framework, Sustainable Mobility, Urban Transport



Future of Autonomous Transportation Opportunities and Challenges in Nigeria

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Abstract

Autonomous vehicles (AVs) are widely promoted as solutions to road safety challenges, congestion, and mobility inefficiencies, yet evidence on their applicability in African contexts remains limited. In Nigeria, persistent road traffic fatalities, chronic congestion, weak infrastructure, and regulatory gaps underscore the need for contextualised analysis linking AV adoption to local institutional, technological, and socio-cultural realities. This study examines the future of autonomous transportation in Nigeria, highlighting its opportunities, challenges, and policy implications. A descriptive research design was employed through a systematic review of literature from Scopus, ScienceDirect, SpringerLink, Google Scholar, and related repositories. Seventeen peer-reviewed studies published between 2010 and 2024 were selected using explicit inclusion and exclusion criteria and analysed through thematic synthesis. The analysis is anchored in the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory to explain user acceptance and system-level diffusion. Findings reveal that AV adoption in Nigeria is constrained by interconnected barriers, including inadequate road and digital infrastructure, high acquisition and deployment costs, regulatory and institutional gaps, cybersecurity risks, and low public trust. Nevertheless, significant long-term prospects exist for improving road safety, enhancing accessibility for vulnerable groups, reducing congestion, and stimulating smart mobility innovation if adoption follows a phased, context-sensitive pathway. The study concludes that AV deployment in Nigeria is less a technological challenge than an institutional and governance issue. It recommends targeted policy reforms, infrastructure investment, regulatory clarity, capacity building, and public engagement as prerequisites for successful integration, while providing policy-relevant insights for transport planning in developing economies.

Keywords: *Autonomous vehicles; Autonomous transportation; Smart mobility; Technology adoption; Transport policy*



Evaluating Machine Learning Algorithms for Predicting Nigerian Bus Driver Accident Involvement: A Comparative Study

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Abstract

Road traffic accidents have continued to generate research interest due to the significant global impairing impacts, especially in developing countries like Nigeria, which are experiencing a disproportionate burden. This study aims to develop an accident predictive model for Nigerian commercial bus drivers using machine learning models comprising Random Forest, Gradient Boost, K-Nearest Neighbour, Support Vector Machine, Decision Trees, and Logistic Regression, utilizing data on risky behaviour constructs (driving violations, errors, and inattention errors). Data were collected from commercial bus drivers through a structured questionnaire. The machine learning classifiers were employed to build the prediction model, which was evaluated using accuracy, classification report metrics, confusion matrix, and mean square error. The results showed that Gradient Boost model achieved the best accuracy of 60%, with driving violations emerging as the most influential predictor of accident involvement through the feature importance analysis. By leveraging predictive model accuracy, stakeholders and policymakers can implement effective interventions to reduce road traffic accidents and improve safety for bus drivers and passengers in Nigeria.

Keywords: Accident Prediction, Bus Drivers, Driving Errors, Driving Violations, Machine Learning Algorithms, Road Safety.



Engineering Evaluation of Vehicle Maintenance Systems at the Directorate of Road Traffic Services (DRTS) Headquarters, Abuja, Nigeria.

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Abstract

This study appraises vehicle maintenance practices at the Directorate of Road Traffic Services (DRTS) Headquarters in Abuja, Nigeria, with the objective of identifying systemic challenges and proposing engineering-based strategies for improvement. Data for the study was obtained through a mixed-methods approach, including interviews, direct observations, and the administration of 150 structured questionnaires, of which 127 were duly completed and analyzed. Respondents were selected using a purposive sampling technique, focusing on technical staff, drivers, and maintenance administrators. Quantitative data was analyzed using SPSS 25, while qualitative responses were thematically examined to provide contextual insights. The findings reveal that poor maintenance culture, bureaucratic delays in accessing repair funds, lack of a standard workshop, inadequate tools, and limited technical capacity among personnel significantly undermine maintenance effectiveness. From an engineering perspective, the study identifies the absence of structured maintenance systems such as Preventive Maintenance Scheduling (PMS), Condition-Based Maintenance (CBM), and Standard Operating Procedures (SOPs). Moreover, diagnostic tools, Failure Mode and Effects Analysis (FMEA), and Root Cause Failure Analysis (RCFA) are not integrated into current maintenance workflows, limiting reliability and optimization. In response, the study recommends the institutionalization of a standardized maintenance policy, investment in a fully equipped workshop aligned with global best practices, adoption of a Computerized Maintenance Management System (CMMS), and regular training of technical staff in engineering-based maintenance frameworks. These interventions are essential for transitioning DRTS from a reactive maintenance model to a data-driven, reliability-centered engineering system that improves fleet performance, reduces costs, and enhances safety and sustainability.

Keywords: Fleet Management, Maintenance Policy, Public Sector Transport, Vehicle Maintenance, Workshop Development.



Sustainable Cold Chain Logistics and Supply Chain of Frozen Fish through Energizing the Applicability of Technology in Lagos Metropolis

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Abstract

This study focused on the level of technology usage in the cold chain logistics of frozen fish by conducting a comprehensive analysis of its current development and proposed targeted enhancement pathway for its sustainability in Lagos Metropolis. This exploratory study is a cross-sectional survey using a mixed method approach. A multi-stage sampling technique was used to conduct a thorough synthesis and analysis of the current technology usage in the cold chain logistics of frozen fish in terms of temperature monitoring ranging from the seaport terminals, transportation, storage facilities and last mile delivery. Primary and secondary data were obtained. Analysis was conducted using inferential statistics. Findings indicated that infrastructural challenges, such as unreliable power supply and inadequate storage facilities, significantly impede the level of modern technologies usage, affecting the overall efficiency of cold chain logistics. Furthermore, barriers to modern technology usage, such as high costs and limited technical expertise, were found to exacerbate these challenges, while regulatory policies, although crucial for market stability, often introduce operational inefficiencies. From the inferential statistics, barriers to modern technology usage has a significant effect on cold chain logistics of imported frozen fish in the Lagos Metropolis ($r = 0.615$, $p < 0.05$). The study recommends investing in resilient infrastructure, providing subsidies to incentivize technology adoption, and fostering capacity-building initiatives for stakeholders. These strategies will enhance the understanding and efficiency of cold chain logistics, guiding industry stakeholders and policymakers toward optimizing the frozen fish supply chain.

Keywords: Cold chain logistics, Frozen fish, Lagos Metropolis, Technology