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The role of road transportation systems in facilitating commercial activities and economic growth in Lagos State

Mobee Taiwo Ajayi[1], Olatunbosun Opeyemi Sesede[1], Ogundimu Olusegun Simeon[2]
[1] Department of Economics, Lagos State University, Ojo, Lagos, Nigeria
[2] School of Transport, Lagos State University, Ojo, Lagos, Nigeria
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Abstract
Road transportation is a key component of urban economic systems, enabling the movement of goods, services, and labour while improving market accessibility and productivity. In Lagos State, Nigeria's commercial hub, road transport remains central to economic activity despite challenges such as congestion, infrastructure deficits, and rapid urban growth. This study examined the role of road transportation systems in facilitating commercial activities and economic growth in Lagos State from 2000 to 2024, within the framework of the Endogenous Growth Theory.
The study adopted an ex-post facto design using annual time-series data from relevant government and statistical sources. Real Gross Domestic Product (RGDP) was used as a proxy for economic growth, while government capital expenditure on road infrastructure, paved road length, vehicle registrations, inflation, and exchange rate served as explanatory variables. Analytical techniques included descriptive statistics, unit root tests, Ordinary Least Squares (OLS) regression, correlation analysis, and Johansen cointegration.
Findings show that road infrastructure investment and transport demand significantly enhance economic growth in Lagos State, while inflation has a negative effect. The results also reveal strong interrelationships among transportation variables and economic performance. Furthermore, cointegration analysis confirms a stable long-run relationship between road transport infrastructure and economic growth, supporting the Endogenous Growth Theory. This indicates that transportation infrastructure acts as productive public capital that improves productivity, reduces transaction costs, and enhances market efficiency.
The study concludes that road transportation systems are vital to sustaining commercial activities and long-term economic growth in Lagos State. It recommends sustained infrastructure investment, improved transport planning, technological innovation in traffic management, and macroeconomic stability as essential conditions for strengthening economic performance and urban development.

Keywords: Road transportation systems, economic growth, infrastructure investment, commercial activities, Lagos State

Introduction

Transportation is a crucial element in the structure of an economy within any society. As cities expand into megacities, the effectiveness, ease of access, and environmental friendliness of their transportation networks play a key role in boosting economic performance and improving the general standard of living. Transportation plays a vital role in a country's economic structure, affecting how people and goods are moved, how individuals gain access to opportunities, and how the nation's overall production and economic activity are supported. In quickly growing cities and newly developed large urban areas, how well the transportation systems work has a direct effect on the economy's ability to compete, the inclusion of different social groups, and the city's ability to withstand challenges (World Bank, 2023 [61]; UN-Habitat, 2022).
Road transportation plays a crucial role in the development of cities and regions, acting as both a way for people and goods to move and a driving force behind economic change. Road transportation plays a vital role in the global economy by enabling the movement of goods, linking different industries, supporting access to education, and expanding the range of products available to consumers. Investing in robust road networks is a key factor in helping countries achieve economic growth and greater inclusivity in today's world, as noted by Navata in 2014 [33]. A dependable and well-maintained road transportation system plays a key role in promoting economic diversification by drawing in tourists who enjoy smooth and efficient travel, and by attracting investors who value reliable infrastructure when deciding where to invest (World Bank, 2020) [60].
Reduced traffic congestion helps transport companies save money, as better road systems result in less fuel use, fewer vehicle damages, and lower repair costs, which in turn boosts the financial performance and environmental friendliness of transportation services (Otegbulu, 2011) [45]. The quicker and more dependable movement of goods and services improves supply chain efficiency, allowing businesses to adhere to delivery timelines, lower inventory expenses, and gain a stronger position in both local and international markets (Oluwole & Olayemi, 2024) [42].
Lagos faces a significant number of road accidents because of poor service reliability, weak traffic control, and heavy use, especially on main roads, as reported by Discovery Journals in 2020 [14]. These events result in economic losses due to reduced productivity and increased healthcare spending, which particularly impact individuals with lower incomes (Ayankora, 2025). The absence of strict enforcement and safety precautions makes existing weaknesses even worse. Adeniji (2024) [3].
Lagos, which started as a Yoruba fishing village in the late 15th century, grew into an important slave-trade center

during the 16th century under the influence of the Portuguese, and it was named after a port in Portugal (Encyclopedia Britannica, 2023) [15]. In 1861, the area became a British crown colony and functioned as the capital of Nigeria until 1991, when Abuja took over as the capital. Despite this change, Lagos continued to serve as the main economic and cultural hub of the country, as noted in Encyclopedia Britannica (2023) [15]. The population of the area increased from less than a million in 1960 to about 21 million by 2014. This growth was driven by a large number of people moving from rural areas to cities during the 1970s oil boom and by a high rate of natural population increase. More than half of the population is under the age of 25 years old (MacroTrends, 2023); (Akinwale, 2010); (Lagos State Government, 2023) [22].

This fast-paced growth, which has spread across both islands and the mainland, has resulted in a diverse population made up of Yoruba, Edo, Igbo, and foreigners, but it has also caused overcrowding and the expansion of urban areas (United Nations, 2018) [52]. Lagos has a distinct geographical layout, with almost a quarter of its area consisting of lagoons, creeks, and rivers. The city's flat land also contributes to its vulnerability to flooding, which is a major environmental issue impacting infrastructure (Lagos State Government, 2023); (NOAA, 2022) [22, 25]. Road transportation in Lagos faces significant challenges due to its large population, with 95% of daily commutes—ranging from 7 to 10 million trips—relying on roads. Most of these trips are made using public transport options such as danfo minibuses and BRT buses, according to LAMATA (2023) [24].

Severe traffic congestion is made worse by insufficient road infrastructure, poor maintenance, and roads that are too narrow to handle the current level of traffic. This leads to major delays, particularly during peak times, which are from 7:30 to 9:30 a.m. and 3:30 to 6:00 p.m. (Olawole *et al*., 2019); (Afolabi & Adejumo, 2019) [6, 41]. Flooding, caused by heavy rainfall and inadequate drainage systems, leads to road disruptions, pavement damage, and a rise in accidents. Additionally, high salinity from nearby water sources causes corrosion of bridges (NOAA, 2022); (Ogunbodede & Sunmola, 2020) [36].

Examining how road transportation has influenced economic growth in Lagos between 2000 and 2024[3] is important because this time frame highlights a period of major changes in urban expansion, population increase, and infrastructure progress, which played a key role in establishing Lagos as Nigeria's key economic center. The study of how road transportation has affected the economy in Lagos State, Nigeria, between 2000 and 2024[37] is important because there is a lack of sufficient understanding and there are significant issues with transportation that need urgent attention. Lagos, as the economic center of Nigeria, produces more than 60% of the country's industrial output, depends heavily on road transport for trade, industry, and communication, but encounters inefficiencies that slow down its development, according to the Lagos State Government report from 2022[25]. Existing studies highlight the importance of physical infrastructure but pay little attention to operational systems such as public and private transportation and service quality factors like reliability and affordability. These aspects play a major role in shaping economic indicators such as GDP and employment levels, as noted in the works of Oni (2010) and Ogunsanya (2002) [38, 43]. This study tackles this gap by looking at these factors across a 34-year span, reflecting the changes in Nigeria's social and economic situation.

Literature Review

Conceptual Review

Road transportation involves the movement of goods and individuals using vehicles such as cars, buses, trucks, and motorcycles along road systems. It continues to be the most commonly used method of transportation due to its adaptability, ease of access, and capacity to offer direct service from door to door. In Lagos, road transport is the main way people move around the city, relying on highways, bridges, and city roads, as well as a significant informal transport system. Recent research indicates that more than 80% of daily passenger journeys in Lagos are made using informal transportation methods like danfo minibuses, okada motorcycles, and keke tricycles. These forms of transport are preferred because they are both affordable and widely accessible (Oduola & Afolayan, 2023) [35]. These informal transportation methods work together with official transit systems like the Bus Rapid Transit (BRT) and the recently opened Lagos Rail Mass Transit Blue and Red Lines, yet they continue to be the main way people move around for those with lower incomes (LAMATA, 2023).

Economic Growth

Economic growth is generally understood as the continuous rise in the total value of goods and services made within an economy, adjusted for inflation, during a particular time frame. It is typically calculated as the percentage rate at which Real Gross Domestic Product (GDP) grows at the national level or Real Gross State Product (GSP) grows at the subnational level, both of which serve as standardized measures of economic performance (World Bank, 2023) [61]. Growth indicates more than just an increase in production; it also shows better income levels, more job opportunities, and improved quality of life, making it a key measure of development (IMF, 2024) [37]. In the case of Lagos State, economic growth is measured through its Real GDP, which represents the total value of all goods and services produced within the state, taking into account changes in price levels. Lagos, frequently referred to as Nigeria's economic center, accounts for over 30% of the country's GDP, highlighting the significance of accurately measuring its actual economic output when evaluating the performance of both the region and the nation as a whole (National Bureau of Statistics [NBS], 2023) [32].

Conceptual Linkage

The connection between road transportation and economic growth has been thoroughly studied and established in the field of development economics. Improved road infrastructure helps reduce transportation costs, which in turn lowers the cost of production and distribution for businesses and increases their overall competitiveness (Aschauer, 1989) [8].

Efficient road systems make it simpler for businesses to get the necessary materials and sell their products, which helps them focus on specific areas of production, operate more cost-effectively, and engage in more trade (Banerjee, Duflo, & Qian, 2020). Road networks help workers move more easily, allowing them to find more job opportunities and making the labor market more efficient, (World Bank, 2023) [61].

Theoretical Review

Endogenous Growth Theory

The Endogenous Growth Theory, pioneered by Romer (1986) and Lucas (1988) [29, 51], emphasizes that long-term economic growth is driven by internal factors such as human capital, innovation, and infrastructure. Unlike neoclassical models that assume diminishing returns to capital, endogenous growth theory posits that investments in infrastructure, including road transportation, generate spillover effects that sustain growth.

Efficient road networks reduce transaction costs, improve productivity, and create positive externalities that stimulate innovation and market expansion. In Lagos, where congestion and poor road quality have historically undermined productivity, investments in road infrastructure can enhance labour mobility, reduce logistical bottlenecks, and sustain higher economic growth.

Infrastructure-Led Growth Hypothesis

The Infrastructure-Led Growth Hypothesis argues that infrastructure development precedes and stimulates economic expansion. Aschauer (1989) [8] provided early empirical support, showing that public infrastructure has a high marginal productivity effect on growth. Roads, in particular, reduce production and distribution costs, attract investment, and improve market integration.

In Lagos, the construction of highways, bridges, and expressways such as the Lekki-Epe Expressway has spurred real estate development, increased commercial activity, and supported industrial clustering. This aligns with the hypothesis that road infrastructure is a leading factor in driving urban and regional economic development.

Empirical Review

The relationship between road transportation and economic growth has been examined extensively across different contexts, producing a wealth of empirical evidence that highlights both the direct and indirect impacts of transport infrastructure on economic performance.

Most recently, Ogunleye and Adekoya (2024) [37] employed a Vector Error Correction Model (VECM) covering 2000–2022. Their results revealed a unidirectional causality from road transport investment to economic growth in Lagos, highlighting that transport investment actively drives growth rather than merely responding to it. Adeleye, Osabuohien, and Bowale (2020) [4] offered recent African evidence using cross-country data. Their study revealed that infrastructure quality, particularly in transport, significantly promotes economic growth. Importantly, they emphasized that the effect of transport infrastructure is strengthened in the presence of good governance and institutional quality, reiterating the complementarity highlighted by Banister and Berechman (2001) [10].

Banister and Berechman (2001) [10] expanded the discussion by examining transport investment in European regions. Their findings highlighted that improving transportation alone is not enough to drive economic growth; instead, the effects on the economy also rely on other important factors like the skills and knowledge of people, the level of technology available, and the effectiveness of institutions. This viewpoint brought about a more detailed understanding that infrastructure is essential but on its own is not enough to support long-term sustainable growth. Boopen (2006) [11] conducted a study on Sub-Saharan Africa, employing dynamic panel estimation methods across various countries. The research found that the development of road transport systems plays a major role in explaining differences in economic outcomes throughout the region. The findings highlighted the significance of transport connectivity across Africa, as numerous economies in the region depend largely on agriculture and natural resources, which in turn rely heavily on well-functioning road systems.

Lakshmanan (2011) [27] took a wider approach, emphasizing the indirect and secondary impacts of improvements in transportation. His research demonstrated that investments in roads do more than lower expenses; they also boost market access, foster agglomeration economies, and strengthen the competitiveness of regions. This expanded the conversation beyond just cutting costs to include the role of transportation in bringing about fundamental changes in structure. In 2013[31], Melo, Graham, and Brage-Ardao carried out a meta-analysis that included 60 empirical studies from various regions. Their analysis showed that there is a positive and statistically significant relationship between productivity and road infrastructure. The extent of the impact differed depending on the method used, the region, and the economic structure, indicating that the effects were specific to each context and highlighting the importance of developing transport policies that are suited to particular situations.

Chen and Haynes conducted a study in the Chinese context, using a meta-analysis approach to examine regional data related to highway development. They discovered that road infrastructure had a greater impact on growth in less-developed interior provinces than in coastal regions, showing that targeted infrastructure investments can effectively reduce regional disparities when properly planned and implemented. In Nigeria, Oyesiku (2002) [46] conducted an early descriptive study on Lagos's development into a megacity, highlighting the significant stress placed on its transportation system. He pointed out that the poor state of road infrastructure posed a threat to the city's sustainability by causing more traffic jams, lowering productivity, and making inequality worse.

Adebisi and Adeyemi (2008) [1] studied agricultural productivity and found that inadequate rural road systems led to higher post-harvest losses and restricted farmers' ability to reach markets. The research highlighted how transportation plays a vital part in connecting agricultural output with overall economic development. Ogwude (2011) [39] utilized multivariate time-series analysis to establish a significant long-term connection between road infrastructure development and Nigeria's Gross Domestic Product. His research highlighted the crucial role of continuous investment in transportation for the overall growth of the country.

Theoretical Framework

This study is based on the Endogenous Growth Theory, specifically the model developed by Barro in 1990, which includes government spending as a component of the production function. The theory suggests that economic growth comes from inside a system because of internal factors like investing in people's skills, creating new ideas, and gaining knowledge. It is important to highlight that the statement underscores the role of public infrastructure as a type of capital that boosts the efficiency of private capital.

In this framework, road transportation infrastructure is considered a vital public asset that lowers transaction costs, enables the spread of knowledge, and supports clustering of economic activities, thus internally contributing to sustained long-term economic growth.
The production function is modelled as:

$$Y = A * F (K, L, G)$$

Where:
1. Y is the level of economic output (Real GDP of Lagos State).
2. A represents Total Factor Productivity (technology, efficiency).
3. K is the stock of private capital.
4. L is the labour force.
5. G is the stock of public infrastructure, which in this context is road transportation capital.

Model Specification
Based on the theoretical framework, the model is specified in a log-linear form to interpret the coefficients as elasticities and to reduce the problem of heteroscedasticity. The functional form is expressed as:

Implicit Functional Form
RGDP=f (RINV, ROAD, VEH, INF, EXR)
This expresses that Real Gross Domestic Product (RGDP) is functionally determined by road infrastructure investment (RINV), length of paved roads (ROAD**)**, and number of registered vehicles (VEH**)**, with an error term capturing unobserved influences.
$RGDP = \beta0 + \beta1RINV + \beta2\ ROAD + \beta3VEH + \beta4\ INF + \beta5\ EXR + \mu$
Where:
1. **RGDP:** Real Gross Domestic Product of Lagos State (Proxy for Economic Growth).
2. **RINV:** Government Capital Expenditure on Road Transport Infrastructure
3. **ROAD:** Length of Paved Roads (in kilometres) in Lagos State at time
4. **VEH:** Number of Registered Vehicles in Lagos State a (Proxy for transport demand and activity).
5. **INF** = Inflation Rate in Lagos state
6. **EXR** = exchange Rate
7. **β0:** Constant term.
8. **β1, β2, β3:** Coefficients to be estimated (elasticities).
- **μ_:** Stochastic error term.

Definition of the variables

Variables	Variable Name	Description	Role / Proxy
RGDP	Real Gross Domestic Product of Lagos State	Measures the total value of goods and services produced in Lagos State, adjusted for inflation.	Proxy for Economic Growth
RINV	Government Capital Expenditure on Road Transport Infrastructure	Public spending on road transport projects such as construction, maintenance, and expansion.	Proxy for Infrastructure Investment
ROAD	Length of Paved Roads (km) in Lagos state	The total length of paved (tarred) roads in Lagos State.	Proxy for Transport Infrastructure
VEH	Number of Registered Vehicles in Lagos state	The total number of vehicles officially registered, indicating traffic volume and usage.	Proxy for Transport Demand & Activity
INF	Inflation Rate	The rate at which general prices of goods and services rise in Lagos State.	Indicator of Price Stability
EXR	Exchange Rate	The value of the Naira compared to foreign currencies.	Indicator of External Sector Conditions
β0	Constant	Intercept of the model	Represents baseline RGDP when explanatory variables are zero.
β1, β2, β3	Coefficients	Elasticities of RGDP with respect to RINV, ROAD, and VEH	Measure the sensitivity of economic growth to changes in each transport-related factor.
u	Error term	Stochastic disturbance capturing unobserved factors	Accounts for shocks, omitted variables, and measurement errors.

Data Source and Description
The study will use yearly data spanning from 2000 to 2024 for Lagos State, concentrating on variables that are important in understanding the relationship between road transportation and economic growth. The dependent variable, Real Gross Domestic Product (RGDP), will be sourced from the Lagos Bureau of Statistics (LBS) and the National Bureau of Statistics (NBS). To maintain consistency and allow for accurate comparisons over time, nominal GDP data will be adjusted for inflation using the Nigerian Consumer Price Index (CPI), with the year 2010 serving as the base year ($2010^{[43]}$=100). This adjustment will provide real GDP values.
The first explanatory variable, Government Capital Expenditure on Road Transport (RINV), will be obtained from the Lagos State Ministry of Budget and Economic Planning and the state's annual appropriation acts, which show the government's financial commitment to developing road infrastructure. Data regarding the length of paved roads (ROAD), measured in kilometers, will be collected from the Lagos State Ministry of Works and Infrastructure and the Federal Ministry of Works, offering information on the physical growth of transportation infrastructure.
Similarly, the Number of Registered Vehicles (VEH), acting as an indicator of transport demand and activity, will be obtained from the Lagos State Motor Vehicle Administration Agency (MVAA). To ensure consistency and reduce variability across the dataset, all variables will be converted into their natural logarithm form before conducting the econometric analysis.

Estimation Techniques
Pre-estimation techniques
During the analysis, we will start by calculating descriptive statistics like the mean, median, maximum, minimum, standard deviation, skewness, and kurtosis. These measures

will help us gain an initial understanding of the dataset's features and how the data is spread out.

This stage will focus on identifying the central tendency, variability, and normality of the variables, which will provide valuable information about their appropriateness for continued econometric analysis. After that, unit root tests will be carried out to assess the stationarity of the time-series variables and to avoid the possibility of getting misleading regression results.

Both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests will be used. The null hypothesis for each test is that a variable has a unit root, which means the variable is not stationary. Each variable will be analyzed at its own level, and if it is found to be non-stationary, differencing will be used until the variable becomes stationary. The results will determine the integration order of the variables, which is a required step before proceeding with further econometric analysis, including cointegration and error correction methods.

Estimation Techniques

Once the order of integration for the variables has been determined, a cointegration test will be carried out to examine whether a long-term equilibrium relationship exists among the series. If the variables are determined to be integrated of the same order, usually I(1), the Johansen cointegration method will be used. This test is suitable for multivariate time series data and helps in determining if there is one or more cointegrating vectors. These vectors show whether the variables tend to move together in the long term, even though they may experience short-term variations.

If there is confirmation of cointegration, the study will move on to estimating a Vector Error Correction Model (VECM). This model is especially appropriate here because it effectively captures both the long-term equilibrium relationship and the short-term dynamics between the variables. The model includes an error correction term (ECM_{t-1}), which is based on the cointegration equation, and it indicates how quickly short-term deviations from the long-term equilibrium are adjusted. The coefficient for this term, represented by λ, is anticipated to be negative and statistically significant, indicating how quickly Real GDP adjusts back to its long-term trend following changes in road infrastructure investment, the length of paved roads, and the number of registered vehicles.

Within the Vector Error Correction Model framework, Granger causality tests will be carried out to identify the direction of causal relationships among the variables. This will help determine if changes in government spending on roads, road expansion, or vehicle use can predict shifts in economic growth, or if economic growth influences these factors instead. Understanding the difference between one-way and two-way cause-and-effect relationships will offer a better understanding of how transportation growth and economic performance influence each other in Lagos State.

Post-estimation techniques

To confirm that the model's estimates are accurate and consistent, several diagnostic checks will be carried out. Initially, the Breusch-Godfrey Lagrange Multiplier (LM) test will be used to examine whether there is serial correlation in the residuals. This is important because autocorrelation can lead to biased standard errors and affect the reliability of statistical inferences.

Second, the White test for heteroscedasticity will be used to check if the error terms have constant variance, since heteroscedasticity can reduce the efficiency of the estimates. Third, the Jarque-Bera test will be carried out to check if the residuals follow a normal distribution, which is a crucial assumption for hypothesis testing and ensuring the model's reliability.

Descriptive Statistics

This section presents the descriptive statistical summary of the study variables, highlighting the distribution, frequency, and central tendencies of data related to road transportation and economic growth in Lagos State.

Descriptive Statistics Table

	LOG__RINV	LOG_EXCH	LOG_INF_	LOG_RD_	LOG_RGDP_	LOG_VEH
Mean	0.990658	2.312632	1.110099	3.991866	3.657212	2.974309
Median	1.161368	2.196761	1.109801	4.031408	3.717547	2.992554
Maximum	1.698970	3.169958	1.521688	4.187521	3.966142	3.354108
Minimum	0.079181	2.007310	0.731428	3.759668	3.285039	2.552668
Std. Dev.	0.473102	0.280884	0.174179	0.136773	0.207605	0.262385
Skewness	-0.488722	1.371139	0.062906	-0.374549	-0.401797	-0.145863
Kurtosis	2.082946	4.561275	3.207929	1.766652	1.925414	1.606262
Jarque-Bera	1.871235	10.37256	0.061524	2.169055	1.875517	2.112092
Probability	0.392344	0.005593	0.969706	0.338061	0.391504	0.347828
Sum	24.76645	57.81579	27.75247	99.79666	91.43030	74.35772
Sum Sq. Dev.	5.371801	1.893503	0.728117	0.448965	1.034399	1.652299
Observations	25	25	25	25	25	25

The descriptive statistics for the main variables across the 25 observation periods show clear differences in the economic and transportation aspects of Lagos State. The government's spending on road transport infrastructure showed an average level of expenditure, but there was a lot of variation from year to year. This is shown by the high standard deviation, which suggests that the amount of money invested changed greatly each year.

The exchange rate had an average that was relatively high, and it displayed a strong positive skew, indicating that the distribution of values is not symmetrical. There is a concentration of lower exchange rates, while the higher values occur less frequently but can involve significant currency declines. Inflation remained fairly consistent near its average level, showing minimal fluctuations, which indicates a more reliable pattern in price changes during the

period. Investment in the length of paved roads had the highest average value among the variables and showed the least fluctuation, indicating a steady and significant focus on infrastructure development. The state's economic growth, measured by Real Gross Domestic Product, remained consistently strong on average, indicating a sizable and resilient economy, although it saw some moderate changes over time.

Finally, the demand for transportation, as indicated by the number of registered vehicles (VEH), also exhibited a high average, with a distribution that is fairly level and somewhat skewed towards lower values. The results of the Jarque-Bera test indicate that, except for the exchange rate, all the variables' data follow a normal distribution, which establishes a solid basis for conducting further inferential analysis.

Regression Analysis

Table 2: Ordinary Least square caption

Dependent Variable: LOG_RGDP_ **Method: Least Squares** **Date: 10/01/25 Time: 20:14** **Sample: 2000 2024** **Included observations: 25**				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	3.321672	1.035323	3.208345	0.0046
LOG__RINV	0.334044	0.053134	6.286770	0.0000
LOG_EXCH	0.018433	0.026669	0.691155	0.4978
LOG_INF_	-0.052598	0.022276	-2.361219	0.0291
LOG_RD_	-0.221120	0.339306	-0.651685	0.5224
LOG_VEH	0.303620	0.111573	2.721279	0.0136
R-squared	0.997198	Mean dependent var		3.657212
Adjusted R-squared	0.996461	S.D. dependent var		0.207605
S.E. of regression	0.012350	Akaike info criterion		-5.744730
Sum squared resid	0.002898	Schwarz criterion		-5.452200
Log likelihood	77.80913	Hannan-Quinn criter.		-5.663595
F-statistic	1352.550	Durbin-Watson stat		2.087201
Prob(F-statistic)	0.000000			

Based on the regression output provided, the model that analyzes the factors influencing economic growth (LOG_RGDP_) in Lagos State shows a very high level of fit, as indicated by an R-squared value of 0.997. This means that the independent variables account for 99.7% of the variation in economic growth. The model is also highly significant, as indicated by the F-statistic of 1352.55 and the corresponding probability value of 0.000000.

Upon closer examination of the individual coefficients, there are notable problems related to multicollinearity. While road infrastructure investment (LOG__RINV) and the number of vehicles (LOG_VEH) have a positive and statistically significant relationship with economic growth, and inflation (LOG_INF_) has a significant negative impact, the variables for exchange rate (LOG_EXCH) and road development (LOG_RD_) are not statistically significant.

Importantly, the positive relationship found for road investment and the negative relationship for road development are not aligned with established theory, and this inconsistency is a typical sign of serious multicollinearity. This occurs when independent variables are closely related, as previously noted in the correlation matrix, leading to unstable and inconsistent estimates of the coefficients. As a result, it becomes challenging to determine the independent impact of each variable.

Summary of Results and Discussion

The research looked at how road transport systems have supported business operations and contributed to economic development in Lagos State between the years 2000 and 2024 [37]. The descriptive statistics showed continuous growth in road infrastructure, vehicle registrations, and economic output, indicating a close link between transportation development and economic growth. The unit root tests showed that most variables were not stationary in their original form but became stationary after applying first differencing, which supports the application of cointegration analysis. The analysis of correlations revealed a strong positive link between road transport investment, the length of paved roads, the number of vehicle registrations, and economic growth, showing that the development of transportation is closely connected to commercial activities and the overall economic performance in Lagos State. However, the very high correlations also indicated that there was multicollinearity among the explanatory variables.

The findings from the regression analysis showed that government spending on road transportation infrastructure and the total number of registered vehicles have a positive and statistically significant impact on economic growth. This suggests that greater spending on road infrastructure and higher levels of transport activity play a major role in boosting economic productivity, supporting business activities, and facilitating commercial exchanges in the state. Inflation has been shown to have a considerable negative impact on economic growth, suggesting that macroeconomic instability can reduce the positive effects of transportation development. Although the length of paved roads had a negative and statistically insignificant coefficient, this result is mostly due to multicollinearity rather than a real negative impact of road expansion on economic growth. Similarly, the exchange rate was not found to be statistically significant, indicating that transportation-related factors have a more direct impact on economic growth at the state level.

Moreover, the Johansen cointegration analysis confirmed the presence of a long-term equilibrium relationship between economic growth, road transport investment, road infrastructure, vehicle registrations, inflation, and exchange rate. This finding supports the Endogenous Growth Theory by showing that road transportation infrastructure acts as productive public capital, which can lead to sustainable economic growth. It does so by improving connectivity, lowering transaction costs, expanding market access, and boosting commercial activities.

The study finds that road transportation systems are important for supporting business activities and contributing to economic growth in Lagos State. It highlights that investments in infrastructure and the level of transport demand are key factors that influence long-term economic development.

Summary of Findings

This study investigated the role of road transportation systems in facilitating commercial activities and economic growth in Lagos State over the period 2000–2024[37]. Using annual time-series data and employing descriptive statistics, unit root tests, correlation analysis, Ordinary Least Squares (OLS) regression, and Johansen cointegration techniques, the study generated several important findings.

First, the results revealed that government capital expenditure on road transportation infrastructure has a

positive and statistically significant effect on economic growth in Lagos State. This finding indicates that investments in road construction, rehabilitation, and expansion contribute significantly to increased economic productivity by improving connectivity, reducing transportation costs, and enhancing access to markets and business opportunities.

Second, the study found that transport demand, measured by the number of registered vehicles, exerts a positive and significant influence on economic growth. This suggests that increased transportation activities facilitate the movement of goods, services, and labour, thereby stimulating commercial transactions and supporting overall economic performance within the state.

Third, inflation was found to have a negative and statistically significant impact on economic growth. This result implies that rising price levels diminish the growth-enhancing effects of transportation infrastructure by increasing business operating costs, reducing purchasing power, and creating uncertainty within the economy.

Fourth, the correlation analysis revealed strong positive associations among road transportation investment, road infrastructure development, vehicle registrations, and economic growth. This finding highlights the close interrelationship between transportation development and commercial expansion in Lagos State, emphasizing the strategic importance of transport infrastructure in supporting economic activities.

Fifth, the Johansen cointegration test confirmed the existence of a stable long-run equilibrium relationship among economic growth, government investment in road transportation, road infrastructure development, transport demand, inflation, and exchange rate. This suggests that although short-run fluctuations may occur, these variables move together over time and maintain a sustainable long-term relationship.

Finally, the findings provide empirical support for the Endogenous Growth Theory, which argues that public infrastructure investment serves as productive capital capable of stimulating economic growth. The results demonstrate that road transportation infrastructure contributes to economic development by enhancing productivity, reducing transaction costs, improving market accessibility, and facilitating commercial activities across Lagos State.

Overall, the study establishes that road transportation systems constitute a critical driver of commercial development and economic growth in Lagos State. Sustained investment in transportation infrastructure, coupled with effective macroeconomic management, remains essential for promoting long-term economic prosperity and supporting the state's position as Nigeria's foremost commercial centre.

Recommendations

Based on the study's findings, it is suggested that policy makers should focus on continuously and carefully investing in road transportation infrastructure, as it plays a key role in supporting business growth and boosting the economy of Lagos State. Such investments should go beyond just expanding roads to also involve the consistent maintenance, repair, and upgrading of current transportation systems to guarantee long-term efficiency and positive economic results.

The study also supports the implementation of a combined and multi-way transportation system that improves the connection between road, rail, water, and public transit networks. This method is crucial for dealing with traffic problems, enhancing transportation efficiency, lowering the costs of moving goods, and boosting the effectiveness of business operations in the state.

Because inflation has a harmful effect on economic growth, it is important to focus on maintaining economic stability at the same time as developing infrastructure. Policies focused on keeping prices stable and making the business environment better will make transportation investments more effective and help the economy grow in a sustainable way.

In addition, the implementation of intelligent transport systems and digital traffic management technologies should be sped up to enhance operational effectiveness, improve traffic movement, and meet the increasing transportation needs of a quickly developing urban economy. It is also important to carry out complementary initiatives that enhance collaboration between public and private sectors in order to gather more funding and encourage new ideas in the development of transportation infrastructure.

Finally, transportation policy needs to be part of a wider approach to sustainable urban development. This demands planning based on solid evidence, better transport data systems, and the encouragement of sustainable mobility options that can help achieve steady commercial development, environmental protection, and economic stability in Lagos State.

Contribution to Knowledge

This research adds value to the existing body of knowledge in transportation economics and economic development by presenting real-world data that highlights how road transportation systems support business operations and drive economic expansion in Lagos State. Based on the Endogenous Growth Theory, the study shows that road transportation infrastructure acts as productive public capital. It helps improve market access, increases mobility, lowers transaction costs, and boosts economic productivity. By concentrating on Lagos State, the study adds valuable sub-national insights from one of Africa's biggest and most vibrant urban economies, thereby enhancing current understanding.

In addition, the study enhances empirical knowledge by including both infrastructure supply indicators, such as road investment and the length of paved roads, and transport demand indicators, like vehicle registrations, all within a single analytical approach. The formation of a long-term balance between transportation factors and economic growth shows that the advantages of transportation infrastructure go beyond immediate economic results and help in achieving sustainable development. The results therefore provide important information for policymakers and development professionals who want to use transportation infrastructure as a key strategy to support business growth, enhance economic strength, and promote sustainable development over time.

Conclusion

This study examined the role of road transportation systems in facilitating commercial activities and economic growth in Lagos State between 2000 and 2024[37]. Drawing on the

Endogenous Growth Theory, the study investigated the effects of government investment in road transportation infrastructure, road network development, and transport demand on economic performance. The empirical findings revealed that road transportation infrastructure and transport activity contribute significantly to economic growth by enhancing connectivity, improving market access, facilitating the movement of goods and services, and supporting commercial activities across the state. In contrast, inflation was found to exert a negative influence on economic growth, highlighting the importance of a stable macroeconomic environment for maximizing the benefits of infrastructure investments.

The study further established the existence of a long-run equilibrium relationship between road transportation variables and economic growth, indicating that transportation infrastructure serves as a strategic driver of sustainable economic development. These findings underscore the critical role of road transportation systems as productive public capital that supports business efficiency, market integration, and economic expansion. Consequently, the study concludes that sustained investment in road transportation infrastructure, complemented by effective transport management and sound macroeconomic policies, remains essential for strengthening commercial activities, enhancing economic competitiveness, and promoting long-term growth in Lagos State.

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