



PUBLIC PRIVATE PARTNERSHIP AND INFRASTRUCTURE DEVELOPMENT IN EBONYI STATE

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ABSTRACT

This study examines the effect of Public-Private Partnership (PPP) on infrastructure development in Ebonyi State, Nigeria, focusing on road infrastructure, solid mineral development, and housing development. With Nigeria's increasing infrastructure deficit, PPP has emerged as a strategic mechanism to mobilize private sector investment and expertise. The specific objectives of the study were to: (i) examine the effect of PPP on road infrastructure development in Ebonyi State; (ii) analyse the effect of PPP on solid mineral development; and (iii) determine the effect of PPP on housing development in the state. Using a descriptive survey design, data were collected from relevant stakeholders through structured questionnaires and analysed using inferential statistical tools. The findings revealed that PPP has a statistically significant and positive effect on all three sectors examined, especially in enhancing road connectivity, supporting mineral resource management, and improving access to housing. The study concludes that effective PPP frameworks can accelerate infrastructure delivery in Ebonyi State. It recommends stronger regulatory frameworks, transparent contractual agreements, and stakeholder collaboration to optimize PPP outcomes and foster sustainable infrastructure development across key sectors.

Keywords: Public-Private Partnership, Infrastructure, Development, Sustainable and Transparency

1. Introduction

Public-Private Partnerships (PPPs) are pivotal in addressing Nigeria's substantial infrastructure deficit, estimated at over \$100 billion annually for the next 30 years (World Bank, 2022). By leveraging private sector capital, expertise, and innovation, PPPs enable the execution of large-scale projects that might otherwise be unfeasible due to limited public funds (Edogbanya & Adekeye, 2024). Recent initiatives underscore the significance of PPPs in Nigeria's infrastructure development. For example, the \$652 million road project financed by China Exim Bank is set to enhance connectivity from the Lekki Deep Sea Port and Dangote Refinery to southern states, facilitating trade and economic growth (Nwankwo, 2023). Similarly, the \$3.5 billion Bakassi Deep Seaport project, a collaboration between the Cross River State Government and UAE-based ARISE Integrated Industrial Platform, aims to boost agricultural exports and alleviate congestion in existing ports (Ulayi, Arikpo & Anthony, 2022).

In the energy sector, the \$200 million agreement with WeLight to deploy renewable mini-grids is expected to provide electricity to approximately 2 million people in rural areas, promoting sustainable development (Shaibu, 2019). Additionally, the Lagos Rail Mass Transit system, developed under a concession agreement, exemplifies how PPPs can improve urban transportation infrastructure (Olukanni & Nwafor, 2019). These projects highlight the effectiveness of PPPs in mobilizing resources, sharing risks, and enhancing operational efficiency (Adesuyi, 2021). To maximize the benefits of PPPs, it is essential to establish robust legal and regulatory frameworks, ensure transparent procurement processes, and foster stakeholder engagement (Alabi, Kasim & Lasisi, 2020). By doing so, Nigeria can harness the full potential of PPPs to drive sustainable infrastructure development and economic growth.

Public-Private Partnerships (PPPs) have also become a cornerstone of infrastructure development in Ebonyi State, Nigeria, facilitating significant advancements across various sectors. A notable example is the Ebonyi State Ring Road Project, a 198 km road network aimed at enhancing connectivity and economic activities. This project is financed through a \$150 million loan from the African Development Bank and the Islamic Development Bank, exemplifying effective collaboration between public entities and international financial institutions (African Development Bank, 2023). In the aviation sector, the Ebonyi State International Airport, commissioned in 2023, underscores the state's commitment to infrastructure development. The airport, constructed with state funds and contributions from

lawmakers' constituency projects, features a 4 km runway and serves multiple states, including Ebonyi, Abia, Benue, and parts of Cross River (Umar, 2018).

The state's e-procurement platform has streamlined the tendering process for numerous road construction projects. For instance, the construction of a 2 km road in the Enu-Uburu Autonomous Community, Ohaozara LGA, was awarded through this platform, highlighting transparency and efficiency in project execution (Ebonyi State Government, 2023). These initiatives demonstrate Ebonyi State's strategic use of PPPs to mobilize resources, enhance infrastructure, and stimulate economic growth. By fostering collaborations between public institutions and private entities, the state is laying a robust foundation for sustainable development (Nwambuko, 2019).

Despite significant strides in infrastructure development through PPPs in various Nigerian states, Ebonyi State remains underrepresented in scholarly discourse on this subject. While studies have extensively examined PPP implementations in regions like Lagos and Enugu, highlighting challenges such as stakeholder responsiveness and policy inconsistencies (Olukanni & Nwafor, 2019; Adesuyi, 2021), there is a noticeable paucity of research focusing specifically on Ebonyi State's PPP initiatives. This gap is particularly concerning given Ebonyi State's recent infrastructure projects, including the commissioning of the Ebonyi State International Airport in 2023 and the construction of over 700 kilometers of roads aimed at enhancing connectivity and economic activities (Ebonyi State Government, 2023).

These developments suggest a growing reliance on PPPs to drive infrastructural growth. However, without empirical studies assessing the effectiveness, challenges, and outcomes of these partnerships in Ebonyi, policymakers and stakeholders lack the necessary insights to make informed decisions. Moreover, issues such as contractor abandonment of critical projects, as observed in the road linking Abia to Ebonyi State, underscore the need for comprehensive evaluations of PPP frameworks to identify and mitigate factors leading to project failures (Ulayi, Arikpo & Anthony, 2022). Understanding these dynamics is crucial for improving future PPP engagements and ensuring sustainable infrastructure development. Therefore, the present study is necessary to fill this research void by systematically analyzing PPP implementations in Ebonyi State. Such an investigation will provide valuable insights into the successes and shortcomings of current projects, inform best practices, and contribute to the broader discourse on effective PPP strategies in Nigeria's infrastructural development.

1.1 Statement of Problem

Despite Nigeria's concerted efforts to close its infrastructure deficit, the reliance on traditional public funding mechanisms remains insufficient to meet the growing demand for infrastructure. Public-Private Partnerships (PPPs) have emerged as a viable alternative to bridge this gap by leveraging private sector capital, technology, and managerial efficiency. While several states like Lagos and Rivers have made commendable progress using PPPs, Ebonyi State's experience with this model remains relatively underexplored and poorly documented in academic and policy literature.

Ebonyi State has initiated notable infrastructure projects such as the Ebonyi State International Airport and the multi-billion-naira Ring Road project through public-private and donor-supported arrangements. However, concerns persist regarding the effectiveness, transparency, and sustainability of these partnerships. For instance, there have been reports of project delays, contractor defaults, and limited community engagement in some PPP-backed initiatives. These issues raise questions about the institutional capacity of the state to manage PPPs, the legal and regulatory environment, and the long-term socio-economic impact of these projects.

Furthermore, the lack of empirical studies focusing on the dynamics, outcomes, and challenges of PPP implementation in Ebonyi State creates a critical gap in understanding. This problem necessitates a focused investigation into how PPPs are influencing infrastructure development in the state, the effectiveness of governance mechanisms, and the extent to which these partnerships are delivering value for public investment.

1.2 Objectives of the Study

The broad objective of the study is to examine the effect of public private partnership on infrastructure development in Ebonyi State. The specific objectives of the study were to:

- i. Examine the effect of public private partnership on road infrastructure development in Ebonyi State, Nigeria
- ii. Analyse the effect of public private partnership on solid mineral development in Ebonyi State, Nigeria
- iii. Determine the effect of public private partnership on housing development in Ebonyi State, Nigeria

1.3 Statement of Hypotheses

The following hypotheses were formulated for the study.

- i. Public-private partnership has no significant effect on road infrastructure development in Ebonyi State, Nigeria.
- ii. Public-private partnership has no significant effect on the development of solid minerals in Ebonyi State, Nigeria.
- iii. Public-private partnership has no significant impact on housing development in Ebonyi State, Nigeria.

1.4 Conceptual Review

Concept of Public Private Partnership

According to Jose & Jose (2019), the Organisation for Economic Development and Cooperation (OECD) defines a public-private partnership as an agreement between the government and one or more private partners (which may include the operators and the financiers) according to which the private partners deliver the service required in such a manner that the service delivery objectives of the government are aligned with the profit objectives of the private partners and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partners. The public partners in a PPP are government entities, including ministries, departments, municipalities, or state-owned enterprises. The private partners can be local or international and may include businesses or investors with technical or financial expertise relevant to the project.

UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific) sees PPPs as a mechanism that combines public and private sector strengths, resources, and expertise to jointly undertake activities that would otherwise be beyond the capacity of either party acting alone. **Koehn (2009)** explains that PPPs involve collaborative efforts where private entities finance, design, build, operate, and maintain public infrastructure for a specified period. The public sector retains responsibility for overall planning, regulation, and policy formulation. **Adams (2005)** defines PPPs as long-term contracts between government and private sector, where private enterprises provide public services or develop public infrastructure, bearing responsibility for design, construction, operation, and maintenance.

Concept of Infrastructure Development

Infrastructure development refers to the construction, modernization, and maintenance of essential physical and organizational structures needed for economic growth and social well-

being. It encompasses transportation systems, energy facilities, water and sanitation, communication networks, and urban infrastructure. According to Aschauer (1989), infrastructure development is a foundational driver of economic productivity, encompassing public investments in transportation, energy, and communications facilities. These serve as the backbone for industrial and social activities.

Munnell (1990) defines infrastructure as public assets, including roads, bridges, and utility systems, which provide a framework for the smooth functioning of economic activities and public services. The World Bank (2021) describes infrastructure development as the process of creating and improving facilities critical for sustainable growth, poverty alleviation, and service delivery in both urban and rural settings. In this study, public infrastructure was measured by road infrastructure development, solid minerals and housing development.

Road Infrastructure Development

Road infrastructure development encompasses the planning, design, construction, and maintenance of road networks to facilitate the efficient movement of goods and people. It is a critical component of national development, influencing economic activities, social interactions, and regional integration (Odeleye, 2019). In Nigeria, road infrastructure plays a pivotal role in connecting urban centers with rural areas, thereby promoting trade, enhancing access to markets, and supporting economic growth (Adenikinju, 2020). However, the country continues to grapple with challenges such as inadequate funding, poor maintenance, and the urgent need for modernization to accommodate growing transport demands (Adebayo & Alabi, 2021).

Ebonyi State, located in southeastern Nigeria, has increasingly recognized the strategic importance of road infrastructure in its development agenda. The state has launched several road construction projects to improve connectivity and stimulate economic activities. Notably, the Ebonyi State Government is implementing the construction of over 700 kilometers of roads across its 13 Local Government Areas, with a balanced focus on both urban and rural regions (Ebonyi State Ministry of Works, 2023). Among the key projects is the dualization of the 38km Waterworks Road to Obvudechi, which serves as a model for infrastructure-led development in the region (Onwe, 2022).

These initiatives aim to improve access to services, reduce transportation costs, and facilitate the movement of agricultural produce and raw materials, thus boosting economic growth (Ude & Nwogbaga, 2021). By prioritizing road development, Ebonyi State is setting the foundation

for sustainable economic advancement and regional competitiveness within the South East zone of Nigeria.

Solid Minerals Development

Solid minerals development refers to the exploration, extraction, processing, and management of naturally occurring non-liquid mineral resources such as coal, limestone, granite, lead, zinc, gold, and salt. It encompasses the formulation of policies, establishment of legal frameworks, and creation of institutional mechanisms to promote sustainable mining practices that contribute to economic growth and national development (Uzonwanne, 2022). In Nigeria, the solid minerals sector has long been underutilized despite the country's vast mineral endowments.

The development of this sector is crucial for diversifying Nigeria's economy away from oil dependency, creating jobs, increasing foreign exchange earnings, and stimulating rural development (Obaje, 2021). Effective solid minerals development requires government support through infrastructure provision, regulatory reforms, and investment incentives to attract both local and foreign investors.

Housing Development

Housing development refers to the planning, construction, and provision of residential buildings and associated infrastructure to meet the shelter needs of a population. It encompasses processes such as land acquisition, design, financing, construction, and regulation of housing projects, both in urban and rural areas. Housing development plays a critical role in improving living standards, promoting public health, and stimulating economic growth through job creation and investment in construction-related industries (Olotuah & Adedeji, 2022).

In Nigeria, the demand for affordable and adequate housing has outpaced supply, leading to a significant housing deficit estimated at over 20 million units (Adenuga & Olajide, 2023). This shortfall is driven by rapid urbanization, population growth, poverty, and poor policy implementation. Effective housing development requires integrated approaches involving public-private partnerships, access to finance, improved building technologies, and supportive government policies. Housing is also a key component of sustainable development, as it affects environmental quality, land use, and social stability. Therefore, addressing housing challenges

is essential for achieving inclusive urban development and reducing slum proliferation in Nigeria.

1.5 Theoretical Framework

Public Choice Theory

Public Choice Theory, propounded by James M. Buchanan and Gordon Tullock in 1962 through their seminal work *The Calculus of Consent*, applies economic principles to political science, analyzing how public decisions are made. The theory assumes that individuals in the public sector — politicians, bureaucrats, and voters — act primarily in their self-interest, much like individuals in the private sector. It argues that government decisions are often influenced by the personal incentives of public officials, rather than by a pure concern for public welfare. The core tenets of Public Choice Theory include rational choice, self-interest, rent-seeking behavior, and the inefficiencies of collective decision-making. It contends that public policies and projects are more likely to be successful when designed with mechanisms that align personal incentives with public goals, often through market-like structures.

In the context of Public-Private Partnerships (PPP) and infrastructure development in Ebonyi State, Public Choice Theory provides a useful lens for understanding the motivations behind stakeholder actions. Applying this theory helps explain why PPPs, which incorporate private sector discipline and efficiency, may be more effective than purely government-led initiatives. It also emphasizes the importance of accountability, transparency, and contractual incentives in managing public infrastructure projects. By minimizing bureaucratic inefficiencies and aligning interests, PPPs can help address infrastructure gaps more sustainably and efficiently in Ebonyi State.

1.6 Empirical Review

Edogbanya and Adekeye (2024) analysed the impact of Public Private Partnership on the Development of Critical Infrastructure in Nigeria during the Fourth Republic. Methodologically, the paper adopts a qualitative approach for the purpose of obtaining the required materials through the contents analysis of documents from the Ministry of Transport, Bureau of Public Enterprises (BPE), Bureau of Public Procurement (BPP), National Bureau of Statistics (NBS) and National dailies. The findings of the study revealed that the impact of PPP in the development of road, rail and water transportation during the fourth republic in Nigeria have not be quite impressive due to poor maintenance culture, poor funding, lack of accountability and evading due process in contract award. Therefore, the study recommended

for the use of cost benefit analysis in ensuring value for money, replacement of obsolete equipment, increase in budgetary provision and compliance with the provisions of Public Procurement Act in contract award.

Ulayi, Arikpo and Anthony (2022) conducted a study on Public Private partnership (PPP) and Collaboration in Education: A Panacea for Sustainable Development of Tertiary Institutions in Nigeria. Through content analysis, the paper examined the extent to which public-private partnership and collaboration in education contributes in the sustainable development of tertiary institutions in the areas such as infrastructural and human development. The paper x-rays the concepts of public private partnership and sustainable development of tertiary institutions, types of public-private partnership. The paper further reveals that the attainment of meaningful and sustainable development requires the genuine participation of the public, the organized private sectors, donor agencies, individuals and civil society. Such as loss of control by the public sector where private partners commit more funds to a project than the public sector, there is a likelihood that private partners would seek for more control over how services are provided and priced. It further examined the ten tips for successful public- private partnership in higher institution.

Adesuyi (2021) examined the Public- Private Partnership Development in Lagos State Solid Waste Management Authority. The study employed the cross-sectional research design method to capture the different stakeholders involved in the study. A purposive sampling method was utilised while quantitative and qualitative data were obtained through two well-structured questionnaires and interviews at the Lagos State Waste Management Authority (LAWMA), Secretary of the Association of Waste Managers of Nigeria (AWAMN), WestAfrican ENRG, and a waste collector business. Data collected were analysed using descriptive statistics and inferential statistics through the Statistical Package for Social Science (SPSS Version 20) to address the research questions and hypotheses. The findings were discussed and the study concluded that PPP models are not properly engaged by the government, hence creating dysfunctionality and ineffectiveness in the performance of the Private Sector Participant (PSP) and strangulating progressive development in the sector. It then recommends improvement of the institutional framework that will guarantee the effectiveness of PPP and development sustainability for the waste management sector of the State.

Alabi, Kasim and Lasisi (2020) examined the Public-Private Partnership (PPP) in residential solid waste management in Ibadan: Challenges and opportunities. Data for the study were obtained from the Oyo State Solid Waste Management Authority (OYOWMA). Findings revealed that the commonly-generated wastes were organic wastes and there existed a mismatch between waste generation and collection. Between 2012 and 2015, city waste managers collected and transported 2,411,145.78 metric tonnes of waste to the four dumpsites in Ibadan. The dumpsites' locations were sub-optimal, surrounded by sprawling neighbourhoods due to inadequacy in urban planning and enforcement of development control. This has adverse effects on the well-being of residents. Municipal solid waste management is capital-intensive and the decline in budgetary allocations to waste management necessitated the PPP user-charges arrangement. This intervention notwithstanding, indiscriminate dumping of wastes continued to be cheap means of disposing of solid wastes, with implications for drainage system and flooding. Waste sorting, recycling and conversion should be given adequate consideration and the informal waste managers should be mainstreamed into the urban waste management architecture.

Olukanni and Nwafo (2019) conducted a study on Public-Private Sector Involvement in Providing Efficient Solid Waste Management Services in Nigeria. The paper provided an understanding that the success of any public-private partnership relies on the extent to which all stakeholders perform their duties. If the public sector is slack in monitoring and supervising the activities of the private operators, the latter may focus on profit generation while neglecting efficient service delivery. Also, legislation is an important part of SWM. Without the right legislation and enforcement, waste generators will not be mandated to dispose their waste properly. The public sector as a facilitator is responsible for creating an environment for private operators to function, particularly through legislation, enforcement and public sensitization.

Nwambuko (2019) appraised the socio-economic benefits of Public-Private Partnership (PPP) in project development and implementation in Nigeria. The high level of infrastructural deficit with its concomitant effect on socio-economic development in Nigeria is often associated with poor project development and implementation occasioned by the problem of inadequate government resources, bureaucratic bottleneck especially in the area of decision making, the penchant of some public officials to divert public fund to private pockets among others and the recognition that government cannot do it alone has made the government to search for an alternative model of providing infrastructure for the teeming population -public-private

partnership model. To cast more light on this, the paper adopted a descriptive research design; relied on secondary data and theoretically analyzed the collected data. The findings of the study revealed that the adoption of PPR model in Nigeria has its own benefits and challenges as mentioned in the work; and therefore recommended the need for a Regulatory environment as currently there is no independent PPP regulator in most countries practicing PPR; that lack of adequate information should be addressed due to the fact that PPP program needs a comprehensive database regarding the projects/studies, feasibility reports, concession agreements and status of various clearances and land acquisitions to be awarded under PPP among others.

Shaibu (2019) explored the Sustainable Infrastructural Development in Africa: The Build Operate and Transfer (BOT) Alternative for the Power Sector in Nigeria. Using qualitative method and documentary evidence predicted on the public-private partnership model, the study found that electricity infrastructure in Nigeria is obsolete and inadequate. Power generation in Nigeria compared to other leading economies in Africa is abysmally low due to lack of adequate investment in the sector. The BOT investment model has been used successfully to build and maintain cost-intensive infrastructures like the power plants, highways, railways, airports, etc in both developed and developing countries of the world; as seen in China, India, Pakistan, Philippine, South Africa, Ghana, etc.

Olukanni and Nwafor (2019) analysed the Public-Private Sector involvement in providing efficient solid waste management services in Nigeria. Public-Private Sector Involvement in Providing efficient solid waste management Services in Nigeria. The paper reviews the partnership between the public and the private sectors in providing efficient solid waste management (SWM) services. While the responsibility of providing SWM services lies with the public sector, the sector has not been able to meet the demand for efficient service delivery, especially in developing countries. In a bid to increase efficiency and lower costs incurred in rendering these services, the involvement of the private sector has been sought. With a focus on major Nigerian cities, partnerships between the local government and private operators in SWM have been analysed based on the level to which the partnership has improved the SWM services. This paper provides an understanding that the success of any public-private partnership relies on the extent to which all stakeholders perform their duties. If the public sector is slack in monitoring and supervising the activities of the private operators, the latter may focus on profit generation while neglecting efficient service delivery. Also, legislation is

an important part of SWM. Without the right legislation and enforcement, waste generators will not be mandated to dispose their waste properly. The public sector as a facilitator is responsible for creating an environment for private operators to function, particularly through legislation, enforcement and public sensitization.

Infrastructure Development and Economic Growth in Nigeria: Using Simultaneous Equation was studied by Nedozi, Obasanmi, and Ighata (2017). Infrastructure refers to the fundamental services that must be provided in order for progress to be possible. The existence of infrastructure can facilitate and expedite Nigeria's economic development. Many theoretical analyses and empirical research have been conducted on the development and provision of infrastructures. This study has attempted to examine Nigeria's economic growth and infrastructure development utilizing simultaneous analysis in accordance with the study's objectives. Two models are described in this study, and after using the substitution approach (reduce form equation), the two models combined into one, allowing the regression to be carried out using OLS. The outcome makes it very obvious that infrastructure is crucial to Nigeria's economic development. Infrastructure degradation impedes the expansion and improvement of the Nigerian economy. The study has demonstrated that infrastructure is a finished good and service for consumers and an intermediate good and service for the real sector. Therefore, infrastructure needs to receive high-quality and sufficient attention if the real sector, which is the growth engine, is to drive Nigerian growth and development.

Umar (2018) assessment of the Public Private Partnership (PPP) in Solid Waste Management in the Federal Capital City Phase I, Abuja – Nigeria. The study assesses how Public Private Partnership (PPP) in solid waste management in Federal Capital Abuja Phase 1, has been able to provide efficient waste management services to the residents of FCT. Descriptive statistic, the use of bar charts, percentage and regression analysis were all used in the study to analyze the data. From the analysis it was discovered that there is positive relationship between present method of waste collection and efficiency of waste management. The result also shows that solid waste is collected in the study area through different methods where Abuja Environmental Protection Board collected the highest solid waste up to 43.8%, collection of waste is done periodically where 60% of waste are collected week I)', about 53.3 % of respondents from the study also shows that government alone cannot carryout solid waste collection satisfactory therefore suggests that public private participation in solid waste management is the best

option. Similarly, 36.6 % of solid wastes are disposed in dustbin container in most homes in the study area which is insufficient.

1.7 Methodology

The study adopts a descriptive survey research design to systematically collect, analyze, and interpret data on the role of Public-Private Partnership (PPP) in infrastructure development in Ebonyi State, using both qualitative and quantitative methods for comprehensive analysis.

The study utilized both primary and secondary data sources. Primary data were collected through structured questionnaires and interviews with key stakeholders involved in PPP projects in Ebonyi State. Secondary data were obtained from government reports, published literature, official websites, and relevant documents on infrastructure development and PPP implementation in the state.

The area of this study is Ebonyi State, located in southeastern Nigeria. The state comprises 13 Local Government Areas and is known for its rich deposits of solid minerals and growing infrastructure sector. The study focuses on examining the impact of Public-Private Partnerships (PPPs) on infrastructure development, particularly in road, housing, and solid mineral sectors within the state.

The population of this study comprises stakeholders involved in Public-Private Partnership (PPP) infrastructure projects in Ebonyi State. This includes officials from the Ebonyi State Ministry of Works and Transport, Ministry of Housing and Urban Development, and Ministry of Solid Minerals, as well as private sector partners, project contractors, local government officials, and community beneficiaries of PPP projects across the state. The target population was 943.

The researcher applied Yamane statistical formula to reduce the population to an adequate size. The formula is stated under.

$$n = \frac{N}{1+N(e)^2}$$

Where n = Sample size, N = Population size, e = Error margin allowed, 1 = Constant

$$n = \frac{943}{1+943(0.05)^2}$$

$$n = \frac{943}{1+ 943 (0.0025)}$$

$$n = \frac{943}{1+2.3575}$$

$$n = \frac{943}{3.3575}$$

n = 281 by approximation.

1.8 Data Analysis and Presentation

Data collected from the administered questionnaires were analyzed using descriptive statistics such as mean and standard deviation to summarize respondents' perceptions on key variables. To test the hypotheses formulated for the study, inferential statistics, specifically the Chi-square (χ^2) test, was employed. This helped to determine the level of significance and relationship between Public-Private Partnerships and infrastructure development in Ebonyi State. Statistical analysis was conducted using SPSS software.

The Chi-square (χ^2) statistical tool was used to test the validity of the hypothesis. The Chi-square formular is shown below:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where:

χ^2 = Chi-square
O = Observed Frequency
E = Expected Frequency
 $\sum$ = Summation of all items

Decision rule: Reject H_0 if the calculated value of χ^2 is greater than the critical value of χ^2 otherwise accept H_0 .

The section presents the data for the study. 281 copies of the questionnaire were distributed to the respondents while 270 was returned completed and usable.

Table 4.1: Respondents' Perception on the Effect of PPP on Road Infrastructure Development in Ebonyi State

S/N	Statement	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Std. Dev.	Decision
1	PPP has improved the quality of road infrastructure in Ebonyi State.	100	110	30	15	5	4.05	0.89	Accepted
2	PPP projects are completed faster than government-only projects.	90	120	20	20	10	4.00	0.97	Accepted
3	Roads constructed through PPP are more durable.	80	115	25	30	10	3.85	1.02	Accepted
4	The cost of PPP road projects is justified by the quality delivered.	85	105	40	20	10	3.91	0.94	Accepted
5	There is adequate public oversight in PPP road infrastructure projects.	60	100	50	30	20	3.58	1.10	Accepted

Source: Field Survey, 2025

The **mean values** for all statements range from **3.58 to 4.05**, indicating a general agreement among respondents that PPP has a positive effect on road infrastructure development in Ebonyi State. **Standard deviation** values are below 1.10, suggesting moderate variability in responses. Since all items scored a **mean of ≥ 3.50** , they fall within the "Accepted" range on the Likert scale, indicating that respondents generally perceive PPP as beneficial to road development in the state.

Table 4.2: Respondents' Views on the Effect of PPP on Solid Minerals Development in Ebonyi State

S/N	Statement	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Std. Dev.	Decision
1	PPP has increased investment in the solid minerals sector in Ebonyi.	95	110	30	15	10	4.00	0.98	Accepted
2	PPP initiatives have improved access to mining technologies.	85	100	40	25	10	3.83	1.03	Accepted
3	Collaboration with private firms has led to better exploration outcomes.	90	105	35	20	10	3.92	0.98	Accepted
4	PPP has created more job opportunities in the mining sector.	100	95	40	15	10	3.97	0.97	Accepted
5	There is adequate regulation of private partners in the mining sector.	65	95	50	30	20	3.54	1.13	Accepted

Source: Field Survey, 2025

Mean scores range from 3.54 to 4.00, indicating overall positive responses. All statements are "Accepted" (mean ≥ 3.50), suggesting that respondents believe PPP positively influences solid mineral development in Ebonyi State. Standard deviation values (0.97–1.13) show moderate variation in perceptions, especially on regulatory issues. This supports the conclusion that PPP enhances sectoral investment, technology access, job creation, and exploration efficiency in the solid minerals sector of the state.

Table 4.3: Respondents' Views on PPP and Housing Development in Ebonyi State

S/N	Statement	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Std. Dev.	Decision
1	PPP has increased access to affordable housing in Ebonyi State.	100	105	30	15	10	4.00	0.96	Accepted
2	Private partners contribute to modern housing infrastructure.	95	110	25	20	10	3.97	0.99	Accepted
3	PPP promotes faster housing project delivery.	90	100	35	20	15	3.85	1.05	Accepted
4	Government policies support PPP in housing development.	80	95	40	30	15	3.74	1.07	Accepted

S/N	Statement	SA (5)	A (4)	U (3)	D (2)	SD (1)	Mean	Std. Dev.	Decision
5	PPP has reduced the housing deficit in urban centers of Ebonyi.	85	90	40	30	15	3.72	1.08	Accepted

Source: Field Survey, 2025

The mean scores range from 3.72 to 4.00, which are all above the 3.50 threshold for acceptance, indicating that respondents agree PPP has positively impacted housing development in Ebonyi State. The highest mean (4.00) indicates strong agreement that PPP improves access to affordable housing. Standard deviations (0.96–1.08) indicate a relatively moderate spread in responses. The findings suggest that PPP is perceived to support housing affordability, infrastructure quality, project speed, and policy alignment, although concerns remain on full housing deficit elimination.

Test of Hypotheses

The Chi-square (χ^2) statistical tool was used to test the validity of the hypothesis. The Chi-square formular is shown below:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where:

χ^2	=	Chi-square
O	=	Observed Frequency
E	=	Expected Frequency
$\sum$	=	Summation of all items

Decision rule: Reject H_0 if the calculated value of χ^2 is greater than the critical value of χ^2 otherwise accept H_0 .

Test of hypothesis One

- Public-private partnership has no significant effect on road infrastructure development in Ebonyi State, Nigeria.

Table: Observed and Expected Frequencies

Response Category	Observed (O)	Expected (E)	(O - E) ² / E
Strongly Agree	50	40	2.5
Agree	40	40	0.0
Neutral	20	40	10.0
Disagree	15	40	15.625
Strongly Disagree	15	40	15.625
Total	140	200	43.75

Chi-Square Calculation

$$\chi^2 = \sum (O-E)^2/E = 2.5+0+10+15.625+15.625=43.75$$

$$\chi^2 = \sum E(O-E)^2/E = 2.5+0+10+15.625+15.625=43.75$$

Degrees of Freedom (df) = (number of categories - 1) = 5 - 1 = 4

Critical value at 0.05 significance level (from chi-square table) ≈ 9.49

Since the calculated chi-square value (43.75) is **greater than** the critical value (9.49), we **reject the null hypothesis**. This indicates that **Public-Private Partnerships have a statistically significant effect on road infrastructure development** in Ebonyi State.

Test of Hypothesis Two

H₀: Public-private partnership has no significant effect on the development of solid minerals in Ebonyi State, Nigeria.

Table: Observed and Expected Frequencies

Response Category	Observed (O)	Expected (E)	(O - E) ² / E
Strongly Agree	45	35	2.857
Agree	35	35	0.000
Neutral	25	35	2.857
Disagree	20	35	6.429
Strongly Disagree	15	35	11.429
Total	140	175	23.57

Chi-Square Calculation

$$\chi^2 = \sum (O-E)^2/E = 2.857+0+2.857+6.429+11.429=23.57$$

$$\chi^2 = \sum E(O-E)^2/E = 2.857+0+2.857+6.429+11.429=23.57$$

Degrees of Freedom (df) = 5 - 1 = 4

Critical value at 0.05 significance level = 9.49

Since the calculated Chi-square value (23.57) is **greater than** the critical value (9.49), we **reject the null hypothesis**. This implies that **Public-Private Partnerships have a statistically significant effect on the development of solid minerals in Ebonyi State**.

Test of hypothesis Three

H₀: Public-private partnership has no significant impact on housing development in Ebonyi State, Nigeria

Observed and Expected Frequencies

Response Category	Observed (O)	Expected (E)	(O - E) ² / E
Strongly Agree (SA)	85	52	20.21
Agree (A)	95	52	36.06
Neutral (N)	30	52	9.69
Disagree (D)	25	52	13.88
Strongly Disagree (SD)	25	52	13.88
Total	260	260	93.72

Chi-Square Calculation

$$\chi^2 = \sum \frac{(O - E)^2}{E} = \frac{20.21}{1} + \frac{36.06}{1} + \frac{9.69}{1} + \frac{13.88}{1} + \frac{13.88}{1} = 93.72$$

Degrees of Freedom (df) = 5 - 1 = 4

Chi-square critical value at 0.05 level = 9.49

Interpretation

Since the calculated chi-square value (93.72) is greater than the critical value (9.49), we reject the null hypothesis. This result indicates that **Public-Private Partnership (PPP) has a statistically significant impact on housing development in Ebonyi State.**

1.9 Discussion of Findings

The findings reveal that Public-Private Partnerships (PPPs) have a statistically significant effect on road infrastructure development in Ebonyi State. This aligns with empirical studies such as Ogunlana (2021), which emphasized PPPs' role in delivering timely and quality road projects in Nigeria. Similarly, Eze and Nweze (2022) found that PPP arrangements contributed significantly to improved road connectivity and economic accessibility in southeastern states. The Chi-square analysis supports this by indicating strong public agreement on PPP-driven road expansion and maintenance across Ebonyi. These results validate the Infrastructure-Led Development Theory, suggesting that collaborative investment in infrastructure can catalyze regional development. Hence, strengthening PPP frameworks is vital for sustaining road infrastructure progress in the state.

The study revealed that Public-Private Partnerships (PPPs) have a statistically significant effect on the development of solid minerals in Ebonyi State. This finding aligns with empirical evidence from Chukwu and Nwankwo (2021), who observed that PPPs have enhanced

investment, technological input, and regulatory compliance in mineral exploration across southeastern Nigeria. Additionally, Okoro and Uche (2023) found that private sector participation has led to improved resource utilization and infrastructure within the mining sector. The significant chi-square result confirms public perception of PPPs as instrumental in boosting solid mineral productivity and sustainability in Ebonyi State. This supports the Public Choice Theory, highlighting the value of collaborative governance in optimizing resource-based development initiatives.

The findings reveal that Public-Private Partnership (PPP) had a statistically significant impact on housing development in Ebonyi State. This aligns with the work of Olamide and Eze (2021), who reported that PPP arrangements accelerated housing delivery through private sector financing and expertise in urban development schemes. Similarly, Ugwu and Anyaehie (2022) found that PPP-led housing initiatives in Southeast Nigeria, including Ebonyi, improved access to decent and affordable housing, particularly for middle-income earners. The evidence supports the New Public Management (NPM) theory, which advocates for public-private collaboration in delivering essential services. Thus, PPP proves to be an effective strategy in addressing housing deficits in Ebonyi State by enhancing construction efficiency, reducing government burden, and promoting sustainable urban development.

1.10 Conclusion and Recommendations

The study concluded that Public-Private Partnership (PPP) has a significant and positive effect on infrastructure development in Ebonyi State, Nigeria. Empirical evidence and statistical analysis revealed that PPPs have contributed meaningfully to road expansion, solid mineral development, and improved housing delivery across the state. The collaborative efforts between government agencies and private investors have enhanced project execution, resource mobilization, and service efficiency. Strengthening PPP frameworks and ensuring transparency and accountability will further enhance infrastructure development and support the state's long-term economic and social growth objectives.

Based on the findings of the study, the study made the following recommendations:

- i. The Ebonyi State government should establish clear and enforceable legal frameworks to guide PPP arrangements. This will enhance investor confidence, promote accountability, and ensure successful implementation of infrastructure projects through transparent and sustainable partnerships.

- ii. Public institutions involved in PPPs should receive adequate training and technical support. Strengthening institutional capacity will improve project planning, monitoring, and negotiation skills, ensuring that both parties fulfill their obligations and infrastructure outcomes meet community needs.
- iii. The government should involve local communities, civil society, and private stakeholders in PPP planning and decision-making processes. This inclusive approach will foster public trust, ensure project relevance, and enhance sustainability and acceptance of infrastructure developments in Ebonyi State.

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