

Private- Public Partnership Investment Strategies as a Panacea for Infrastructure Financing in Nigeria: The Case of Pension Fund Investment

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Abstract - The relationship between private- public partnership investment strategies and infrastructure financing in Nigeria has been a topic of significant interest in recent years. Existing research suggests that Nigeria's rapidly growing private- public partnership can provide an important source of investment capital for infrastructure development. The main objective of this study is to examine how private-public partnerships influence infrastructure financing in Nigeria. The study covers a twenty-year period from 2004 to 2023. The study employed an ex-post research design, secondary data were employed in view of the fact that the information needed is historical in nature and available, this study employed Ordinary Least Square Regression Analysis with the aid of STATA software version 16.0. This technique is employed because of its detailed description of the relationship between one or more independent variables and a dependent variable. This study relied on the Modern Portfolio Theory and reveal that PPP investment strategy has a positive and significant relationship with infrastructure financing in Nigeria. In agreement with the research prediction, the result shown in Table 2 revealed that infrastructural funds have a positive significant relationship with infrastructural financing ($\beta=.171$; $t=9.60$; $p=0.000$). Hence, Hypotheses H_1 was supported. The hypothesis results are in line with the results of the previous studies (Eke et al., 2018; Vanguard, 2018; Okechukwu et al., 2016; Fapohunda, 2013), as well as the Nigerian regulations on PPP investment strategy. We therefore, recommend That PPP funds should be allocated on assets towards infrastructure investment, either through direct investment in infrastructure projects or through specialized investment vehicles.

I. INTRODUCTION

Infrastructure was viewed as a public good, built and maintained with public funds. In recent years, however, the increasing constraints on public finances, associated with growing demands for social expenditures driven by population growth, cost of governance and evolving societal needs, have posed

great challenges in maintaining existing infrastructure and building new facilities, especially in most sub-Saharan African (SSA) countries (Okwoche & Makanza, 2023).

Although extensive studies have demonstrated that the correlation between infrastructure, such as roads, bridges, airports, etc., has enhanced economic mobility and positive tax implications on growth rates, these projects present cost-related challenges as a result of more prolonged periods required for capital recoveries and complexities of pricing as a result of social considerations (Agranov & Palfrey, 2016). To address these challenges, various innovative financing options have emerged, which include the involvement of non-government entities in funding and managing projects; among them are pension funds, which have surplus financial muscles to provide for such project financing (Chen & Bartle, 2022).

There is a widespread consensus that inadequate infrastructure is one of the significant constraints to sustained economic growth and development in Nigeria. However, the potential benefits of improving this infrastructure are immense and should be a source of hope and optimism. Nigeria's various development plans, such as National Vision 20:2020 (NV 20:2020) and the Economic Recovery and Growth Plan (ERGP), 2017-2020, consistently point to weak infrastructure as one of the factors that seriously undermined the country's economic performance over the years.

As the 2019 Global Competitiveness Index Report reveals, Nigeria scored 48.33 points out of 100 and ranked 130th of 141 countries surveyed for the overall quality of infrastructure, well behind Egypt (52nd), South Africa (69th), and Algeria (82nd). The 2020 Africa Infrastructure Development Index

(AIDI), produced by the African Development Bank to monitor and evaluate infrastructure development status and progress across the continent, also placed Nigeria (with an index of 23.27) at the bottom of the pyramid behind 23 other African countries. Although Nigeria's index has indicated a gradual improvement since 2014, it also underscores the profound infrastructural challenges within the country (African Development Bank, 2020). Public Private Partnership (PPP) is referred to as a generic term used to describe a myriad of structures that facilitate the participation of the private sector in the provision of public infrastructure and services. It involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project. PPP refers to a specific type of arrangement that involves a long-term agreement between a private sector party and a government in which the private sector party designs, builds, finances and operates public infrastructure in exchange for some form of payment.

Looking at the Nigerian situation with huge infrastructural needs and inadequate funding for such needs, PPP can mutually meet the infrastructural needs and similarly generate the needed funds for the provision and management of these infrastructure, thus lessen the financial burden of the government.

According to a study by Carlo, et al. (2023), infrastructure investment is increasingly significant for institutional investors. The study focused on private-public partnership investment strategies as a panacea for infrastructure financing in Nigeria using the CEM Benchmarking database. PPP across the globe face comparable infrastructure investment costs, but they also observed significant scale advantages in infrastructure investments, with more considerable pension funds exhibiting lower investment costs and higher net returns.

It is also observed from the above literature that the argument on the private-public partnership investment strategies as a panacea for infrastructure financing in Nigeria has resulted in conflicting results at the doorsteps of the academic domain, thus propelling the motivation for this study.

1.2 Statement of the Problem

Nigeria is experiencing stunted growth due to sluggish infrastructure development. Resources

channeled to the provision of infrastructure services were largely inadequate and sub-optimal. However, funds directed to the provision of infrastructures were allocated through budgetary allocation, which is not released, embezzled, or outrightly diverted to less productive needs, which are susceptible to corruption (Ogunlana, et al., 2016). This, however, created a lacuna in the infrastructure development process. This method has proven inadequate and most often unimplemented, creating a financing gap for the execution of infrastructure projects. Severe budget constraints and inefficient infrastructure management by public entities have led to an increased involvement of private investors in the business.

The continuing need for infrastructure investment places enormous demands on financial markets. The aggregate capital sourced by unlisted infrastructure equity funds (operating internationally) since 2004 is close to US\$200bn for water infrastructure only (Water UK, 2013).

In 2024, the Federal Government allocated N1.32 trillion to Infrastructure, representing 5% of the total budget for the fiscal year, this is in line with the 2021 revised National Integrated Infrastructure Master Plan (NIIMP), which stated that out of the total infrastructure investment of USD 2.3 trillion required over the next 23 years, about USD 150 billion is needed annually (by both the private and public sectors) to finance infrastructure investment over the medium-term period of 2021-2025. Over this period, the share of the private sector in total investment requirement is higher at 56 per cent, while the public sector (Federal and State) accounts for the remaining 44 per cent. This depicts the dilemma of infrastructure financing using the traditional method of government budget.

Pearson (2013) observes that if Africa is to effectively participate in the global trading environment and reach its true economic potential, it will require a level of investment in infrastructure that goes well beyond the government's capacity. The private sector needs to be involved, and if this is to happen, then instruments to reduce risk levels and increase returns need to be developed – that is, pension fund financing. This study is broadly aimed at examining the strategies used by private-public partnership investment strategies as a panacea for infrastructure financing in Nigeria.

1.3 Research Objectives

The main objective of the study is to explore the relationship between private-public partnership investment strategies as a panacea for infrastructure financing in Nigeria, this is supported by the following specific objectives:

- i. To examine how private-public partnerships influence infrastructure financing in Nigeria.
- ii. To examine the effect of housing project financing (real estate) on infrastructure financing in Nigeria.

1.4 Research Questions

To what extent will private-public partnership investment strategies as a panacea for infrastructure financing in Nigeria? The specific research questions are stated as follows:

- i. How does private-public partnership influence infrastructure financing in Nigeria?
- ii. What is the effect of housing project financing (real estate) on infrastructure financing in Nigeria?

1.5 Research Hypotheses

The research hypotheses of the study are stated in null forms as follows:

H_01 : There is no significant relationship between private-public partnerships and infrastructure financing in Nigeria.

H_02 : Housing project financing has no significant effect on infrastructure financing in Nigeria.

1.6 Scope of the Study

The study covers a twenty-year period from 2004 to 2023, and explore the relationship between private-public partnership investment strategies and infrastructure financing in Nigeria.

II. LITERATURE REVIEW

2.1 Conceptual Review

According to Infrastructure Concession Regulatory Commission (2015), the main reasons that prompts governments to involve in PPPs for infrastructural development and service propagation are: (a) for optimal utilization of available resources and efficiency in services. (b) To improve on the standing organizational plans and policies that will pave more ways for transparency and fairness assessment. (c) To attract more skilled force with competitive flair and orientation on efficient performance. (d) To reform sectors through a reallocation of roles, incentives and

improve accountability. Dabak (2018) adjudge that government went into Public Private Partnership with the objectives of delivering significantly improved public services, by contributing to the enhancement of quality and quantity of infrastructures in the nation. Also, to release the full potential of public sector assets, including state-owned businesses and exploit the better risk management of the private sector and to provide value for the taxpayer and wider benefits for the economy; and to allow stakeholders to receive a fair share of the benefits of the Public Private Partnership.

According to Dominic, et al. (2019), the reasons for PPP in Nigeria include: gross deficiencies and wide funding gaps observed in the Nigeria's infrastructural spheres, high rate of white elephant projects, high level of corruption in project execution and limited public resources to address the nation's growing infrastructure needs. Infrastructure finance may be defined as all means or methods available for mobilizing the resources required to finance physical assets and services which are fundamental to the growth and development of an economy. Provision of good infrastructure can accelerate economic development and prosperity in developing countries just as maintenance of existing infrastructure can ensure that developed countries remain developed. The level of accumulated infrastructure facilities is, no doubt, one of the major indices for measuring development of an economy. With the rising demand for infrastructure co-moving with the accelerating pace of globalization and urbanization, the total global infrastructure investment requirement by 2030 for transport, electricity generation, transmission and distribution, water and telecommunications, according to the OECD, amounts to \$71tn. The European Commission estimates that, by 2020, Europe will need between euro 1.5tn and euro 2tn of infrastructure investments.

Conceptual Framework

The study examines the effect of private-public partnership investment strategies on infrastructure financing in Nigeria. The study used infrastructural financing as the dependent variable, while private-public partnership investment strategies as independent variables. Therefore, the theoretical framework developed is shown in Figure 1.1 which explicates the association between dependent variables on one hand and independent variables on the other hand.

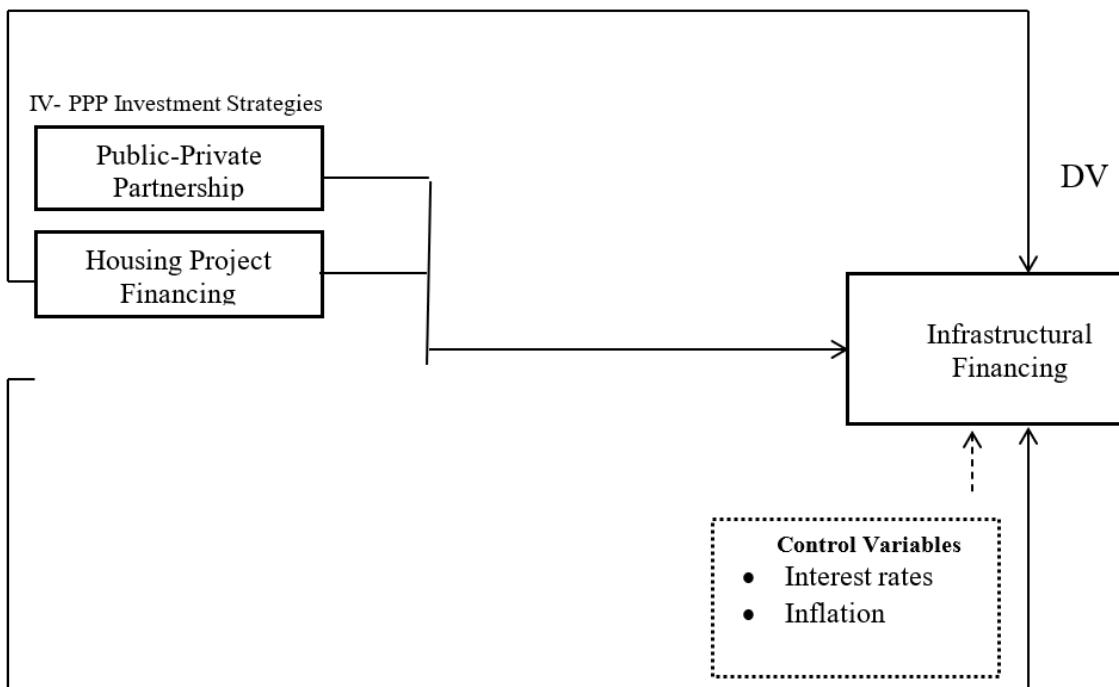


Figure 1.1

2.3 Theoretical Framework

Modern Portfolio Theory (MPT)

This theory forms a solid theoretical foundation to support research on the private-public partnerships and infrastructure financing in Nigeria. It provides the framework for understanding pension fund behavior, investment choices, and risk management. The theory of MPT emphasizes portfolio diversification and suggests that investors can optimize their portfolios by combining assets with different risk levels. Infrastructure investments are considered as part of this diversification strategy.

2.4 Empirical Review

Several studies have been reviewed on the relationship that exists between Infrastructure deficit and Public Private Partnership (PPP) which pension funds administrators also use as a means to finance projects, both internationally and locally. Some researchers posited that such an alternative source of funding could provide long-term financing for infrastructural development (Ogunlana, et al 2016). However, several other scholars have examined the significance of pension funds to infrastructural development.

Carlo et al (2023) examined the increasing importance of alternative investment especially pension funds in financing infrastructure projects due to its performance as the best-performing asset class as measured by net returns. The study focused on pension funds allocation to infrastructure, using the

CEM benchmarking databases. The study observed significant scale advantages in infrastructure investments, with larger pension funds exhibiting lower investment costs and higher net returns.

Mundonde and Mokoni (2024), in a study on a framework model for financing sustainable water and sanitation infrastructure in Zimbabwe, employed the Tobit econometric model on data collected from both domestic and international data banks over a 25-year period (1996- 2021). They developed and recommended a financing framework for water and sanitation PPP infrastructure projects in the country and developing countries as a whole.

Kashyap and Sharma (2024) reviewed project financing through the use of infrastructure investment trust, structured finance, private equity, public offerings and the emergence of PPP as a viable tool for real estate financing in India. The research review used doctrinal legal research methods and concluded that little result was achieved due to their unpopularity as financing methods.

Chan, et al. (2023) studied barriers to attracting private sector investment in Iranian public road infrastructure projects using a descriptive survey approach and employing three-round Delphi technique with 35 experts from both public and private sectors of Iran. The result showed four (4) main groups of legal and organizational, political, economic, and operational barriers to be significantly

The Table 1 above presents a discussion of the descriptive statistics for variables which comprise of i infrastructural fund, housing project financing, private-public partnership and investment strategy which presented the result of the average mean value, minimum, maximum and standard deviation. The result from Table 1 above indicates that the average mean value of infrastructural financing (INFFIN) is 13.59; standard deviation of 5.55; minimum of 6.7; and maximum of 19.12. With regards to housing project financing (real estate), the result revealed the mean average of 10.75, minimum of 4.37, maximum of 14.86, and standard deviation of 4.94. Regarding

the PFA public-private partnership, the average mean value of the public-private partnership is 10.88; minimum value of 1.87, maximum of 13.44 and standard deviation of 4.19. Furthermore, the mean value of investment strategy is 8.36; minimum value of 1.50; maximum of 13.85 and the standard deviation of 5.30. Finally, the result of the control variable indicates that the average mean value for the inflation rate is 2.52% with the standard deviation of 1.90%; minimum value of -0.04, maximum of 7. The result of interest rate also shows the average mean of audit size score of 1.41%; minimum value of 1.79, maximum of 0.09 and standard deviation of 5.08.

Table 2: Regression Analysis (Testing of Hypotheses)

loginffin	Coef.	Std.Err.	T	P>t	[95%Conf.	Interval]	Sig.
loghpf	-0.355	0.343	-1.030	0.331	-1.145	0.435	
logppp	0.023	0.110	0.210	0.836	-0.230	0.276	
loginvs	0.102	0.026	3.930	0.004	0.042	0.161	**
inflr	-0.007	0.014	-0.490	0.640	-0.038	0.025	
intr	0.035	0.019	1.830	0.100	-0.009	0.080	*
_cons	20.123	5.758	3.490	0.008	6.844	33.402	
Mean dependent var		18.528	SD dependent var			0.418	
R-squared		0.1982	Number of obs			17	
F-test		291.212	Prob > F			0.045	
Akaike crit. (AIC)		-43.794	Bayesian crit. (BIC)			-42.216	

*** p<.01, ** p<.05, * p<.1

IV. DISCUSSIONS OF FINDINGS

The study tests the hypotheses of the (public-private partnership) and control variables (inflation rate and interest rate) on endogenous constructs (infrastructural financing). The result of individual constructs testing on PPP and control variables are as follows in the sub-section below: This study relied on the Modern Portfolio Theory and reveal that PPP investment strategy has a positive and significant relationship with infrastructure financing in Nigeria. In agreement with the research prediction, the result shown in Table 2 revealed that infrastructural funds have a positive significant relationship with infrastructural financing ($\beta = .171$; $t = 9.60$; $p = 0.000$). Hence, Hypotheses H_1 was supported. The hypothesis results are in line with the results of the previous studies (Chan, et al, 2023 and Mmdi, 2023), as well as the Nigerian regulations on PPP investment strategy. Regarding the investment strategy, the result shown in Table 2 revealed that investment strategy has a positive significant relationship with infrastructural financing ($\beta = 0.102$; $t = 3.930$;

$p=0.004$). Hence, hypothesis H_2 was supported. Thus, the study agrees with the research prediction that the existence of an investment strategy improves due to their experience in global investment. The result aligns with previous studies on the relationship between investment strategy and infrastructural financing. Thus, foreign investors are more willing to invest in an economy with a strong investment strategy.

Finally, the result shown in Table 2 revealed that public-private partnership has a positive insignificant relationship with infrastructural financing ($\beta = 0.023$; $t = 0.210$; $p = 0.836$), thus the hypothesis H_2 is not supported. The result indicates that public-private partnership is not a predictor for infrastructure financing in Nigeria. The findings of this study contradicted the modern portfolio theory due to the fact that PPA strategies have been blamed for their role in the infrastructural decay' scandals and failure. Regarding the control variables, the study controlled for inflation rate and interest rate on infrastructure financing. Table 2 indicates a positive and significant

relationship between interest rate and infrastructural financing ($\beta= 0.035$; $t= 1.83$; $p=0.100$). However, inflation rate has a negative and insignificant effect on infrastructure financing ($\beta= -0.007$; $t= -0.490$; $p=0.640$). Thus, the result of this relationship supports the research prediction that the existence of inflation rate negatively affects the infrastructural financing.

V. SUMMARY AND RECOMMENDATIONS

This study has provided valuable insights into the complex relationship between PPP funds' investment strategies and infrastructure financing in Nigeria. The findings highlight the critical role that PPP can play in mobilizing long-term financing for infrastructure development through their strategic investment decisions.

Based on the findings, the study recommends that pension fund administrators in Nigeria should:

1. That PPP funds should be allocated on assets towards infrastructure investment, either through direct investment in infrastructure projects or through specialized investment vehicles and
2. Expand their investment in equity instruments, particularly in sectors supporting infrastructure development, to leverage the capital market's role in mobilising resources for infrastructure financing.

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YEARS	REAL EST	PPP	OPEN/CLOSE	INFL RATE %	INTR RATE %	TOTAL PFA
2007	79.08	0	4.46	2.8	5.02	815.18
2008	125.48	0	9.03	3.8	1.92	1,098.99
2009	142.96	0	5.74	-0.4	0.16	1,529.63
2010	170.52	0	8.61	1.6	0.18	2,029.77
2011	186.05	0	11.45	3.2	0.1	2,442.84
2012	231.35	6.5	16.17	2.1	0.14	3,195.47
2013	192.32	8.08	20.93	1.5	0.09	4,057.44
2014	2,559,352.70	104,666.23	435,323.29	0.80	0.25	48,506,867.54
2015	2,658,304.63	167,579.31	256,893.70	0.70	0.25	59,554,739.54
2016	2,560,338.94	234,502	203,115.85	2.10	0.50	68,536,576.16
2017	2,589,316.49	252,153.87	149,176.77	2.10	1.25	82,454,704.15
2018	2,713,192.91	426,711.23	120,236.83	1.90	2.50	98,538,081.13
2019	2,835,616.36	390,349.36	139,858.06	2.30	1.75	112,770,958.39
2020	2,473,019.69	411,527.90	376,070.15	1.40	0.25	134,598,120.41
2021	2,035,030.16	433,328.46	524,181.81	7.00	0.25	152,449,387.25
2022	2,522,927.46	460,796.89	644,017.79	6.50	4.33	171,357,946.50
2023	2,759,236.58	686,993.16	1,030,283.38	3.40	5.08	200,590,719.70
TOTAL	25,707,463.68	3,568,622.66	3,879,234.02	42.80	24.02	1,129,373,270.00