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THE BIG PUSH THEORY AND INFRASTRUCTURAL DEVELOPMENT IN NIGERIA

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ABSTRACT

Good infrastructure is widely recognised as a cornerstone of economic development in emerging economies. In Africa, and particularly in Nigeria, limited financing has discouraged investment, reduced productivity, and exacerbated poverty and inequality. Despite repeated government interventions, capital formation remains persistently low, leaving Nigeria's infrastructure lagging behind that of comparable nations. Existing research confirms that sustained capital growth requires public capital expenditure (PCE), foreign direct investment (FDI), official development assistance (ODA), and strong institutional quality (IQ). However, few studies have examined these determinants collectively within a single framework such as the Big Push Theory. This theory posits that a coordinated set of investments is necessary to generate the synergistic effects that drive continuous economic growth. This study investigates the main factors influencing capital formation in Nigeria and evaluates whether current investment patterns align with the Big Push Theory. Employing a quantitative approach, regression analysis was conducted to examine the relationship between Gross Fixed Capital Formation (GFCF) and its determinants. The findings reveal that PCE has a negative and statistically significant relationship with GFCF, while FDI, ODA, and IQ exhibit positive and significant impacts. These results underscore the importance of institutional quality, foreign aid, and historical investment momentum, while highlighting inefficiencies in public spending and weak integration with foreign investment. The study concludes that for Nigeria to effectively pursue a Big Push development strategy, reforms must prioritise not only mobilising financial resources but also strengthening institutions and improving the quality of investments.

Keywords: Big Push Theory, Capital Formation, Foreign Direct Investment, Institutional Quality.

INTRODUCTION

Background

Good infrastructure is often recognised as key to the economic development of many emerging countries (Calderón & Servén, 2010; Susantono & Berawi, 2015). It helps get work done, reduces the cost of doing business, and encourages industrialisation and increased trade. In 1943, Rosenstein-Rodan introduced the Big Push Theory, arguing that significant investments in both infrastructure and business are required to help developing countries avoid indivisibilities and other factors that cause low growth (Rosenstein-Rodan, 1943). Based on this theory, staggered or incremental investments may fail to lead to lasting economic change.

Applying the Big Push approach seems appropriate for Nigeria. Being Africa's most prosperous country does not stop Nigeria from experiencing problems with infrastructure services such as water, sanitation, transport and electricity (World Bank, 2020). The limited financing in these African economies discourages investment, reduces productivity, and increases poverty and inequality (AfDB, 2018). According to the National Integrated Infrastructure Master Plan, a budget of over $100 billion per year is needed to achieve Nigeria's target development by 2040. However, the government is not spending nearly as much (FGN, 2015).

Even after various attempts by governments, capital formation remains low in Nigeria, and the country's infrastructure fails to match that of comparable countries. The results from studies conducted by Owusu-Manu et al. (2019), Bakar and Mat (2017), Sherkulovich (2015), Ismail and Mahyideen (2015) and Maryaningsih et al. (2014) indicate that infrastructure contributes to the recovery of economic growth.

Even though several studies link infrastructure to Nigeria's development, few have specifically examined the drivers of capital formation in Nigeria through the lens of the Big Push Theory. This study aims to examine the main factors affecting capital formation in Nigeria and to assess whether the country's investment patterns align with the Big Push Theory.

To provide solutions to the identified problems, the following research objectives are set for the study:

1. To investigate the effect of public capital expenditure on gross fixed capital formation in Nigeria.
2. To examine the influence of foreign direct investment (FDI) inflows on gross fixed capital formation.
3. To assess the impact of official development assistance (ODA) targeted at infrastructure on gross fixed capital formation.
4. To determine the influence of institutional quality and governance on gross fixed capital formation in Nigeria.

In line with the above objectives, these are the research questions to be addressed by this study:

1. How does public capital expenditure influence gross fixed capital formation in Nigeria?
2. What is the impact of foreign direct investment inflows on gross fixed capital formation?
3. Does official development assistance directed at infrastructure significantly affect gross fixed capital formation?
4. To what extent does institutional quality or governance affect gross fixed capital formation in Nigeria?

Further to the research questions, the answers provided will be guided by these hypotheses:

1. $\mathbf{H_1}$: Public capital expenditure has a significant positive effect on gross fixed capital formation in Nigeria.
2. $\mathbf{H_2}$: Foreign direct investment inflows significantly increase gross fixed capital formation.
3. $\mathbf{H_3}$: Official development assistance directed at infrastructure has a positive effect on gross fixed capital formation.
4. $\mathbf{H_4}$: Institutional quality and governance have a significant effect on gross fixed capital formation in Nigeria.

This study contributes to knowledge by incorporating the basic assumptions of the Big Push Theory into a framework for infrastructure development in Nigeria. Using data and statistics, it uncovers the main factors that influence capital formation. The study also addresses the existing gaps in the literature. In terms of policies, the study provides insights for building infrastructure that supports Nigeria's national development.

This paper is structured into five sections. Section 1 is the introduction, which sets the stage for the research by highlighting the background, problem, objectives, questions, and hypotheses, as well as the research's significance. Section 2 will cover the theoretical framework and literature review for the research, highlighting the theoretical framing, conceptual definitions, empirical literature review, and research gaps. Section 3 will discuss the overall methodology for the research. Section 4 presents the results and discussion, comparing them with the findings of previous studies. Finally, the research will be synthesised in Section 5, which will also offer policy recommendations based on the research findings.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical Framing: The Big Push Theory

According to the Big Push Theory, which was put forth by Paul Rosenstein-Rodan in 1943, significant obstacles to growth in developing nations must be removed through extensive, well-coordinated investments.

Rosenstein-Rodan (1943) argued that, because of an economy's indivisibilities and synergies, small, independent investments are inadequate to spur significant economic growth.

According to the hypothesis, to generate a synergistic impact that can drive an economy towards continuous growth, an organised group of investments is required. The Big Push Model's central tenet is that numerous sectors and industries have complementary linkages, which means that the expansion of one can spur the growth of others (Rodrik, 2013). This theory emphasises the importance of comprehensive investment strategies across Nigeria's agricultural, industrial, and service sectors to promote equitable and balanced economic development (Todaro & Smith, 2015).

According to the Big Push Theory, several market flaws, including inefficiencies and organisational failures, impede the progress of developing countries. According to Opuala-Charles et al. (2025), this implies that significant government planning and intervention are necessary to address these market failures and create an environment that encourages private-sector investment. However, one drawback of the theory is that it assumes the government can successfully plan and execute significant investments, which is not always possible due to institutional flaws and corruption (Murphy et al., 1989; Currie, 2018). Nevertheless, this theory is significant to this study in that it suggests that, to help underdeveloped countries like Nigeria, with many infrastructure gaps, rise out of poverty, various large-scale efforts by the government, support institutions, and investments are important to build capital, mainly for infrastructure and industry.

Conceptual Definitions

Big Push Investment:

When a government makes a big push for investment, it allocates resources strategically across different economic sectors to address the main issues that prevent a nation from growing. Originating in Rosenstein-Rodan's (1943) theory, this concept holds that the foundations of economic growth in poor countries include significant investments in infrastructure and industry, as well as improvements in the education of the population. According to the theory, when different sectors support one another, it leads to higher sales, lower costs, and growth through large-scale production (Todaro & Smith, 2020). Big Push Investment in the Nigerian context focuses on building key infrastructure in energy, transport, and internet access to initiate industrial growth and raise productivity in the economy (Adegbite, 2021). Unlike single, small-scale investments, this strategy can work for economies struggling with low capital levels and weak institutions.

Infrastructural Development:

According to Bertha (2007), infrastructure development entails improving the quality of infrastructure elements such as roads, electricity, sanitation, and information and communications technology. It appears this concept prioritises complex infrastructure while ignoring soft infrastructure. Infrastructure development, according to Spacey (2018), is the creation of the essential services that promote economic expansion and the standard of living. In this case, the soft side of infrastructure is highlighted. Asaju (2023) defines infrastructure development as the availability of those concrete structures that support and improve the delivery of core services necessary for the economy's sustainability and resilience, as well as for enhancing the general well-being of the populace.

Hence, infrastructural development can be conceptualised as the improvement and construction of physical systems and facilities, including transportation, energy, water supply, and telecommunications, that help the economy and benefit society. Typically, the change is determined by examining Gross Fixed Capital Formation (GFCF), which represents the total net investment in buildings, machinery and the country's infrastructure. GFCF provides information on how much a country allocates to resources that increase economic growth (OECD, 2022). This is thus adequate to measure the performance of infrastructure investments in Nigeria, as it reflects investments made by both the government and the private sector (Adeleke & Saibu, 2021).

Comparative African Context

Inadequate infrastructure is a widespread trend across Africa. Many African economies face chronic funding deficits, poor institutional performance, and limited involvement in the development of large-scale infrastructure. For example, South Africa, a relatively developed country, also faces electricity shortages and a lack of state investment in transport infrastructure, which slows the rate of productivity growth (Eberhard et al., 2017; World Bank, 2020). On the same note, the Standard Gauge Railway and other ambitious initiatives undertaken by Kenya demonstrate the potential of infrastructure-based growth and the perils of sustaining debt (World Bank, 2019).

According to estimates from the African Development Bank (AfDB, 2018), the continent needs $130–$170 billion annually to invest in infrastructure, and there is a financing gap of approximately $68–$108 billion annually. The infrastructural deficit in Nigeria is of most significant concern, given the number of people and its resource endowment compared to those of other peer economies. Most African nations, including Ethiopia, have shown that numerous grand-scale investments in power generation and transport corridors have been associated with tremendous economic growth, albeit with growing fiscal strain (Calderón et al., 2018). Countries in West Africa, such as Ghana and Côte d'Ivoire, have increased their investments in energy and roads. However, infrastructure remains concentrated in a few efficient areas, and financing capacity is limited (Owusu-Manu et al., 2019). This relative sense reaffirms the imperative of harmonising policy towards infrastructural convergence in Nigeria with the multidimensional, multisectoral investment approach suggested by the Big Push Theory, in that capital formation should be adequate to stimulate the structural transformation required for an inclusive growth society.

EMPIRICAL LITERATURE REVIEW

Public Capital Expenditure and GFCF

Public capital spending is a key component of the Big Push Theory, which holds that extensive, well-coordinated state involvement is required to promote structural change and economic growth. It comprises various government-led infrastructure projects, ranging from roads and energy to schools and other sectors (Calderón & Servén, 2010). The significance of government-led capital investments in promoting infrastructure expansion is highlighted by numerous studies. For example, Niu and Zhao (2020) examined the impact of government investment on China's industrial transformation. Based on a Cobb-Douglas production function, the authors found that higher government spending significantly increases productivity and industrial expansion. By showing that focused investment can result in revolutionary growth in some areas, this research bolsters the Big Push theory.

Using secondary data from 1981 to 2011, Kanu and Nwaimo (2015) investigated the connection between Nigeria's GFCF and capital expenditure (CAPEX). According to the study's findings, national savings and imports positively and significantly impacted GFCF over the short and long term. At the same time, capital expenditures negatively and significantly affected GFCF in Nigeria at both the 1% and 5% significance levels. Additionally, it was noted that GFCF in the previous year was not significantly affected by its lagged value.

In a similar study, Oji and Odi (2024) used the Autoregressive Distributed Lag Model to investigate how capital expenditures affected gross fixed capital formation in Nigeria. According to the study's findings, consistent with other empirical research, there is a substantial short- and long-term correlation between public administration spending, economic services, and social and community services, and Nigeria's GFCF. The study concludes that capital expenditure and GFCF in Nigeria are significantly correlated.

Furthermore, Akujuobi et al. (2021) investigated the relationship between CAPEX and GFCF in Nigeria from 1981 to 2018. Using Ordinary Least Squares Multiple Regression, the study found a strong correlation between Nigerian CAPEX and GFCF. Based on the results, the study concluded that public spending has increased Nigeria's capital formation. As a result, it suggested that public spending on administration be monitored appropriately. Hence, it is evident from the literature that there is a positive and significant relationship between CAPEX and GFCF, particularly in Nigeria.

Foreign Direct Investment (FDI) and GFCF

According to Umeora (2013), FDI brings capital, advanced technology, and methods to countries, often boosting the creation of structures such as factories, production lines, and telecom equipment. It is widely believed that FDI helps drive capital accumulation in the economy. The study by Azolibe et al. (2020) sought to determine whether government spending on roads, transport, defence, and healthcare infrastructure is significantly associated with domestic investment and FDI in Nigeria.

The co-integration test indicated that the variables in the models follow a long-run relationship. Results from the short-run coefficients of the error-correction estimates indicate that government spending on roads, transport, defence, and health infrastructure is positively associated with investment and foreign direct investment within the country. However, the research did not find this to be significant. As a result, it was determined that government spending on infrastructure effectively stimulates investment in an economy.

Using World Bank data from 1995 to 2021, Yeboah et al. (2025) investigated how trade openness and FDI affected economic development in nine European nations. The results show that FDI has a short-term beneficial influence on economic growth but a long-term negative impact. In a similar vein, trade openness promotes near-term growth but has detrimental effects over time. Etukafia et al.'s (2024) study examined the short- and long-term effects of FDI inflows on Nigeria's GFCF growth between 1981 and 2022, using data from the Central Bank of Nigeria's 2023 statistical bulletin. The long-term coefficient finding indicates a negative relationship between GFCF and FDI. Conversely, the short-term dynamics between GFCF and FDI are incompatible.

Additionally, Emako et al. (2023) studied the impact of foreign direct investment on capital accumulation in 16 developing nations during 2005–2018. The findings demonstrated how FDI had a favourable effect on these nations' physical capital buildup and human capital formation. Similarly, for the years 1980–2020, Olowe (2022) examined how foreign direct investment affected Nigerian capital formation and found that FDI had a positive and significant impact on capital formation.

Additionally, Nyiwul and Koirala (2022) investigated how FDI affected agricultural development in 16 developing nations and found that FDI and agricultural development were positively correlated in both directions.

Furthermore, Polloni-Silva et al. (2021) examined the impact of foreign direct investment on the productivity of municipalities in the Brazilian state of São Paulo during 2010–2016. The findings revealed that FDI had a positive impact on Brazil's human capital. Djokoto (2021) also examined the impact of FDI on agricultural development in 64 nations between 1997 and 2016. The study found contradictory findings about the impact of foreign direct investment on capital accumulation. Adverse effects were observed in established economies, whereas none were observed in developing economies. Likewise, Soe (2020) examined how local investment and FDI affected Myanmar's economy from 2012 to 2017. Using a panel vector autoregressive model, the data analysis revealed that the impact of FDI varies across industries. A negligible influence was observed in the oil and gas industry; however, the effect was more substantial in the non-oil and gas industry.

Imoughele (2020) also examined how FDI affected Nigeria's industrial sector output between 1986 and 2018. The results showed a long-term correlation between industrial sector output and FDI. Similarly, Omorokunwa and Ajao (2019) investigated how FDI affected public-private investment in Nigeria. The examination of annual data from 1981 to 2016 revealed that spending has a direct, albeit slight, negative impact on investment in the long and short term. The report suggested that the government concentrate more on increasing domestic investment in Nigeria over the long run.

Official Development Assistance (ODA) and GFCF

ODA provides aid for additional capital projects in underdeveloped countries. When infrastructure is needed, and the country's own resources are limited, ODA offers easy-term loans and technical guidance. It follows the Big Push idea of using joint efforts to resolve structural problems. The relationship between ODA and GFCF has been well researched in literature. Bourguignon and Sundberg (2007) believe that project-based, capital-centred targeted aid for infrastructure delivers better results than regular aid. Kimenyi and Kholi (2011) note that aid focused on infrastructure improves the performance of fragile states like Nigeria, where public infrastructure is underdeveloped. As reported by the OECD (2020), funds for sub-Saharan Africa intended for infrastructure projects have increased fixed capital assets.

Paulin et al. (2025) examined how ODA affected both FDI and domestic investment across 30 sub-Saharan African nations between 2006 and 2019. Two linear models, one examining the impact of ODA on domestic investment and the other on FDI, were specified to accomplish this goal. The estimation results, which were derived using Parks' (1967) Realisable Generalised Least Squares (RGLS) method, demonstrate that ODA has a beneficial impact on both FDI and domestic investment in sub-Saharan African nations. Woldegiorgis (2023) also examined the relationship between inclusive development and ODA across 34 African nations from 1991 to 2018. The results of the simple OLS regression indicated that ODA and inclusive development are negatively correlated.

Dang and Duc (2019) also examined how ODA affected economic growth in 60 developing nations worldwide, using panel data from 1996 to 2016. According to this paper's key results, ODA significantly and favourably affects economic growth. Ono and Sekiyama (2023) studied the effect of ODA on FDI by assistance type, as this topic has been largely ignored in earlier research.

Five major donor nations ("France, Germany, Japan, the United Kingdom, and the United States") and sixty-three recipient nation pairs from 1996 to 2020 were examined using the Generalised Method of Moments with a gravity model. The findings imply that FDI is encouraged by ODA loans from the UK, Japan, and Germany. The study highlighted that a significant amount of their ODA loans was used to boost the production sector and economic infrastructure. Therefore, by fostering infrastructure development in recipient nations, ODA loans may attract foreign direct investment. These studies demonstrate that ODA plays a significant role in the economic expansion of underdeveloped nations.

Institutional Quality and GFCF

Different institutions determine the outcomes of money spent on public and private projects. As a result, researchers found that public spending is influenced by institutional quality (including transparency, regulatory strength, and corruption) as well as by investors' confidence in the state and their views on the success of infrastructure projects. Using the autoregressive distributed lag estimation technique, Dada and Abanikanda (2022) examine the moderating effect of institutional quality on Nigeria's FDI-led development hypothesis from 1984 to 2018. The results show that, in most models, the interaction between institutional variables and FDI has a significant impact on economic growth, suggesting that institutions play a crucial absorptive role. Thus, the authors conclude that Nigeria's growth and foreign direct investment depend on the presence of high-quality institutions.

In their investigation of the moderating role of institutional quality on the relationship between external debt and economic growth in highly indebted developing nations, Hassan and Meyer (2021) found that the adverse effects of external debt on economic growth are mitigated by institutional quality. In a similar study, Iheanacho et al. (2021) evaluated the effects of institutional quality (as measured by "the rule of law, government efficacy, regulatory quality, and corruption control") on economic performance in 12 West African nations between 1996 and 2015. The study found that all the institutional quality indicators used have a favourable and noteworthy effect on West African economic performance. Islam and Shindaini (2022) also investigated the relationship between economic growth and institutional quality in Bangladesh from 1990 to 2019. They concluded that institutional quality has a favourable long-term effect on economic growth.

Matashu and Musvoto (2020) investigated the relationships between economic growth in sub-Saharan African nations and institutional quality. They found that the composite of institutional quality indicators has a strong, statistically significant correlation with economic growth. According to Matallah and Benlahcene's (2021) investigation into the relationship between public service quality and economic growth in 15 Middle East and North Africa (MENA) countries from 1996 to 2018, the government effectiveness index significantly boosts economic growth in these nations. Nonetheless, in the chosen nations, government expenditure (or independence from the government) has a statistically negligible positive impact on economic growth.

According to Utile et al. (2021), who use annual time series data from 2001 to 2019 to investigate the impact of institutional quality on the evolution of the Nigerian economy in the twenty-first century, institutional quality significantly hinders economic progress. Likewise, Kaufmann et al. (2021) found in the Worldwide Governance Indicators project that nations with better governance perform better in infrastructure.

While research confirms that capital growth requires PCE, FDI, ODA, and a high level of IQ, studies that analyse all of these within a single framework, such as the Big Push Theory, are scarce. It is also common for research to analyse specific sectors or aspects across countries. However, there is insufficient effort to create an overview that reflects how countries collaborate on investment. This research helps resolve this difference by focusing on and assessing GFCF, following the Big Push approach, and using recent data and robust regression methods.

METHODOLOGY

Research Philosophy

The positivist research philosophy, which Saunders et al. (2019) claim is ingrained in the empirical philosophy of natural science, serves as the foundation for this study's philosophical perspective. Positivist philosophy is a school of thought that studies social issues by applying the methods of natural scientific investigation (Bryman & Bell, 2015). This scientific approach views social reality as an observable phenomenon whose existence can be established by developing ideas grounded in preexisting beliefs and testing them through scientific methods in an environment free of bias (Lincoln et al., 2011).

In this study, the positivist philosophy holds that a researcher must be kept separate from the subject of the study to conduct an objective investigation.

This method allows the researcher to address the research questions posed in this study with helpful answers or solutions. For this reason, instead of relying solely on ideas from other studies that offer opposing views on the drivers of capital formation in Nigeria through the lens of the Big Push Theory, the specific drivers will be identified. The positivist research philosophy employed in this investigation was thus influenced by the study's ontological and epistemological paradigms. According to Park et al. (2020), positivists believe their ontology is objectivist, meaning the world exists as a real entity. Because of this, the researcher believes that the drivers of capital formation in Nigeria can be studied using scientific methods, thereby revealing the truth without outside interference, enabling better generalisation.

This work assumes that accurate knowledge is attained by applying the scientific method to transform the complex world into numerical facts. This bolsters Howell's (2013) argument that positivism holds that the only way to comprehend any field of phenomena accurately is to examine individual examples of patterns. Furthermore, it is founded on quantitative research, which employs precise, statistical, and mathematical methods to produce data about a complex environment (Frey, 2018). In this case, it establishes the causal relationship between capital production and Nigeria's infrastructure development.

Research Approach

The study used a deductive approach that was grounded in positivist principles (Saunders et al., 2019). According to Trochim (2020), the deductive research approach is often called the top-down research strategy because theories help shape hypotheses about the topic under study. When comparing hypotheses and facts, this research approach assesses whether existing theories of a social phenomenon are strong.

The aim in this case is to either refute, uphold, or alter the current theoretical analysis of social phenomena while laying the groundwork for further theoretical advancement (Dudovskiy, 2009). The research topic is predicated on a conjectural theory derived from an understanding of the literature on the drivers of capital formation within Nigeria through the lens of the Big Push Theory. Since the infrastructure in Nigeria is constantly evolving, it challenges the usefulness of various theories that seek to explain it. This underscores the need for the deductive approach. Moreover, it helps gather statistical data so that the researcher can conclude from the general to the specific, which aligns with positivist beliefs (Sheppard, 2020).

Research Strategy

Since the study is about measurable relationships, it used quantitative methods to examine the relationships among macroeconomic variables that influence infrastructure development in Nigeria. The method enabled statistical testing of the hypotheses proposed by the Big Push Theory using actual figures on capital formation and related data. With quantitative methods, the reliability and generalisability of the study results is enhanced (Bryman, 2016; Saunders et al., 2019). This strategy helps recognise the main factors behind GFCF, as it is a proxy for infrastructure investment.

Research Choices

A monomethod quantitative design was employed, using numerical data from secondary sources to examine the link between infrastructure and macroeconomic drivers. Using this technique ensures the method is clear and appropriate for measuring how investment-related factors affect GFCF. With a single method, the results become more internally consistent, and the modelling steps are smoother (Creswell & Creswell, 2018). Additionally, secondary data ensures the utilisation of validated macroeconomic indicators sourced from internationally recognised databases while minimising resource expenses.

Time Horizon

The study used the period from 2000 to 2020 to examine long-term changes in infrastructure development. This period features several rounds of different policies and economic conditions, making it suitable for identifying the main features of capital formation. This longitudinal design aligns with the aim of tracking progress in infrastructural development driven by sustained investment efforts and macroeconomic factors (Saunders et al., 2019). In addition, it improves understanding of how time affects the connection between the variables.

Data Collection and Operationalisation

The study utilised information from reputable international and national sources, including the World Bank World Development Indicators (WDI), the United Nations Conference on Trade and Development (UNCTAD), the Central Bank of Nigeria (CBN), the Budget Office of the Federation, the OECD-DAC, and Transparency International. The information available from these sources is standardised and can be compared across countries, which is vital for robust analysis. Secondary data is cost-effective to obtain, spans a longer period, covers more samples, and yields better results for the procedure. Gross fixed capital formation, foreign direct investment, public capital expenditure, debt servicing, institutional quality and official development assistance are defined according to established frameworks (OECD, 2022; World Bank, 2023).

Definitions used for operations will be based on international standards for consistency, validity and reproducibility. The definitions of the variables are summarised in Table 1.

Table 1: Definitions of Variables

Variable	Conceptual Definition	Operational Definition	Measurement / Proxy	Source
Gross Fixed Capital Formation (GFCF) *(Dependent Variable)*	Total investment in fixed assets, including infrastructure, machinery, buildings, and other assets, reflects the economy's rate of physical capital accumulation.	Proxy for infrastructural development is used to capture growth in physical capital stock.	GFCF as % of GDP	World Bank (2023)
Public Capital Expenditure (PCE)	Government expenditure on important long-term projects, for example, roads, energy and similar assets	Total government capital spending relative to GDP or total budget.	Capital expenditure as % of GDP or % of total government expenditure	CBN (2020)
Foreign Direct Investment (FDI)	Cross-border investment by foreign entities to acquire a lasting interest and control in domestic enterprises.	Net FDI inflows relative to the size of the economy.	FDI inflows (USD) or as % of GDP	World Bank (2020), UNCTAD (2022)
Official Development Assistance for Infrastructure (ODA)	International aid targeted specifically at physical infrastructure, such as energy, transport, and water.	Development assistance allocated to infrastructure sectors.	% of total ODA directed to infrastructure or % of GNI	AidData (2020)
Institutional Quality / Governance (IQ)	The degree to which a country's institutions enable effective government, rule of law, transparency, and control of corruption.	Aggregated governance indicators assessing the quality of institutions.	WGI (e.g., Government Effectiveness, Rule of Law) or Corruption Perception Index (CPI)	World Bank (2020), Transparency International (2023)

Model Specification

$$GFCF_t = \beta_0 + \beta_1 PCE_t + \beta_2 FDI_t + \beta_3 ODA_t + \beta_4 IQ_t + \varepsilon_t$$

Where:
$GFCF_t$: Gross Fixed Capital Formation (as % of GDP) – Proxy for infrastructural development used to capture physical capital stock growth

PCE_t: Public Capital Expenditure (% of GDP)

FDI_t: Foreign Direct Investment inflows (USD or % of GDP)

ODA_t: Official Development Assistance (% of GNI)

IQ_t: Institutional Quality (WGI or CPI)

ε_t: Error term

β_0: This is the intercept of the model. It represents the expected value of Gross Fixed Capital Formation (GFCF) when all the independent variables (PCE, FDI, ODA, IQ) are equal to zero. It is the baseline level of infrastructure development in the absence of external influences.

β_1: This is the coefficient of Public Capital Expenditure (PCE). It measures the expected change in GFCF for a one-unit increase in PCE, holding other variables constant.

β_2: This is the coefficient of Foreign Direct Investment (FDI). It captures how much GFCF is expected to change with a one-unit increase in FDI, assuming all other variables are constant.

β_3: This is the coefficient of Official Development Assistance (ODA). It indicates the effect of a one-unit increase in infrastructure-targeted aid on GFCF.

β_4: This is the coefficient of Institutional Quality (IQ). It shows how improvements in governance or institutional quality are expected to impact GFCF.

t: The subscript *t* represents time, indicating that the model uses time-series data—typically annual data. Each variable (e.g., $GFCF_t$, PCE_t) reflects its value in a specific year *t*.

Table 2: Expected Signs of Coefficients (based on theory)

Variable	Symbol	Expected Sign	Justification
Public Capital Expenditure	β1	+	Government-led investment directly stimulates infrastructure (Big Push)
FDI Inflows	β2	+	Foreign capital promotes infrastructure expansion and private investment.
ODA for Infra-structure	β3	+	Development aid targeted at infrastructure enhances fixed investment.
Institutional Quality	β4	+	Better institutions improve policy effectiveness and investor confidence.

Statistical Tools

To examine trends and variability in the data, descriptive statistics were used to assess central tendencies, dispersion, and distributional characteristics, shedding light on the patterns and fluctuations in macroeconomic metrics from 2000 to 2020 (Gujarati & Porter, 2009). Correlation analysis was used to determine the degree and direction of linear relationships among independent variables, like PCE, FDI, and IQ. For the inferential part of the study, Fully Modified Ordinary Least Squares (FMOLS) regression was chosen, as it excels at accounting for problems of cointegration, endogeneity and serial correlation in time-series data (Phillips & Hansen, 1990). In this case, FMOLS was recommended because it reliably provides consistent results for long-term parameters when the sample size is small (Nazlioglu et al., 2011).

There are potential endogeneity issues, such as reverse causality or unmeasured behaviour. Although other econometric methods, including the Generalised Method of Moments (GMM) and the Autoregressive Distributed Lag (ARDL) model, might also be used to model dynamic relationships and explicitly address endogeneity, FMOLS was ultimately selected for this research. The reason is that the author primarily focused this research on long-run relationships rather than short-run dynamics, and the sample size was relatively small (2000-2020), which constrained the efficiency of GMM estimation. On the contrary, FMOLS is more reliable and performs better at modelling long-term parameters, given these limitations.

To ensure the regression results are reliable, several robustness tests were conducted. The Variance Inflation Factor (VIF) was used to assess whether the explanatory variables in the model are correlated and could influence the results (Kutner et al., 2004). For heteroskedasticity, the Breusch-Pagan test was used; for autocorrelation, the Durbin-Watson statistic was used, depending on how the model was specified. Next, adjusted R-squared and F-statistics were used to assess the regression model's effectiveness and significance. These tools collectively ensured the robustness, validity and clarity of the results from econometric analysis.

Ethical Considerations

For this study, data collection involved gathering secondary data from reputable sources, including the World Bank, UNCTAD, and the Central Bank of Nigeria. Since the researcher worked with data that did not include people, ethical issues such as informed consent and the protection of personal details were not present (Saunders et al., 2019). Also, the study was conducted in accordance with ethical guidelines, citing and referencing all the literature and sources used. To avoid bias, the analysis focused on hard evidence and remained unbiased throughout. All results were reported honestly, helping to build trust in the methodology used in this research (Bryman, 2016). To ensure the originality of all work handed in, the researcher adhered to the university's integrity and anti-plagiarism rules. All these ethical principles strengthen the research and make it more credible.

RESULTS INTERPRETATION AND DISCUSSION OF FINDINGS

Descriptive statistics and diagnostic analysis

Trend analysis

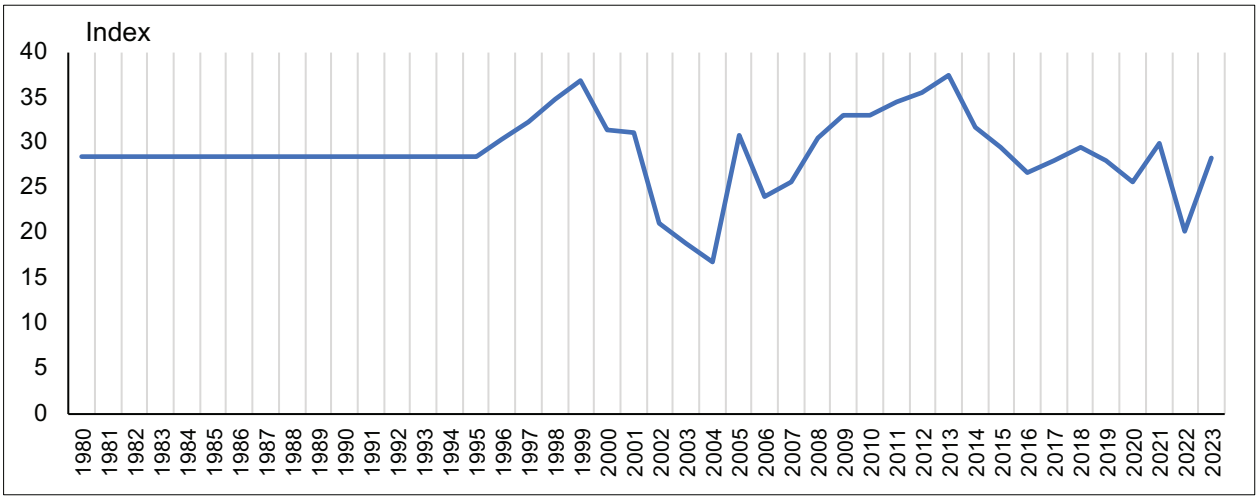


Figure 1: Institutional Quality (IQ)

Source: Author's Computation (2025) from data extracted from the World Bank database (2020, 2023a, 2023b).

From Figure 1, Institutional Quality (IQ) in Nigeria exhibited a largely stagnant trend during the early years of the study period, with values remaining around 28.46 between 1980 and 1995. This long-standing flatness in institutional development suggests a bureaucratic, possibly dysfunctional governance structure that failed to evolve significantly over a decade and a half.

From the perspective of the Big Push Theory, which advocates a coordinated, large-scale investment effort to break the cycle of underdevelopment, such institutional inertia would have impeded the effective implementation of infrastructure projects, as sound institutions are critical for resource allocation, project execution, and contract enforcement.

A notable shift occurred in the late 1990s, with IQ rising to 36.85 in 1999. This surge coincided with Nigeria's return to democratic governance, which may have brought a renewed focus on public accountability, regulatory reforms, and institutional rebuilding. However, this momentum was not sustained. The early 2000s saw a drastic drop in institutional quality, reaching a low of 16.92 in 2004. This regression highlights periods of policy inconsistency and possible governance lapses that could undermine investor confidence and limit capital inflows, thus stalling the capital formation process necessary for infrastructure development.

Although there was a modest recovery from 2005 to 2013, peaking again at 37.44 in 2013, the IQ indicator remained volatile in subsequent years, falling to a low of 20.28 in 2022 before recovering to 28.30 in 2023. This volatility signals persistent institutional fragility and governance instability, with adverse effects on the sustainability and efficiency of infrastructure investments.

Under the Big Push framework, institutions are expected to play a coordinating role by aligning public and private sector efforts in large-scale investments. In Nigeria's case, inconsistent institutional quality likely disrupted this coordination, limiting the transformative potential of capital inflows from foreign direct investment and official development assistance.

Overall, Nigeria's institutional quality pattern reflects a challenging environment for infrastructure development. Despite periods of improvement, the inability to maintain strong, consistent institutions undermines the very foundation upon which a successful Big Push strategy must rest. Without durable reforms that ensure institutional stability and effectiveness, large-scale capital formation efforts are likely to fall short of triggering sustained economic transformation.

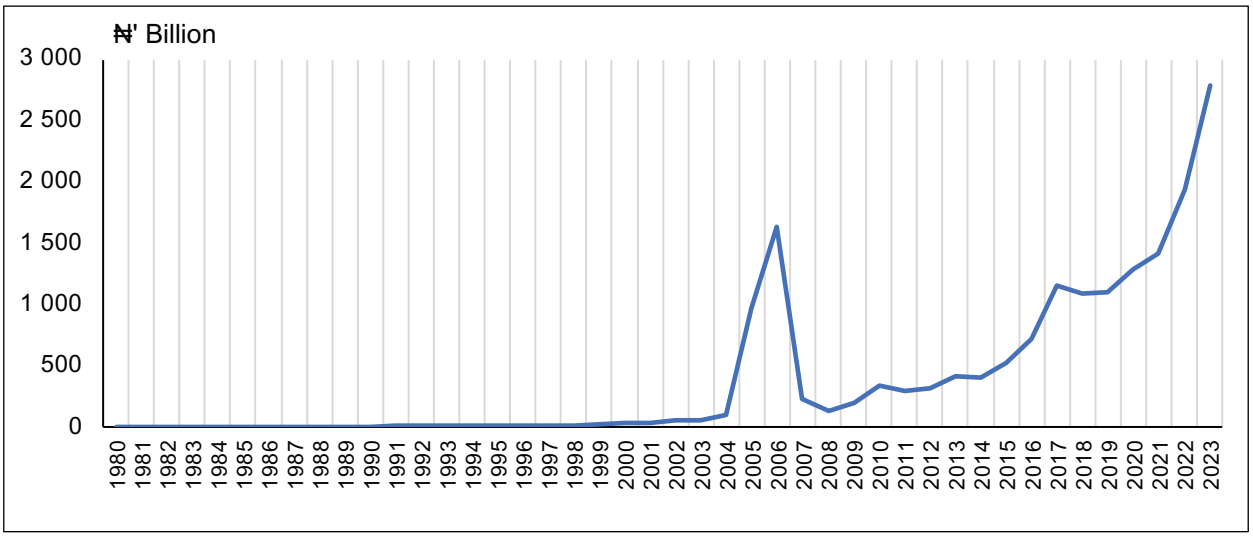


Figure 2: Net Official Development Assistance (ODA)

Source: Author's Computation (2025), World Bank (2020, 2023a, 2023b)

From Figure 2, Net Official Development Assistance (ODA) to Nigeria remained negligible throughout the 1980s and early 1990s, with annual inflows below ₦10 billion.

This low level of external support during the structural adjustment era reflected the country's weak international creditworthiness, political instability, and strained diplomatic relations. Under the Big Push Theory, external aid plays a critical role in bridging the financing gap for developing countries that are unable to generate sufficient domestic savings to support large-scale infrastructure projects. Nigeria's minimal ODA receipts during this period likely constrained its ability to implement such transformative investments.

Beginning in the late 1990s and early 2000s, ODA flows increased, reaching ₦54.85 billion in 2002 and rising further to ₦95.44 billion in 2004. The most dramatic surge occurred between 2005 and 2006, when Nigeria received ₦965.17 billion and ₦1,639.20 billion, respectively. This spike is likely associated with the global push for debt relief and poverty reduction strategies, including Nigeria's Paris Club debt forgiveness in 2005.

While this represented a historic opportunity to channel massive resources into infrastructure, the subsequent years suggest that much of the aid may not have been efficiently deployed. Despite continued high levels of ODA—often exceeding ₦1 trillion annually after 2016—there is limited evidence of a proportionate rise in Gross Fixed Capital Formation, suggesting inefficiencies in public investment management or the diversion of aid toward non-capital expenditures.

From 2017 to 2023, ODA continued to rise, peaking at ₦2.79 trillion in 2023. However, this persistent growth in aid inflows did not yield commensurate improvements in capital formation metrics. This discrepancy raises critical questions about absorptive capacity, fiscal governance, and project selection in Nigeria. According to the Big Push framework, foreign assistance should act as a catalyst for large-scale, coordinated investments across complementary sectors to overcome development bottlenecks. In Nigeria's case, the weak linkage between high ODA and gross capital formation suggests that the aid may have been fragmented, poorly targeted, or undermined by weak institutions and corruption.

In summary, while the volume of ODA to Nigeria has grown substantially, especially in the last two decades, its effectiveness in driving capital formation and infrastructural development remains questionable. The country's experience underscores a key critique of the Big Push Theory: that without strong institutions, strategic planning, and accountability, even large injections of external financing may fail to produce the desired developmental outcomes.

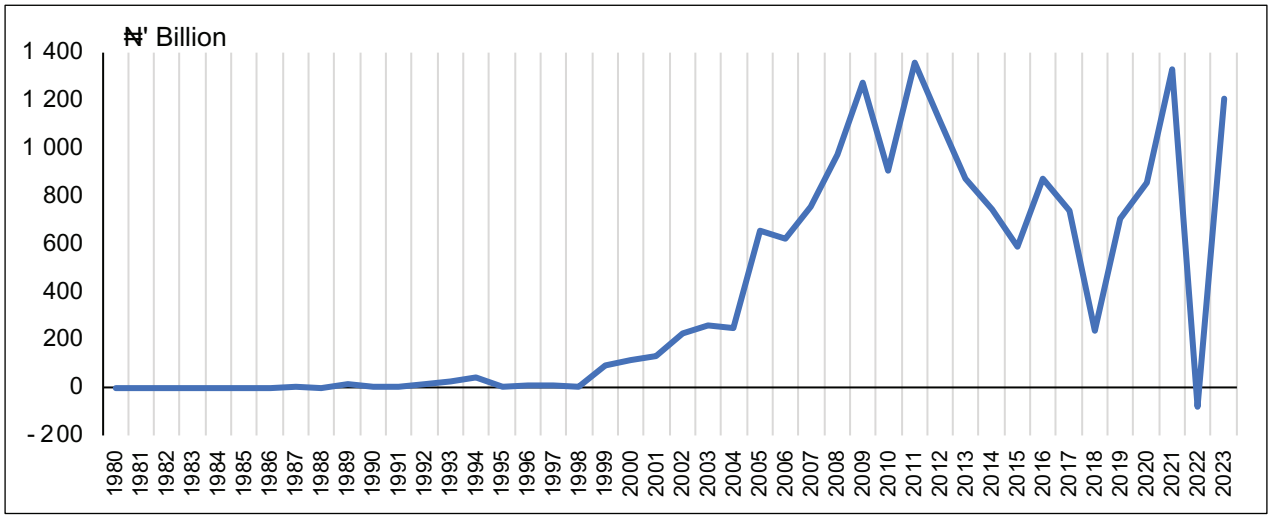


Figure 3: Foreign Direct Investment (FDI)

Source: Author's Computation (2025), World Bank (2020, 2023a, 2023b)

From Figure 3, Foreign Direct Investment (FDI) net inflows in Nigeria were minimal and erratic in the early part of the study period. From 1980 to the early 1990s, annual FDI inflows remained below ₦10 billion, with Nigeria even recording a net outflow of ₦0.41 billion in 1980. These low levels of FDI reflect a combination of macroeconomic instability, regulatory uncertainty, and weak infrastructure—all of which deter long-term investor commitment.

Under the Big Push Theory, FDI is a crucial mechanism for overcoming capital scarcity, promoting technology transfer, and enabling infrastructural development. Nigeria's inability to attract sustained FDI during this period highlights a failure to meet the necessary preconditions for large-scale external investment.

A turning point emerged in the mid-1990s, with FDI inflows rising significantly, reaching ₦92.79 billion in 1999 and ₦115.96 billion in 2000. This period coincided with economic liberalisation policies and the transition to democratic governance, which improved investor sentiment. From 2001 to 2011, Nigeria witnessed a steady and substantial increase in FDI, culminating in a peak of ₦1,360.29 billion in 2011.

Investments in the oil and gas sector, telecommunications, and banking reforms largely drove these flows. During this phase, the rise in FDI was more closely aligned with increased Gross Fixed Capital Formation, suggesting that external investment played a tangible role in driving capital accumulation and infrastructural expansion.

However, the post-2011 period was marked by volatility and a gradual decline in FDI inflows. By 2018, inflows had dropped to ₦237.29 billion—down from over ₦1 trillion just a few years prior. In 2022, Nigeria recorded a net disinvestment of ₦79.57 billion, reflecting growing investor apprehension over exchange rate instability, policy reversals, security concerns, and regulatory unpredictability. Although Nigeria recovered to ₦1,208.13 billion in 2023, the preceding instability underscores the fragility of its investment climate.

These fluctuations limit the catalytic role FDI can play in a Big Push strategy. For FDI to contribute meaningfully to capital formation and infrastructure development, it must be stable, sectorally diversified, and supported by a conducive investment environment. Nigeria's experience shows that without consistent policy and institutional reform, FDI becomes opportunistic and short-term, with limited structural impact. Moreover, the concentration of FDI in extractive sectors limits its potential to stimulate broad-based infrastructural development.

In essence, while Nigeria has experienced periods of strong FDI inflows, particularly during the 2000s, the lack of continuity and sectoral breadth restricts its effectiveness as a driver of sustainable capital formation. The Big Push Theory underscores the importance of sustained and coordinated investment flows—conditions that have not been fully met in Nigeria's FDI landscape.

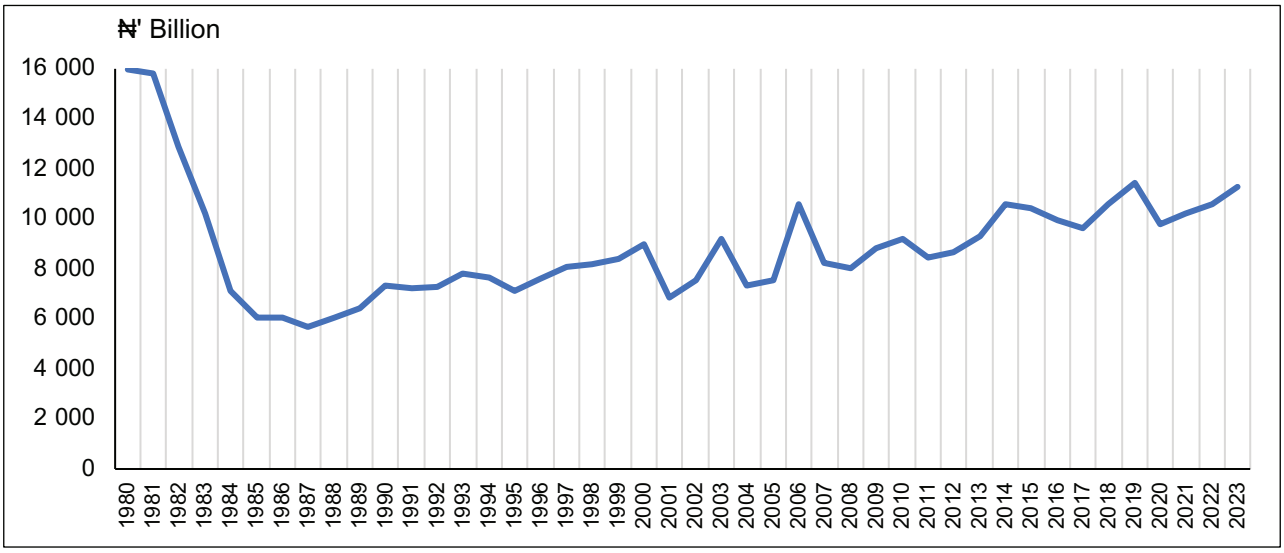


Figure 4: Gross Fixed Capital Formation (GFCF)

Source: Author's Computation (2025), World Bank (2020, 2023a, 2023b)

From Figure 4, Gross Fixed Capital Formation (GFCF), a key indicator of investment in physical assets such as infrastructure, machinery, and buildings, showed a fluctuating but generally sluggish growth trend in Nigeria over the study period. In the early 1980s, GFCF stood at ₦15,996.38 billion in 1980 but began to decline steadily, reaching a low of ₦6,032.26 billion in 1985. This contraction reflected the impact of Nigeria's economic crisis during the oil glut and structural adjustment era, when fiscal austerity, inflation, and currency devaluation constrained public and private investment. Under the Big Push Theory, which emphasises the need for a significant, coordinated increase in capital investment to overcome development traps—such a contraction in GFCF reflects an environment far from the threshold needed for transformative growth. During the late 1980s and early 1990s, GFCF remained relatively stagnant, fluctuating between ₦5,668.87 billion and ₦8,385.96 billion, despite marginal improvements in foreign aid and FDI.

This stagnation implies that capital inflows were either insufficient or poorly utilised, further reinforcing the theory's concern with the need for strategic coordination in investment efforts. Notably, between 2000 and 2010, GFCF improved moderately, peaking at ₦10,557.89 billion in 2006.

This uptick coincided with the global commodity boom, debt relief gains, and macroeconomic stabilisation, all of which provided the fiscal space and investor confidence to scale up infrastructure-related spending. However, the gains were not sustained consistently, as GFCF figures hovered around ₦8,000–₦9,000 billion for much of the subsequent decade.

From 2011 to 2023, GFCF grew slowly and erratically, reaching ₦11,250.11 billion in 2023. While this increase is notable, it pales in comparison to the massive rise in government capital expenditure and official development assistance during the same period.

The weak responsiveness of GFCF to these large inflows suggests structural inefficiencies in public investment management, low absorptive capacity, and possibly corruption-related leakages or project delays. For a Big Push strategy to succeed, capital formation must rise significantly and translate into productive infrastructure that supports industrialisation and diversification. Nigeria's GFCF trajectory shows that while nominal figures have grown, the scale and pace of investment have been insufficient to trigger the threshold effects proposed by the theory.

Furthermore, the lack of sustained acceleration in GFCF indicates that Nigeria has not experienced the kind of coordinated and sectorally integrated investment wave that Big Push advocates. Instead, capital formation appears fragmented and cyclical, often tied to volatile oil revenues and short-lived policy initiatives. Without a long-term capital formation strategy anchored in institutional strength and coherent planning, the potential of public and private investment to catalyse infrastructure-led development remains underutilised.

In conclusion, Nigeria's pattern of GFCF reflects a missed opportunity to convert financial inflows into sustained, strategic investment. This undermines the practical application of the Big Push framework and signals the urgent need for reform in capital project planning, execution, and monitoring.

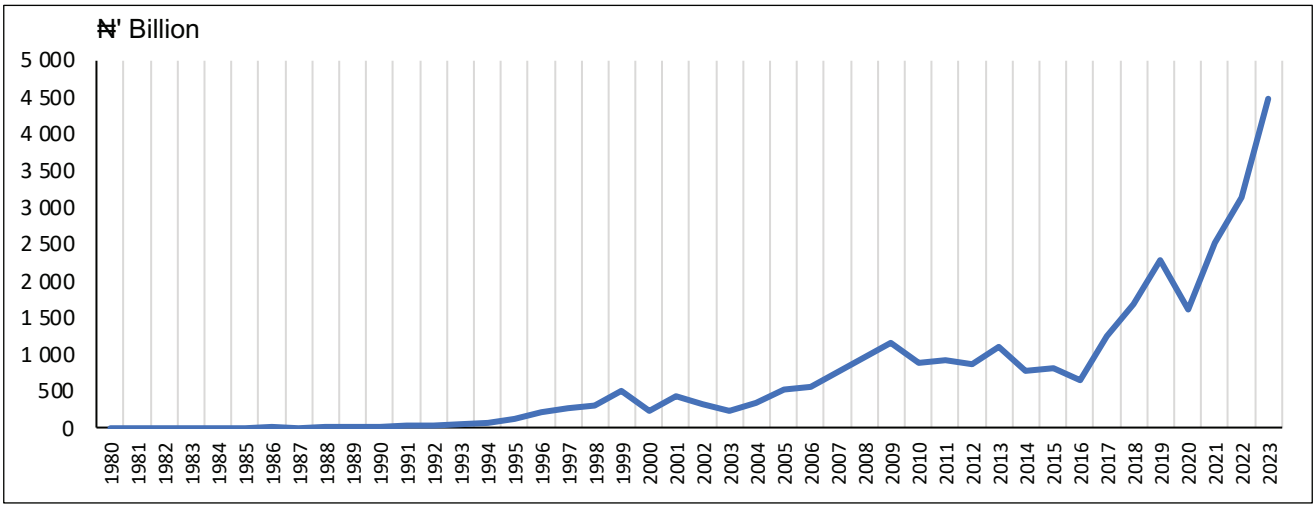


Figure 5: Total Federal Government Capital Expenditure (PCE)

Source: Author's Computation (2025), World Bank (2020, 2023a, 2023b)

From Figure 5, Total Federal Government Capital Expenditure (PCE), which represents direct government investment in infrastructure and other fixed assets, presents a compelling but complex narrative in Nigeria's development trajectory. In the early years of the study (1980–1990), PCE was remarkably low, starting at just ₦5.38 billion in 1980 and reaching only ₦24.05 billion by 1990.

This low level of capital expenditure limited the government's ability to stimulate foundational infrastructure in the transportation, energy, and health sectors, which are critical for breaking out of underdevelopment traps, as posited by the Big Push Theory. During this period, budgetary constraints, debt crises, and the structural adjustment program significantly curtailed the government's developmental role.

The 1990s and early 2000s witnessed a gradual increase in PCE, particularly from 1999 onwards, where expenditure rose sharply from ₦498.03 billion in 1999 to ₦965.17 billion in 2005. This growth was primarily driven by the return to democratic rule, rising oil revenues, and the adoption of national development strategies to rebuild infrastructure and public services. These years signalled a potential shift toward the large-scale investment framework proposed by the Big Push Theory, in which coordinated and sustained government spending is used to overcome infrastructural bottlenecks and stimulate complementary private-sector investment.

From 2006 to 2015, PCE maintained an upward trend, reaching ₦818.35 billion in 2015. However, the increase was neither linear nor proportional to the country's needs, with noticeable fluctuations due to changes in oil prices, political cycles, and budget implementation challenges. A critical observation is that despite rising government expenditures, GFCF and other real economy indicators did not increase at the same rate. This discrepancy suggests inefficiencies in translating capital budgets into actual infrastructure assets—likely due to corruption, cost overruns, and poor procurement practices.

The most dramatic surge in PCE occurred between 2016 and 2023, with expenditure increasing from ₦653.61 billion in 2016 to a record high of ₦4,486.21 billion in 2023. This period corresponds with renewed government emphasis on capital budgeting, infrastructure revival, and economic diversification. While these efforts align with the Big Push approach in terms of scale, the critical issue lies in execution quality and sustainability. The lack of corresponding growth in GFCF and the continued volatility in foreign investment suggest that much of this spending may not have generated the complementary and synergistic effects required to trigger a self-sustaining growth trajectory. In essence, although Nigeria has made substantial fiscal commitments to capital expenditure, particularly in the past two decades, the outcomes have fallen short of expectations. The Big Push Theory emphasises that large-scale investments must be well-coordinated, mutually reinforcing, and underpinned by strong institutions.

In Nigeria's case, the disconnect between increased capital spending and infrastructural transformation highlights systemic weaknesses in budget discipline, project delivery, and institutional quality. Without addressing these structural challenges, even significant public investments may fail to achieve the threshold effects necessary for sustained economic transformation.

Table 2: Descriptive statistics

	Foreign direct investment net inflows (₦' Billion)	Gross Fixed Capital Formation (₦' Billion)	Institutional Quality (IQ)	Net official development assistance received (₦' Billion)	Total Federal Government Capital Expenditure (₦' Billion)
	FDI	GFCF	IQ	ODA	PCE
Mean	385.76	8 907.94	28.93	392.90	687.46
Median	124.19	8 405.86	28.53	42.22	336.31
Maximum	1 360.29	15 996.38	37.44	2 794.57	4 486.21
Minimum	-79.57	5 668.87	16.92	0.05	4.10
Std. Dev.	458.70	2 252.26	4.19	634.94	933.74
Skewness	0.76	1.30	-0.65	1.95	2.22
Kurtosis	2.11	5.15	4.26	6.52	8.36
Sum	1 6973.36	391 949.40	1 272.82	17 287.47	30 248.07
Observations	44	44	44	44	44

Source: World Bank, Author's Calculations (2025)

The descriptive statistics in Table 2 provide insights into the distribution, central tendency, and variability of key drivers of capital formation in Nigeria from 1980 to 2023. Foreign Direct Investment (FDI) exhibits a mean of ₦385.76 billion and a median of ₦124.19 billion, indicating a positively skewed distribution (skewness = 0.76) with a few exceptionally high values pulling the average upward.

The minimum FDI value of ₦79.57 billion suggests a net disinvestment in at least one year, reflecting periods of investor withdrawal. The standard deviation of ₦458.70 billion shows considerable variability in FDI inflows, underlining their volatility and sensitivity to Nigeria's political and economic climate.

Gross Fixed Capital Formation (GFCF) has the highest mean value among the variables at ₦8,907.94 billion, reflecting its central role in capital accumulation and economic growth. The standard deviation of ₦2,252.26 billion and a maximum of ₦15,996.38 billion suggest wide variations in annual investment in fixed assets, possibly driven by macroeconomic cycles, fiscal policy shifts, and external shocks such as oil price fluctuations. With a skewness of 1.30 and kurtosis above 5, GFCF is both right-skewed and leptokurtic, indicating occasional large values and a distribution with heavier tails than a normal distribution. Institutional Quality (IQ) has a mean of 28.93 and a relatively low standard deviation of 4.19, suggesting gradual change over the study period. The variable is slightly negatively skewed (skewness = -0.65), indicating that higher-quality institutions were less common, with most values clustered toward the higher end of the scale.

The kurtosis of 4.26 further implies a somewhat peaked distribution. This stability (or stagnation) in institutional quality may have limited Nigeria's capacity to effectively mobilise and manage large-scale investments—a key requirement under the Big Push framework.

Official Development Assistance (ODA) shows a mean of ₦392.90 billion, but the extremely high skewness (1.95) and kurtosis (6.52) point to significant outliers. While the median is only ₦42.22 billion, the maximum of ₦2,794.57 billion reflects a few exceptional years of large aid inflows. This indicates that although Nigeria has occasionally received substantial ODA, it is not a consistently reliable source of capital, and its impact on capital formation is likely to depend on external donor conditions and short-term global trends rather than on long-term national development strategies.

Total Federal Government Capital Expenditure (PCE) exhibits the highest skewness (2.22) and kurtosis (8.36), reflecting a highly non-normal distribution with a few years of extremely high spending. With a mean of ₦687.46 billion and a median of ₦336.31 billion, recent years of elevated capital budgets have significantly lifted the average. However, the substantial standard deviation (₦933.74 billion) again indicates inconsistent and irregular investment patterns. This inconsistency undermines the coordinated, large-scale public investment push envisioned by the Big Push Theory and points to governance and execution challenges in Nigeria's fiscal management.

Table 3: Correlation matrix

Correlation matrix	*FDI*	*GFCF*	*IQ*	*ODA*	*PCE*
Foreign direct investment net inflows	1.00				
Gross Fixed Capital Formation	0.18	1.00			
Institutional Quality	0.25	-0.04	1.00		
Net official development assistance received	0.51	0.34	-0.19	1.00	
Total Federal Government Capital Expenditure	0.59	0.32	-0.05	0.89	1.00

Source: Author's Computation (2025)

The correlation matrix in Table 3 reveals the strength and direction of linear relationships between the key drivers of capital formation. Foreign Direct Investment (FDI) shows a moderate positive correlation with Gross Fixed Capital Formation (GFCF) (r = 0.18), suggesting that while FDI contributes to capital formation, the relationship is relatively weak. This could reflect Nigeria's difficulty in converting foreign capital into long-term productive assets due to infrastructure deficits or institutional bottlenecks.

FDI also shows a positive relationship with Institutional Quality (r = 0.25), indicating that better institutions may slightly enhance investor confidence.

Institutional Quality (IQ), however, exhibits a very weak negative correlation with GFCF (r = -0.04) and a negative correlation with both ODA (r = -0.19) and PCE (r = -0.05).

These results are concerning, as they suggest that improvements in institutional quality have not necessarily aligned with increased public or donor investment. This mismatch implies potential governance issues—where inflows of capital or aid are not effectively managed or allocated in line with institutional strength, thereby undermining the coordination principle of the Big Push Theory. Official Development Assistance (ODA) shows a strong positive correlation with PCE (r = 0.89) and a moderate positive correlation with GFCF (r = 0.34). This indicates that donor funding has historically supported public capital expenditure and, to some extent, capital formation. However, the high correlation with PCE suggests that ODA may be substituting rather than complementing domestic investment efforts. For the Big Push to be effective, external aid should work in tandem with government spending to achieve critical mass in infrastructure investment.

Total Federal Government Capital Expenditure (PCE) shows the strongest correlation with FDI (r = 0.59) and a moderate correlation with GFCF (r = 0.32). These relationships imply that increased public capital spending has some catalytic effects on attracting foreign investment and boosting capital formation, as predicted by the Big Push Theory. However, the moderate strength of these relationships also underscores that simply increasing public spending is insufficient; efficiency, coordination, and institutional capacity matter significantly.

In summary, while there are positive linkages between some key variables, the relatively weak correlations—especially between institutional quality and the core drivers—indicate that governance issues and poor policy coherence constrain Nigeria's path to a Big Push-style development. Strengthening institutions and improving public investment efficiency are crucial for capital inflows and public expenditure to translate effectively into sustainable infrastructural development.

Table 4: Fully Modified Ordinary Least Squares (FMOLS) regression

Dependent Variable: GFCF

Method: Fully Modified Least Squares (FMOLS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCF (-1)	0.69	0.03	24.94	0.00***
PCE	-0.26	0.13	-2.05	0.05**
FDI	0.14	0.14	0.97	0.34
ODA	1.11	0.18	6.07	0.00***
IQ	29.95	13.41	2.23	0.03**
Constant	1 452.08	459.40	3.16	0.00***
R-squared		0.73		
Adjusted R-squared		0.69		
S.E. of regression		936.42		
Long-run variance		105 961.20		
Mean dependent var		8 575.32		
S.D. dependent var		1 681.12		
Sum squared resid		31 567 880		

*** means statistically significant at the 5% level (p < 0.05); *** means statistically significant at the 1% level (p < 0.01), GFCF = Gross Fixed Capital Formation, PCE = Total Federal Government Capital Expenditure, FDI = Foreign Direct Investment Net Inflows, ODA = Net Official Development Assistance Received, IQ = Institutional Quality (Index).*

Source: Author's Computation (2025)

From the FMOLS estimation results in Table 4, it can be established that GFCF (-1) (the lag of Gross Fixed Capital Formation) has a positive and statistically significant impact on current GFCF at the 1% significance level (b = 0.69, p-value = 0.00). This indicates strong path dependency, in which past levels of capital formation significantly influence current investments. Specifically, a ₦1 billion increase in past GFCF leads to approximately a ₦0.69 billion increase in current GFCF. This result reinforces the cumulative nature of capital formation in line with the Big Push Theory—sustained investment is essential to build momentum for infrastructural development.

Public Capital Expenditure (PCE) shows a negative and statistically significant relationship with GFCF at the 5% level (b = -0.26, p = 0.05). Contrary to expectations, a ₦1 billion increase in public capital expenditure is associated with a ₦0.26 billion decrease in GFCF. This counterintuitive result may imply inefficiencies, misallocation, or corruption in public spending, in which capital budgets do not effectively translate into productive investments. For the Big Push to succeed, the quality—not just the quantity—of public expenditure must be improved.

Foreign Direct Investment (FDI) has a positive but statistically insignificant impact on GFCF (b = 0.14, p = 0.34). Although the coefficient suggests that a ₦1 billion increase in FDI could raise GFCF by ₦0.14 billion, the relationship is not statistically strong. This implies that FDI inflows have not consistently translated into long-term capital formation in Nigeria, possibly due to capital flight, repatriation of profits, or the concentration of investment in sectors with low fixed asset formation (such as oil and gas).

Official Development Assistance (ODA) has a positive and highly significant impact on GFCF at the 1% level (b = 1.11, p = 0.00). This means that a ₦1 billion increase in ODA inflows results in about a ₦1.11 billion increase in GFCF. The implication is that donor funding has been more effective than domestic public spending in boosting capital formation, possibly because of better project execution, stronger external oversight, or targeted infrastructure support. This underscores the relevance of external coordination and funding for Nigeria's infrastructural development under the Big Push framework.

Institutional Quality (IQ) also has a positive and statistically significant effect on GFCF at the 5% level (b = 29.95, p = 0.03). This result indicates that improvements in institutional quality—such as rule of law, regulatory quality, and governance—are associated with higher capital formation. A one-unit improvement in the institutional quality index corresponds to an increase of approximately ₦29.95 billion in GFCF. This reinforces the importance of institutions in coordinating and sustaining the large-scale investment needed for a Big Push.

Overall, the model is robust, with an R-squared of 0.73, meaning that the independent variables explain 73% of the variation in GFCF. The results highlight the importance of historical investment momentum, institutional quality, and foreign aid, while also pointing to inefficiencies in public spending and weak integration with FDI. These findings suggest that for Nigeria to pursue a Big Push development strategy effectively, attention must be given not only to mobilising funds but also to institutional reform and investment quality.

Standard Error of the Regression (S.E. = 936.42): This indicates the average distance that the observed values fall from the regression line. A standard error of ₦936.42 billion suggests moderate variability around the predicted values of Gross Fixed Capital Formation (GFCF). While not excessively large relative to the mean GFCF (₦8575.32 billion), this still suggests that some external shocks or unaccounted factors may be influencing capital formation. In Big Push theory terms, it implies that while the model explains a substantial portion of the variation, coordination failures or infrastructure gaps may introduce noise into the investment process.

Long-run Variance (105,961.20): This statistic reflects the variance of the residuals over the long term. A relatively high long-run variance implies that, despite the long-run cointegrating relationships captured by the FMOLS, the data still exhibits substantial volatility. This can be attributed to economic instability, policy reversals, or inconsistent investment flows, which are critical barriers in sustaining a Big Push-type strategy that relies on steady, large-scale investments.

Robustness Tests

Table 5: Multicollinearity: VIF

Variance Inflation Factors			
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
GFCF (-1)	0.00	24.24	1.17
PCE	0.02	8.98	5.63
FDI	0.02	3.07	1.72
ODA	0.03	7.56	5.33
IQ	179.84	61.02	1.28

Source: Author's Computation (2025)

The multicollinearity test using Variance Inflation Factors (VIF) in Table 5 indicates that there is no serious multicollinearity issue among the independent variables in the FMOLS regression model. The centred VIF values for all variables are below the threshold of 10, indicating that the explanatory variables contribute distinct information to the model without excessive overlap. This supports the reliability of the coefficient estimates.

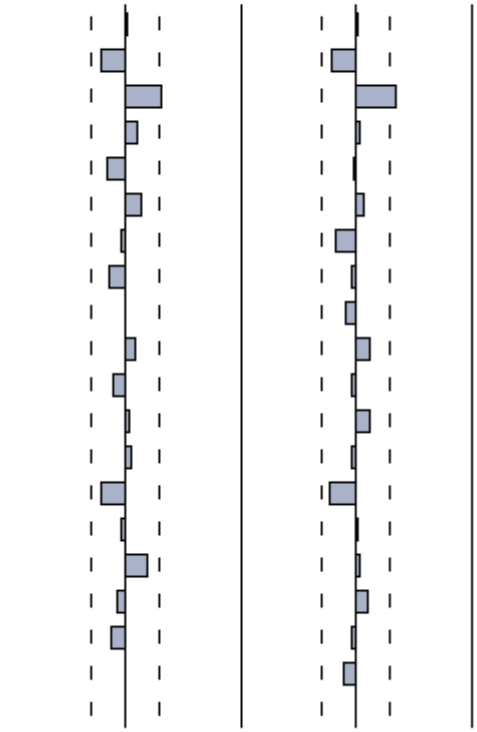
Specifically, the lagged Gross Fixed Capital Formation (GFCF (-1)) shows a very low centred VIF of 1.17, confirming it is an independent and important predictor in the model. Public Capital Expenditure (PCE) and Net Official Development Assistance (ODA) have moderately higher centred VIFs, around 5.3-5.6, suggesting some correlation but at acceptable levels that do not undermine the model's integrity. Foreign Direct Investment (FDI) and Institutional Quality (IQ) have low-centred VIFs, indicating minimal multicollinearity with other variables.

While uncentered VIF values for some variables appear high, these are less reliable in the presence of a constant term, so the centred VIFs provide a more accurate assessment. Overall, the absence of significant multicollinearity means the FMOLS model estimates are robust, and the individual effects of the variables on capital formation can be interpreted with confidence.

In the context of the Big Push Theory and Nigeria's infrastructural development, this result strengthens the validity of the key findings. It ensures that the positive roles of institutional quality, official development assistance, and other drivers of capital formation are not distorted by overlapping explanatory power, thereby highlighting their unique and significant contributions to Nigeria's investment landscape.

Autocorrelation

Q-statistic probabilities adjusted for 1 dynamic regressor



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.022	0.022	0.0226	0.881
		2	-0.213	-0.214	2.1242	0.346
		3	0.336	0.363	7.4716	0.058
		4	0.114	0.028	8.1021	0.088
		5	-0.159	-0.024	9.3576	0.096
		6	0.133	0.073	10.272	0.114
		7	-0.035	-0.173	10.338	0.170
		8	-0.155	-0.044	11.649	0.168
		9	-0.002	-0.097	11.649	0.234
		10	0.097	0.126	12.192	0.272
		11	-0.106	-0.044	12.859	0.303
		12	0.026	0.117	12.902	0.376
		13	0.058	-0.032	13.118	0.439
		14	-0.228	-0.244	16.534	0.282
		15	-0.027	0.013	16.583	0.344
		16	0.194	0.038	19.248	0.256
		17	-0.075	0.109	19.663	0.292
		18	-0.121	-0.033	20.784	0.290
		19	0.006	-0.113	20.787	0.349
		20	0.005	-0.005	20.789	0.410

Figure 5: Autocorrelation (ACF) and Partial Autocorrelation (PACF) diagram

Source: Author's Computation (2025)

The autocorrelation Q-statistics in Figure 5 assess whether residuals from your FMOLS regression are serially correlated up to 20 lags. Serial correlation violates classical regression assumptions and can bias standard errors, affecting inference reliability. Across all lags from 1 to 20, the Q-statistic p-values are well above the commonly used significance levels (0.01, 0.05, 0.10). The lowest p-value observed is around 0.058 at lag 3, which is still marginally above the 5% significance threshold.

The autocorrelation test results indicate no significant presence of serial correlation in the residuals of the FMOLS regression model, as all Q-statistic p-values exceed the 5% significance threshold across 20 lags. This means the null hypothesis of no autocorrelation cannot be rejected, confirming that the model's error terms are independent over time. This absence of autocorrelation ensures that the model meets an important assumption for valid regression analysis, implying that the estimated coefficients and their standard errors are unbiased and reliable.

Consequently, the dynamic relationships between Gross Fixed Capital Formation and its key drivers—such as Institutional Quality, Official Development Assistance, and Public Capital Expenditure—are accurately captured. In relation to the study on Nigeria's infrastructural development and the Big Push Theory, these results enhance confidence in the robustness of the model and support the validity of the inferences drawn. The findings can therefore be used to inform policy and investment strategies with assurance that time-related dependencies in the data do not distort them.

CONCLUSION AND POLICY RECOMMENDATIONS

Recap of key findings

The study's findings have provided valuable insights into the drivers of capital formation in Nigeria. The findings revealed important trends in the variables driving capital growth in Nigeria. Irregular fluctuations in FDI highlight the challenges posed by Nigeria's volatile political and economic climate. GFCF is the most variable, with a high mean of ₦8,907.94 billion and a right-skewed, leptokurtic distribution, suggesting significant economic changes and policy decisions. IQ showed little change, and its connection to other capital drivers is weak, suggesting that governance issues are an obstacle to attracting capital. Despite ODA's volatility, it showed a strong relationship with PCE and a moderate one with GFCF, suggesting donor funds may often replace funds from the country itself. PCE shows that public spending is inefficient because it is highly inconsistent and only moderately correlated with GFCF.

These patterns are also evident in the FMOLS regression results. The findings show that GFCF (-1) plays an important role in making capital growth over time. Unexpectedly, PCE leads to lower development, showing that public investment is not being executed properly.

FDI still has a significant impact, although the statistical results failed to demonstrate a meaningful role in increasing capital over time. Better targeting of ODA seems to have made it a significant force in driving up GFCF. The findings also showed that good IQ levels help improve GFCF, emphasising the importance of strong governance.

A large standard error and high temporal variance indicates that the economy struggles with unexpected events and problems in organising effectively. Overall, although improved by investments in infrastructure, donations, and institutional progress, Nigeria's Big Push plan is hampered by weak and ineffective spending decisions and poor policy coordination, so more reform and better planning are necessary.

Policy Suggestions

A variety of policies should be used to support capital growth and economic growth in Nigeria. First, increasing spending on PCE and improving its coordination is necessary. Current public investment is not working well, so improving project selection, execution, and accountability can yield better results. Establishing effective teamwork among ministries and agencies reduces duplication and waste, thereby supporting the country's broader development. In addition, the country should strive to receive more useful FDI. FDI policies should aim to support local workers' skills, help develop technologies, connect local industries, and ensure FDI is of high quality. Also, stronger monitoring frameworks can reveal the true impact of FDI on building long-term capital and on growing the economy, enabling policy changes when required.

Furthermore, ODA funds should focus on infrastructure sectors that deliver rapid, significant results, for example, transport, energy, and telecommunications. Proper use of donor funds can supplement domestic investments and encourage private-sector investment. Officials should work closely with development groups to ensure that aid supports projects that lead to broader economic growth and ongoing benefits. Lastly, improving the rules and organisations that direct development is significant. The study points out that strong institutions make it easier for companies to raise capital. Therefore, measures taken to expose information, control corruption and improve regulatory work will encourage investment. Efforts should also be made to reinforce the system of laws, enhance how money is handled in the public sector and increase the ability of institutions to lead on large building projects.

Limitations of the Study

Certain limits of the study must be recognised. Firstly, the annual aggregate data may mask differences in capital formation across industries and regions. In addition, it is not always possible to fully measure variables like institutional quality, and they may not capture all the factors that make a government effective. Also, because the research covers the period up to 2023, it does not include recent changes or major disruptions. Moreover, because of possible endogeneity, it is not definite that one variable causes the other.

Directions for Future Research

Future studies should use disaggregated data to examine capital formation processes across industries and regions. Also, adding qualitative reviews to institutional reforms can improve knowledge about how governance improves.

Furthermore, applying suitable methodologies, such as panel data or structural models, can make it easier to determine the impact and connections among FDI, ODA, and investment. Lastly, studying the role of modern progress, such as digital networks and financing climate projects, will provide valuable insights for creating contemporary policies.

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STRENGTHENING INSTITUTIONAL CAPACITY BUILDING FOR A SUSTAINABLE IMPLEMENTATION OF PUBLIC INFRASTRUCTURE GOVERNANCE – A SOUTH AFRICA CASE STUDY

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Abstract

Infrastructure governance in South Africa focuses on the interaction between internal governance systems and collaborative governance mechanisms. The study adopts a qualitative, secondary-data-based research approach to analyse how internal governance systems, including leadership, performance oversight, risk management, ethical accountability, and knowledge management, interact with collaborative governance arrangements to influence infrastructure governance outcomes. This paper examines institutional capacity building as a foundational determinant of sustainable public infrastructure. It draws on thematic analysis of academic literature, policy documents, institutional and audit reports, and international case studies, synthesising fragmented evidence into an integrated analytical framework. The findings indicate that institutional capacity constraints in South Africa are not primarily the result of policy gaps, but rather of weak implementation driven by fragmented governance arrangements, politicised decision-making, limited professional and technical capacity, and poorly integrated data and monitoring systems. While collaborative governance offers opportunities for improved coordination and legitimacy, its effectiveness is constrained where internal governance systems lack accountability, professional capacity, and institutional resilience. The paper highlights the need to shift from compliance-driven governance towards adaptive, data-driven, and professionally managed infrastructure systems, supported by integrated monitoring, clear accountability, and protected technical capacity. The conceptual framework provides a structured basis for future empirical testing and policy reform to strengthen sustainable infrastructure governance in South Africa. Such reforms are critical to ensuring resilience, efficiency, and long-term sustainability in the country's infrastructure sector.

Keywords: Institutional capacity building, Collaborative governance, Internal governance, Infrastructure governance.

INTRODUCTION

South Africa's persistent infrastructure failures reflect a deeper institutional and governance challenge rather than isolated technical or financial constraints (Wall, 2024). Despite progressive policy frameworks, infrastructure delivery continues to be undermined by fragmented governance, weak institutional capacity, politicised decision-making and inadequate monitoring and maintenance systems (Doe & Smith, 2024). Existing literature recognises the importance of institutional capacity and collaborative governance in addressing complex public-sector challenges. However, these strands are often treated separately, with limited integration between internal governance systems and collaborative governance arrangements (Emerson et al., 2012). As a result, insufficient attention has been paid to how institutional capacity-building shapes the effectiveness of collaborative governance in infrastructure delivery (SAICE, 2025). This paper aims to develop an integrated governance framework to support the implementation of sustainable and equitable public infrastructure in South Africa.

The objectives are to:

- Analyse institutional capacity constraints affecting infrastructure governance
- Examine the role of internal governance systems and collaborative governance mechanisms
- Propose a conceptual framework linking internal governance capacity to sustainable infrastructure outcomes.

Despite extensive research on infrastructure governance and institutional capacity in South Africa, persistent infrastructure failures indicate unresolved theoretical and operational gaps (Wall, 2024). Existing studies consistently identify weak institutional capacity, fragmented governance arrangements, limited intergovernmental coordination and inadequate monitoring and evaluation systems as key constraints to effective infrastructure delivery (Maumela et al., 2025). However, much of the literature addresses these challenges in isolation, rather than analysing them as interconnected, mutually reinforcing governance failures (Lieberman, 2011).

A central gap lies in the absence of integrated analytical frameworks that systematically link internal governance systems such as leadership, accountability, performance oversight, financial, risk and performance and knowledge management with collaborative governance arrangements involving multiple stakeholders (Maumela et al., 2025). While collaborative governance is frequently promoted as a response to complex public-sector challenges, limited attention has been paid to the extent to which its effectiveness depends on the strength of internal institutional capacity (Foli, 2025).

Another significant gap concerns the operationalisation of intergovernmental coordination and data integration. Although the literature recognises siloed planning, fragmented mandates, and poor data sharing as drivers of infrastructure failure, there is limited guidance on how to institutionalise coordination mechanisms and integrated information systems across government spheres (Manda, 2020).

The literature further reveals a weak empirical and conceptual treatment of political economy dynamics, particularly political interference, patronage networks, and short-term incentives that undermine professional decision-making, maintenance planning, and accountability (Mabizela, 2024). While these dynamics are often acknowledged, they are rarely incorporated systematically into institutional capacity-building and governance frameworks (SAICE, 2025).

Lastly, there is limited evidence of synthesis on how institutional capacity-building interventions improve infrastructure lifecycle management and service delivery outcomes across diverse municipal contexts (DeCorby-Watson et al., 2018). Existing approaches tend to prioritise technical training and compliance requirements, with comparatively less emphasis on systematic governance reforms, adaptive learning and institutional resilience (Nzewi, 2025).

This paper addresses these gaps by developing an integrated conceptual framework that connects internal governance capacity, collaborative governance mechanisms and political-institutional context. In doing so, it provides a structured analytical basis for understanding persistent infrastructure governance failures and for guiding future empirical research and policy reform in South Africa.

The paper is structured to review the literature on institutional capacity building, infrastructure governance, and collaborative governance. It is followed by an outline of the research methodology and presentation of key analytical findings derived from secondary data. It then develops an integrated conceptual framework and concludes with policy implications and directions for future research.

INSTITUTIONAL CAPACITY AND INFRASTRUCTURE GOVERNANCE: CONCEPTUAL AND THEORETICAL PERSPECTIVES

This section reviews the conceptual narrative literature, supported by a thematic synthesis, examining the relationships among institutional capacity building, infrastructure governance, and collaborative governance. The purpose was to synthesise fragmented theoretical, policy and empirical insights to inform the development of an integrated governance framework. Priority was given to peer-reviewed literature, South African policy documents, institutional reports, and international governance studies. Sources that focused solely on technical engineering analysis, without governance analysis, were excluded.

The analysis for the review was thematic, identifying recurring governance and capacity determinants that informed the development of the conceptual framework.

Institutional Capacity Building in the Public Sector

Institutional capacity building has evolved from a narrow emphasis on technical skills development towards a systematic understanding that prioritises organisational systems, governance structures and institutional resilience (Emam et al., 2025). Early capacity-building approaches assumed that training and skills transfer would improve public-sector performance. Subsequent research, however, demonstrates that technical capacity alone produces limited and unsustainable outcomes in the absence of effective leadership, accountability mechanisms, coordinated structures, and adaptive learning systems (Matlala, 2025). Contemporary scholars conceptualise institutional capacity as a multidimensional construct shaped by organisational design, decision-making processes and broader political-institutional conditions (Woodhill, 2010).

In the South African public sector, institutional capacity building is closely linked to efforts to address infrastructure backlogs, service delivery failures and historical inequalities (Wall, 2024). Despite comprehensive policy and legislative reforms, capacity constraints persist due to fragmented mandates, weak professionalisation, unstable leadership, limited intergovernmental coordination and poor integration of data and monitoring systems (Boyce & Mbanga, 2025). These constraints highlight the limitations of skills-based interventions and underscore the need for integrated institutional reforms that strengthen internal governance systems, enable coordination across government spheres and support adaptive, performance-oriented infrastructure governance (Lukat et al., 2022).

Infrastructure Governance

Understanding Infrastructure Governance as a Public Good Entity:

Infrastructure development as a public good is intrinsically linked to equity, efficiency, and sustainability (OECD, 2017; OECD, 2021). Infrastructure serves as a public good by providing non-excludable, non-rival services such as transportation, water, sanitation, energy, and digital connectivity. These services are fundamental to economic participation, social inclusion, and overall societal well-being. Consequently, infrastructure governance is pivotal in shaping equitable development outcomes.

Recent empirical research indicates that the distribution of infrastructure assets significantly influences social equity (Wu & Liu, 2022). Marginalised and historically disadvantaged communities continue to face infrastructural deficits, perpetuating spatial and socio-economic inequalities (Tsile, 2025). Moreover, studies reveal that prioritising equity in infrastructure investment does not compromise efficiency; rather, a well-designed equity-focused allocation can reduce disparities in service quality with minimal impact on average system performance. Additionally, frameworks that incorporate equity into planning ensure that disadvantaged communities receive fair access, bridging historical gaps and fostering inclusive development (Fobosi & Malima, 2025).

Efficiency in infrastructure governance aims to maximise social returns on investment through integrated planning, lifecycle management, and performance measurement. Sustainability further demands that infrastructure systems serve both present and future generations while minimising harm to the environment, society, and the economy. Governance frameworks that integrate equity and Sustainability into planning and decision-making processes are thus essential for long-term infrastructure resilience (OECD, 2023).

Defining Infrastructure Governance from a planning, coordination, accountability, and maintenance perspective:

Infrastructure governance (IG) from the perspectives of planning, coordination, accountability, and maintenance is guided by frameworks, processes, and systems that shape how infrastructure is conceived, developed, operated, and sustained within the public sector (OECD, 2020; OECD 2025). It is regarded as the integrated management of planning, coordination, accountability and maintenance that ensures sustainable, reliable and equitable infrastructure services.

Planning in IG uses systematic strategies to identify needs, set priorities, allocate resources, and integrate infrastructure with broader development goals (OECD, 2025). It addresses both new investments and ongoing lifecycle needs. It prevents fragmentation and aligns the project with local conditions and long-term objectives.

Strong coordination processes in IG involve aligning actions among diverse stakeholders to ensure coherence in decision-making, data sharing, and responsibility allocation, thereby avoiding duplication of effort, policy overlaps, and service delivery failures. IG mandates transparency at every phase, from procurement through to operations and outcomes. Its emphasis is on monitoring, evaluation and the enforcement of regulatory standards (OECD, 2020). Maintenance is prioritised under IG because asset longevity depends on ongoing care. It prioritises routine maintenance alongside new investments, with clear operational responsibilities, capacity-building and adequate budgeting. Neglect in these areas leads to service delivery interruptions and long-term cost increases (Mangai et al., 2025).

Infrastructure Governance and Its Link to Institutional Fragmentation and Political Interference:

Infrastructure governance encompasses the systems, processes, and institutional arrangements that steer infrastructure planning, coordination, accountability, and maintenance throughout the project lifecycle (OECD, 2023). Effective governance in this area requires aligning strategic planning, resource allocation, implementation, and long-term management, supported by clear accountability mechanisms and reliable performance monitoring. The literature consistently highlights institutional fragmentation as a key factor contributing to infrastructure failures in South Africa (Wall, 2024). This fragmentation arises when government departments and agencies operate within isolated departmental structures, with unclear role delineation and weak intergovernmental coordination, thereby undermining coherent planning and maintenance across national, provincial, and municipal levels (OECD, 2025). These structural weaknesses are further exacerbated by inconsistent monitoring and evaluation systems and poor data integration, which hinder institutions' ability to track performance, manage risks, and support adaptive decision-making.

Political interference compounds governance fragmentation, as patronage-based appointments, short-term political incentives, and the prioritisation of new capital projects over maintenance disrupt professional decision-making and weaken accountability. Consequently, infrastructure governance failures reflect not only technical shortcomings but also deeper institutional and political economy constraints (Mangai et al., 2025).

COLLABORATIVE GOVERNANCE AS A GOVERNANCE RESPONSE

Collaborative governance has emerged as a significant response to complex public-sector challenges that exceed the capacity of individual institutions. It emphasises inclusive decision-making, stakeholder participation, and shared responsibility across government, the private sector, and civil society. The literature suggests that collaborative governance can enhance legitimacy, coordination, and problem-solving capacity by mobilising diverse resources and knowledge (Ansell & Gash, 2008).

However, its effectiveness depends heavily on institutional design, leadership, power balance, and the capacity of participating institutions when internal governance systems are weak; collaborative arrangements risk becoming mere consultative exercises with limited impact on implementation. In the South African context, collaborative governance is often advocated to tackle infrastructure delivery challenges and concerns about community legitimacy. However, evidence suggests that collaboration cannot replace weak internal governance. Without strong leadership, accountability mechanisms, and professional capacity within public institutions, collaborative processes are unlikely to improve infrastructure outcomes (Musekiwa, 2024).

Core Principles of Collaborative Governance

The core principles of collaborative governance are rooted in accountability, redefining it in multi-actor contexts where government, nonprofit organisations, the private sector, and civil society jointly design, implement, and share responsibility for policy and service outcomes (Ansell & Gash, 2008). This accountability model establishes horizontal and vertical accountability relationships across networked actors, rather than relying solely on hierarchical state control. Its effectiveness requires the participation of diverse stakeholders who represent varied perspectives and ensure equitable representation in decision-making. Stakeholder participation in the decision-making process empowers them to shape outcomes, which can lead to stronger governance outcomes. This translates into adaptive management, where successful collaborations engage in continuous social learning, conflict resolution, and institutional adaptation. This reorientation results in the engagement of diverse interests, the maintenance of internal and external legitimacy, the fostering of shared learning, and the access to shared resources.

Overall, collaborative governance serves as a structural bridge, strengthening state capacity by making diverse expertise, resources, and problem-solving capabilities accessible, while building stakeholder legitimacy through inclusive participation, transparent decision-making, and shared ownership (Emerson, Nabatchi & Balogh, 2012; Emerson & Nabatchi, 2015). This dual legitimacy enhances both governmental effectiveness and public trust, addressing governance failures rooted in institutional fragmentation and democratic deficits (Ansell & Gash, 2008).

Integrating Internal Institutional Governance and Collaborative Governance

While institutional capacity building and collaborative governance are well-established in the literature, they are often treated as separate analytical domains. Limited attention has been given to how internal governance systems interact with collaborative arrangements within specific political and institutional contexts (Emerson et al., 2012). Emerging governance literature highlights the importance of integrating internal control systems, such as risk management, performance oversight, and knowledge management, with participatory and collaborative mechanisms. Such integration enables institutions to balance accountability and inclusiveness, align internal decision-making with external stakeholder engagement, and support adaptive governance processes (Ludovico et al., 2025). This study builds on these insights by synthesising literature on institutional capacity, infrastructure governance, and collaborative governance into an integrated analytical framework. The framework addresses identified gaps by explicitly linking internal governance capacity, collaborative mechanisms, and the political institutional context to sustainable infrastructure outcomes.

CHALLENGES IN INSTITUTIONAL CAPACITY BUILDING

Empirical and conceptual challenges that hinder capacity building in infrastructure governance include sparse, unreliable data from agencies that often lack systematic performance and financial records (OECD, 2017). This makes it hard to diagnose capacity gaps or track improvements. Another identified challenge is fragmented financing, in which multiple funding streams, such as central budgets, regional allocations, and donor aid, generate coordinated bottlenecks and inconsistent budgeting, limiting long-term planning. High staff turnover erodes institutional memory and technical expertise, weakening continuity in governance processes. Irregularities in procurement and opaque contracting undermine the effectiveness of oversight and divert resources from service delivery (Duja, 2025). Scholars differ on whether capacity refers to structural resources such as budgets and staff, functional abilities such as decision-making and learning, or both, resulting in inconsistent assessment frameworks. Decentralised government entities for planning, financing and operations prevent integrated decision-making and knowledge sharing across departments. Limited adaptive learning agencies lack formal feedback loops, experimentation mechanisms and platforms for disseminating lessons. This restricts the ability to technically evolve or adapt to social changes (Adom & Simatele, 2024).

Empirical gaps such as poor data, fragmented funding, staff churn, and corruption undermine institutions' practical ability to perform, while conceptual ambiguities, including unclear capacity definitions, siloed structures, political short-termism, and weak learning, hinder the design of effective capacity-building strategies. Together, they create a cycle in which weak measurement feeds into poorly coordinated reforms and unclear objectives, preventing the establishment of robust, evidence-based governance. By addressing both dimensions, that is, improving data systems, stabilising human resources, clarifying capacity metrics and fostering integrated learning-oriented institutions, offers a pathway to a stronger public infrastructure governance.

GLOBAL AND REGIONAL PERSPECTIVES ON CAPACITY BUILDING IN INFRASTRUCTURE GOVERNANCE

Comparative international experiences demonstrate that sustainable infrastructure governance depends less on the volume of investment and more on the strength of institutional capacity, governance coordination and accountability mechanisms. Countries that have achieved consistent infrastructure performance typically exhibit professionalised public administrations, clear role delineation, robust project appraisal systems and integrated monitoring and evaluation frameworks (OECD, 2017)

One cited example is Chile's national investment system (Sistema Nacional de Inversiones), which provides a structured framework for planning, evaluating, and prioritising public infrastructure investments (World Bank, 2017).

The system standardises project appraisal, separates evaluation from implementation functions and embeds accountability through clear institutional checks and balances. Evidence indicates that this approach has contributed to improved project selection, cost control and continuity in infrastructure delivery. According to the OECD (2017), the Chilean case also illustrates how institutionalised governance processes, rather than isolated technical reforms, strengthen long-term infrastructure outcomes.

Similar lessons emerge from other high-performing governance contexts, including Singapore, where sustained investment in institutional capacity, the professionalisation of the public service, and integrated planning systems underpin infrastructure performance (World Bank, 2017). These cases reinforce the importance of coherent governance architecture, merit-based administration, and long-term planning horizons over ad hoc or politically driven interventions.

Experiences from the Global South and African contexts further highlight the role of political economy conditions in shaping capacity-building outcomes. While policy frameworks often mirror international best practice, weak enforcement, patronage networks and limited administrative autonomy frequently undermine implementation. Comparative studies across African countries show that institutional capacity is closely linked to governance quality, accountability mechanisms and the insulation of technical functions from political interference (Hutchison & Johnson, 2011; Dzreke & Dzreke, 2025).

These international and regional experiences for South Africa underline that no single governance model can be transplanted wholesale. However, consistent lessons point to the need for integrated institutional reforms that strengthen internal governance systems, professionalise public administration, institutionalise coordination across government spheres and embed data-driven monitoring and evaluation. These insights inform the development of the conceptual framework proposed in this paper, which adapts international governance principles to Africa's specific political, institutional and historical context.

The literature widely agrees that the governance of sustainable infrastructure relies more on institutional capacity, governance integration, and the political–institutional context than on policy design or technical expertise alone (OECD, 2017; World Bank, 2017). Although institutional capacity building and collaborative governance are well-established, they are often treated as distinct, with limited attention to how internal governance systems influence the effectiveness of collaboration. Ongoing weaknesses in leadership, accountability, coordination, data integration, and adaptive learning, exacerbated by political economy dynamics, continue to undermine infrastructure outcomes. This body of work highlights the need for an integrated analytical framework that connects internal governance capacity, collaborative governance mechanisms, and contextual conditions to better explain governance failures and guide sustainable infrastructure reform (Musekiwa, 2024).

RESEARCH METHODOLOGY

The research approach

This study adopted a qualitative, interpretivist research approach to examine institutional capacity building and sustainable infrastructure governance in South Africa. An interpretivist paradigm is appropriate because governance, institutional capacity and collaboration are socially constructed phenomena shaped by context, power relations, organisational norms and policy environments (Bryman, 2016). Understanding these dynamics required interpretation rather than quantitative measurement. It is also exploratory and conceptual, aiming to synthesise existing knowledge and develop an integrated governance framework rather than test predefined hypotheses or generate new empirical data.

The research design

The research follows a secondary data-based qualitative research design, relying exclusively on documentary and literature analysis. The design is suitable given the extensive availability of high-quality secondary sources on public infrastructure governance, institutional capacity and governance reform in South Africa and comparable international contexts. The study is further positioned as a conceptual synthesis and analytical review that integrates fragmented theoretical policy and empirical insights into a coherent framework for sustainable infrastructure governance (Bowen, 2009; Yin, 2018).

Secondary data were drawn from a wide range of authoritative sources to ensure depth, credibility, and triangulation.

The sources included:

- Peer-reviewed academic literature on institutional capacity building, collaborative governance, infrastructure governance and public sector performance and accountability.
- South African policy and legislative documents on national development and infrastructure, governance, public finance, and monitoring and evaluation frameworks.
- The institutional and audit reports from the National Treasury, the Auditor-General of South Africa, and sector departments and oversight bodies. International and comparative case studies from multilateral organisations, development finance institutions and global governance and infrastructure research bodies.
- Grey literature that covered topics on policy briefs, governance diagnostics and infrastructure performance reviews.

Data analysis

Data were analysed using a qualitative thematic analysis supported by a framework aligned with the study's theoretical foundations. The analysis followed four stages based on Braun and Clark (2006). The relevant literature, policy documents, and institutional reports were reviewed to identify recurring themes in governance and institutional capacity. Second, the material was coded and categorised into analytical domains, including leadership and ethics, technical capacity, financial and risk management, knowledge management, intergovernmental coordination and collaborative governance mechanisms. Third, relations between these domains and infrastructure governance outcomes were examined. Finally, insights from the thematic analysis were synthesised to develop an integrated conceptual framework that links institutional capacity, collaborative governance, and political-institutional context to sustainable infrastructure outcomes. This combined approach enabled systematic interpretation of diverse sources while maintaining conceptual coherence. This approach also enabled a systematic interpretation of diverse sources while maintaining conceptual coherence.

The four-stage approach unfolded as follows (Braun & Clark, 2006):

- Familiarisation with both the literature and documents to identify recurring governance and capacity-related issues.
- Coding categorisation of data into core analytical domains that included:
    - Leadership and ethics
    - Human and technical capacity
    - Financial and risk management
    - Data systems and knowledge management
    - Intergovernmental coordination
    - Collaborative governance mechanisms

The coding framework was developed using a combination of deductive and inductive approaches. Initial analytical domains were derived deductively from the study's theoretical foundations, particularly from the literature on institutional capacity building, infrastructure, and collaborative governance. These theoretical constructs informed the preliminary coding categories, including leadership and ethics, technical and human capacity, financial and risk management, knowledge management, intergovernmental coordination and collaborative governance mechanisms.

As part of the review process, analysis of academic literature, policy documents, and institutional reports identified additional governance challenges and relationships inductively, allowing the coding framework to be refined and expanded. This hybrid approach enabled the analysis to remain theoretically grounded while capturing recurring empirical patterns within the literature.

- Pattern Identification examined the relationships between institutional capacity, governance arrangements, political economy factors and infrastructure outcomes.
- The conceptual synthesis integrated insights across domains to construct an integrated framework for sustainable infrastructure governance.

The adoption of this analytical strategy enabled the study to move from a descriptive review to explanatory and integrative insights.

Research Limitations

Limitations of the study, stemming from its exclusive reliance on secondary data, meant that some documentary sources focused more on formal governance arrangements than on everyday institutional practices, and politically sensitive dynamics were underreported in official documents. The study did not empirically test the proposed framework through primary data or case-based application. Despite this, the limitations were consistent with the study's conceptual scope, as the framework was intended as a foundation for future empirical research, including case studies and stakeholder-based investigations that can validate and refine its components.

Ethical considerations

As the study relied solely on publicly available secondary sources, it does not involve human participants and therefore does not require formal ethical clearance. All sources are appropriately cited, and interpretations are presented transparently to maintain academic integrity.

RESEARCH RESULTS

The thematic and framework analysis of the literature and documentary sources yielded five interconnected findings that explain the persistent failures in infrastructure governance in South Africa and inform the proposed Sustainable Infrastructure Governance Framework. Institutional capacity deficits are systemic; hence, infrastructure failures are not primarily due to policy gaps or resource scarcity but stem from broader institutional weaknesses.

These weaknesses extend beyond mere shortages of technical skills to encompass fragmented organisational systems, unstable leadership, weak accountability structures, limited financial and risk management capacity, and inadequate adaptive learning mechanisms. Capacity deficits inform governance domains and reinforce one another, illustrating that institutional capacity must be viewed as an integrated, multidimensional construct.

Governance fragmentation and political interference undermine delivery. This is confirmed by the analysis showing that fragmented mandates, siloed departmental structures, weak intergovernmental coordination, and inconsistent regulatory enforcement hinder coherent infrastructure planning and lifecycle management. These structural weaknesses are exacerbated by political interference, patronage-based appointments, and short-term incentives that prioritise new capital projects over maintenance. Consequently, infrastructure decline reflects failures in governance architecture rather than isolated administrative shortcomings.

Weak financial and performance management accelerate asset deterioration. Financial mismanagement, under-expenditure on maintenance, tariff dysfunction, procurement irregularities, and fragmented funding streams undermine sustainability and infrastructure performance. The lack of structured financial risk assessment within medium-term planning leads to reactive budgeting and weak lifecycle oversight. Similarly, limited performance monitoring constrains adaptive management and accountability. Therefore, embedding integrated financial risk and performance management systems is central to sustainable infrastructure stewardship.

Data fragmentation limits adaptive governance by creating disjointed data systems, insufficient cross-departmental information sharing, and constrained analytical capacity, hindering evidence-based decision-making.

Weak monitoring and evaluation systems obstruct early detection of infrastructure risks and restrict institutional learning. The findings highlight the importance of integrated digital systems and institutionalised feedback loops in improving transparency, coordination, and adaptive governance.

Collaborative governance is necessary but not sufficient, as mechanisms such as private-public partnerships and intergovernmental coordination forums can enhance legitimacy and resource mobilisation. However, analysis shows that collaboration cannot make up for weak internal governance systems. Without strong leadership, contract management skills, financial oversight, and independent accountability mechanisms, partnerships become unstable and shift risk back to the public sector. Therefore, collaborative governance acts as a supporting mechanism rather than a replacement for strong institutional capacity.

The analytical findings collectively demonstrate that infrastructure failures are interconnected and systemic. Leadership deficits, financial mismanagement, data fragmentation, weak oversight, and political interference reinforce one another. Sustainable infrastructure governance requires integrated reforms that strengthen internal institutional capacity, financial and performance management systems, intergovernmental coordination, data integration, and collaborative governance mechanisms. These findings provide the empirical and analytical basis for developing the Sustainable Infrastructure Governance Framework presented in this study.

THE DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

The findings from the thematic and framework analysis informed the conceptual framework development for this study. It links internal governance systems, collaborative governance arrangements and contextual political-institutional conditions to sustainable infrastructure outcomes. It provides an analytical framework for understanding how governance failures and capacity constraints interact, and how integrated reforms can support equitable, efficient, and resilient infrastructure delivery.

The framework was developed iteratively and draws on:

- Governance theory
- Institutional capacity literature
- Comparative international practices

Sustainable Infrastructure Governance Framework

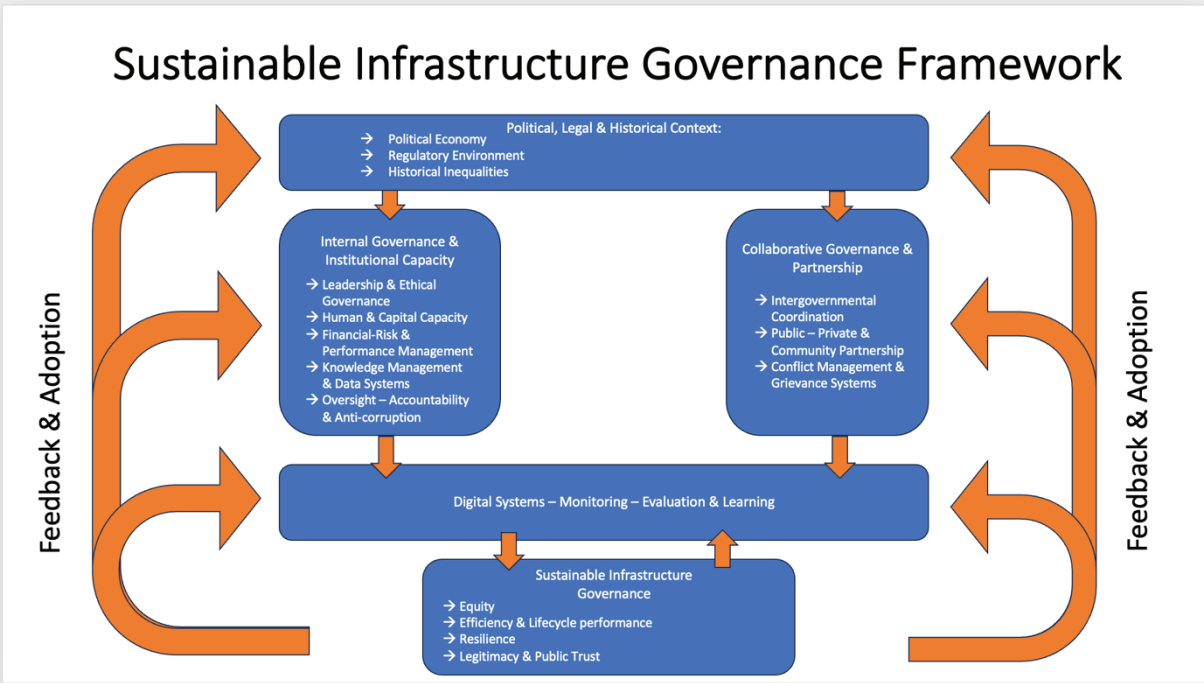

Figure 1: Sustainable Infrastructure Governance Framework

Source: Authors own (2026)

Institutional Capacity Domains in Infrastructure Governance – Internal Governance and Institutional Capacity

Leadership and Ethical Governance:

Institutional excellence is based on the integration of strategic vision, ethical foundations, and rigorous decision-making capacity, which together create complementary leadership competencies.

Dimensions such as strategic vision, ethical leadership, and decision-making capacity foster a resilient organisation, build stakeholder legitimacy, and sustain institutional performance that is critical within the public sector, where effectiveness depends on governance legitimacy and demonstrated ethical conduct and transparent decision-making aligned with the public interest. A strategic visionary leader is someone who has a clear vision for how to direct their organisation during turbulent times and navigate uncertainties, whilst maintaining the organisation's long-term objectives. They are considered effective based on how their communication organisation's vision compels and aligns with stakeholder interests, and how organisational resources are allocated and guided toward the organisation's priorities. Research demonstrates that both transformational and ethical leadership styles effectively enhance institutional performance, with evidence of increased employees' moral behaviour and the organisation's commitment.

There is consistency between what they communicate and their actions, enabling them to create a culture of trust and accountability that spreads throughout the organisation and improves its performance. They view ethics as a guiding value integrated into decisions, not as a trade-off. Good institutional performance requires leaders who are capable of developing adaptive decision-making frameworks that combine analytical rigour with inclusive deliberation. There are four identified ethical decision-making themes under ethical leadership: recognising moral issues, conducting Analysis, forming moral intentions, and taking ethical actions. It is the leader's responsibility to balance competing shareholder interests while maintaining institutional integrity.

Human Capital Capacity:

Research across South African municipalities shows a critical deficit in technical competency. Country municipalities lack the necessary in-house skills and capacity, resulting in contracted services spending often exceeding norms due to the absence of in-house technical expertise. There are five mutually reinforcing capacity deficits identified as key dimensions affecting infrastructure development in the country, namely:

- A technical expertise gap exists when municipalities lack in-house technical skills, forcing them to rely on expensive external consultants who lack accountability for long-term outcomes. This undermines the design quality and lifecycle oversight from inception.
- Financial management is deficient due to insufficient knowledge, resulting in weak financial capacity. This results in under-expenditure on maintenance, cost under-recovery, and tariff dysfunction, which accelerate the deterioration of infrastructure across all assets (Wall, 2024).
- Institutional coordination failures arise from siloed departments, fragmented governance, and political interference in personnel appointments, which override merit-based decision-making (Robert, 2022).
- Data gaps due to the absence of robust monitoring systems and data-sharing mechanisms. Municipalities are unable to track their performance, identify problems early or enable adaptive management. This information vacuum prevents accountability and learning (Marindi & Pillay, 2025; Mello, 2018).

These dimensions cascade into weak leadership, which creates silos and prevents coordination, thereby worsening financial mismanagement. The financial deficits eliminate maintenance budgets because there are no monitoring systems to track performance. A systemic solution is required to restore infrastructure, as demand calls for simultaneous intervention across all dimensions. There is a need to professionalise the workforce, strengthen financial systems, break institutional silos, implement lifecycle management frameworks, and establish integrated monitoring systems.

Financial – Risk and Performance Management:

Within the internal governance and institutional capacity block, financial risk and performance management ensure that infrastructure plans are fiscally sustainable, resilient to shocks, and translated into reliable service-delivery outcomes.

Financial risk management enables public institutions to identify and mitigate risks such as cost overruns, unfunded maintenance, procurement inefficiencies and fiscal exposure arising from poorly structured partnerships. Weak management is a core capacity deficit, as municipalities underspend on maintenance, misprice tariffs, and accumulate arrears, accelerating asset deterioration and service failures. Fragmented funding streams, siloed budgeting and poor lifecycle planning further undermine infrastructure performance. All these highlight weak financial controls, poor asset management and limited planning as systematic contributors to infrastructure deterioration and service delivery failures (Auditor-General South Africa, 2022). Without integrating financial risk assessment into medium-term planning and infrastructure prioritisation, governance remains reactive and politically driven, favouring new capital projects over asset preservation.

Financial risk management requires a structured cycle of identifying fiscal exposures, such as revenue volatility, cost overruns, corruption, debt, and contingent liabilities. It also requires continuous analysis of causes and likelihoods, prioritising risks, designing and implementing responses such as controls, insurance, contract and restructuring designs, and examining other critical success factors, including clear risk-governance structures, a culture of risk avoidance, adequate resources, skills, and integrated risk-information systems.

Within a sustainable infrastructure governance framework, financial risk and performance management operate to reinforce governance mechanisms. It safeguards sustainability, while performance management offers evidence for adaptive decision-making and accountability. Integrated through centralised management systems and shared data platforms, these mechanisms address fragmentation, enhance intergovernmental coordination, and decrease exposure to political interference (National Treasury, 2019).

Embedding financial risk and performance management within institutional capacity building shifts infrastructure governance from compliance-focused delivery to adaptive stewardship of public assets. This strengthens accountability, supports collaborative governance arrangements, and enhances the state's ability to deliver resilient and equitable infrastructure outcomes.

Knowledge Management and Data:

Data-driven governance is fundamental to institutional performance. Evidence indicates that integrated data information platforms facilitate evidence-based decision-making, transparent accountability, and adaptive management. However, Africa's public sector remains fragmented, hindering these countries' municipalities from facing three identified fragmented data architectures related to data challenges:

- System fragmentation: Due to departmental isolation, cross-sectoral information sharing and coordinated decision-making are non-existent. This results in weak monitoring and evaluation, as evidence is rarely translated into planning and budgeting actions. Additionally, there is an institutional capacity deficit stemming from limited analytical capacity and governance frameworks that prevent effective data utilisation, even when data systems are in place.
- System consequences: A fragmented data architecture perpetuates infrastructure failures. Weak monitoring systems fail to identify problems early, leading to infrastructure failure, and the absence of a performance baseline turns off adaptive management. Decentralised planning hinders collaboration and information flow, resulting in a lack of transparency that undermines accountability and public trust.

The failure of Africa's infrastructure stems from institutional fragmentation and a lack of cohesive coordination across national, provincial, and municipal levels. The absence of integrated monitoring and evaluation systems, coupled with unclear roles and siloed responsibilities, systematically hinders and undermines the integrated planning, delivery, and maintenance of the country's infrastructure. Each level operates within an isolated mandate rather than within coordinated frameworks. Local municipalities possess executive and legislative authority, which limits municipalities' ability to hold them accountable for failing to fulfil their constitutional obligations.

This is perplexing because the Municipal Structures Act of 1998 requires district municipalities to coordinate with and support their local counterparts (Local Government: Municipal Structures Act, 1998).

Additionally, regulatory confusion, characterised by policy overlap and inconsistent interpretation and enforcement of laws, undermines cohesion and slows service delivery. This results in a breakdown of coordinated planning, with departments working in silos, poor communication, absent data sharing, and departmental mandates prioritised over collaborative efforts toward integrated solutions. It also impedes effective monitoring of infrastructure performance, the adoption of adaptive management, and accountability across government departments. Compounding factors such as political interference through cadre deployment and political patronage override merit-based intergovernmental coordination, disrupting technical collaborations and institutional learning. Political interests take precedence over coordinated planning, particularly concerning maintenance versus new capital projects.

Successful integration and coordination require legislative clarity, focusing on role delineation and accountability across all levels of government; institutionalised, coordinated mechanisms such as binding intergovernmental forums and data protocols; and strengthening internal governance to enable reliable cross-level partnerships and multi-stakeholder commitments to collaboration rather than hierarchical governance. Most importantly, the ambiguity identified as the cause of infrastructure fragmentation needs to be addressed through institutional reforms (clear mandates, coordinated forums) and a political commitment to collaborative governance that transcends departmental and hierarchical silos.

Oversight – Accountability and Anti-Corruption:

Effective oversight strengthens institutional capacity, as research shows that strong central oversight directly correlates with institutional performance through enhanced leadership, oversight, and guidance. When oversight bodies lack hierarchical authority or adequate resources, civil servants comply with institutional requirements only formally, reducing governance effectiveness.

South Africa has a comprehensive anti-corruption architecture, including constitutional protections, financial management acts, and anti-corruption legislation. Yet, there is still institutional resilience and collapse due to the consistent non-application of the laws, not from the absence of policy, revealing a governance gap. When anti-corruption laws are not properly applied and accountability is lacking, this leads to maladministration, creating a permissive environment for recidivism. Public institutions that lack accountability mechanisms are unable to detect, deter, and prevent misconduct. Legitimacy is eroded, enabling systematic malfeasance.

There is deliberate institutional dismantling when political interference operates systematically through cadre deployment, organisational restructuring, and staff purging to dismantle institutional capacity. An example of this is when South African Revenue Services (SARS) was captured by the elite, resulting in a loss of human capacity to detect and investigate crimes and the collapse of information technology systems that support the institution's function of SARS's destruction was a political act, not a resource-scarcity issue (Ismail & Richards, 2023).

Oversight deficit drives systematic failures by enabling corruption in procurement, financial management, and service delivery. This failure stems from three identified procurement problems: inadequate official capacity, non-compliance with legal requirements, and political interference that overrides competitive processes. Without an independent oversight authority, technical capacity alone cannot prevent corruption.

Institutional resilience requires integrated governance, demonstrated by a transparent oversight structure, reduced opportunities for corruption, independent bodies with hierarchical authority, consistent consequences to deter misconduct, performance monitoring, and institutional autonomy that protects technical capacity from political capture. Institutional resilience depends largely on governance architecture that enables ethical practices. Governance frameworks prove ineffective when oversight mechanisms lack authority, accountability systems lack enforcement, and political interference systematically dismantles capacity. Oversight, ethics, and accountability can function as integrated determinants of institutional capacity only when legal frameworks are implemented and applied appropriately.

Institutional Capacity Building and Collaborative Governance – Collaborative Governance and Partnerships

Institutional and Intergovernmental Coordination:

Africa's infrastructure failure is due to institutional fractures and fragmented coordination across national, provincial, and municipal levels. The absence of an integrated monitoring and evaluation system, along with unclear roles and siloed responsibilities, prevents and undermines the country's thematic, integrated planning, delivery, and maintenance of infrastructure, as each level operates under an isolated mandate rather than within coordinated frameworks. Local municipalities possess executive and legislative authority, which limits their ability to hold themselves accountable for failing to fulfil their constitutional obligations. This is ambiguous because the Municipal Structures Act, 1998, requires district municipalities to coordinate with and support their local municipalities.

There is also the issue of regulatory confusion, in which policy overlap and inconsistent interpretation and enforcement of law undermine cohesion and slow service delivery. This leads to a breakdown in coordinated planning, with departments working in silos, poor communication, no data sharing, and prioritising departmental mandates over collaboratively working towards integrated solutions. It also hinders effective monitoring of infrastructure performance, the adoption of adaptive management, and accountability across government departments. Compounding factors, such as political interference through cadre deployment and political patronage, override merit-based intergovernmental coordination, disrupting technical collaborations and institutional learning. Political interests supersede coordinated planning, particularly regarding maintenance versus new capital projects. A successful integration and coordination requires legislative clarity, with a focus on role delineation and accountability across all levels of government; institutionalised, coordinated mechanisms such as binding intergovernmental forums and data protocols; strengthened internal governance to enable reliable cross-level partnerships; and multi-stakeholder commitments to collaborate rather than hierarchical governance. Most importantly, the ambiguity identified as the cause of infrastructure fragmentation needs to be addressed through institutional reforms (clear mandates and coordinated forums) and a political commitment to collaborative governance that transcends departmental and hierarchical silos.

Public-Private-Community Partnerships and Institutional Capacity Building:

Public–Private–Community Partnerships (PPCPs) are crucial in collaborative governance and partnership for the sustainable development of public infrastructure in South Africa because they explicitly acknowledge communities as stakeholders in infrastructure planning, delivery, and oversight, aligning closely with the collaborative governance theory outlined in this study's framework (Kader & Fahri, 2025). In contexts marked by inequality, contested service delivery, and low institutional trust, these partnerships rely not only on financial or technical expertise but also on the state's institutional capacity to manage complex relationships. They serve as a means for institutional capacity building by integrating state authority, private technical and financial resources, and local knowledge into structured, rule-bound arrangements. Institutional capacity building is essential for effective PPCPs.

The literature indicates that partnerships often fail when public institutions lack the internal governance capacity to prepare projects, manage contracts, coordinate across government levels, and maintain accountability. Weak project preparation, unclear role allocation, and limited contract management capabilities expose infrastructure programs to fiscal risk, underperformance, and social contestation (National Treasury, 2019; Auditor-General South Africa, 2022). Consequently, partnerships become unstable or shift risk back onto the public sector. Under a sustainable infrastructure governance framework, PPCPs are supported by institutional capacities in four key areas.

- Strategic planning, financial management, and risk management are essential, with the National Treasury's Payment System requiring rigorous project appraisal, risk allocation, lifecycle costing, and performance-based contracts. These measures strengthen internal decision-making, financial discipline, and risk management within departments and municipalities, enabling institutions to assess affordability, manage fiscal commitments, and align infrastructure investments with long-term lifecycle costs.
- Intergovernmental coordination capacity is vital where national, provincial, and municipal mandates intersect, as fragmented authority remains a persistent cause of delivery failure.

This capacity allows PPPs to transfer significant technical, operational, and financial risk to private partners while compelling public entities to develop contract management, monitoring, and enforcement skills. It also facilitates long-term contracts that foster learning within treasury, line departments, and municipalities, as well as stakeholder management and dispute avoidance. Community partnership capacity is the third key area, involving structured, early stakeholder engagement; clear role definition; transparent communication; and formal mechanisms to resolve legal and regulatory disputes, thereby directly enhancing governance, accountability, and conflict management capabilities. Within this capacity, grievance mechanisms provide social legitimacy and reduce conflict-related disruptions.

- The fourth key area is data, monitoring, and accountability, where PPP guidance emphasises measurable outputs, monitoring indicators, and public reporting on socio-economic impacts and B-BBEE, institutionalising performance information and external scrutiny.

In South Africa, the immediate practices identified under PPCP initiatives include the Mega Water Infrastructure project, which includes the Olifants Management Model, and the planned Vaal-Gamagara upgrade, both of which receive co-funding from DWS and mining companies. This initiative ensures water distribution to 94 villages and involves commitments to joint governance and implementation through the Lebalo Water Users Association and the Water Partnership Office (DWS–DBSA–SALGA). In municipal services, MISA encourages PPPs and innovative financing to support unfunded municipal infrastructure, operations, and maintenance, explicitly linking these partnerships to SME development and job creation. KwaDukuza's waste-management PPP underscores the importance of robust oversight, performance monitoring, and community engagement as keys to success.

Empirical research on hybrid governance in South African PPPs indicates that public value relies less on formal PPP structures and more on frameworks that operationalise role clarity, inclusive participation, a balance of trust and accountability, and equitable outcomes. PPCPs are implemented as capacity-building governance systems and through digital monitoring, evaluation, and learning platforms, which integrate financial, performance, and social data across partners and institutions. These systems promote transparency, enable early risk detection, and facilitate adaptive decision-making. Without such institutionalised systems, partnerships depend on informal coordination and reactive problem-solving, which under Sustainability. In this context, PPCPs are not replacements for institutional capacity but rather tests of it. Where internal governance and institutional capacity are weak, partnerships exacerbate governance failures. Conversely, where capacity is strong, PPCPs serve as tools for collective problem-solving, resilience, and equitable infrastructure outcomes, reinforcing the aims of sustainable infrastructure governance in South Africa.

Conflict Management and Grievance Systems within Collaborative Governance and Partnerships:

Within collaborative governance & partnership, grievance systems function as relational governance tools rather than standalone complaint mechanisms. Instruments like Social Impact Assessment (SIA) and Social Impact Management Plans (SIMPs) are essential management tools that translate predictive assessments into defined responsibilities, resources, and procedures for mitigation, monitoring, reporting, and handling complaints and grievances throughout the project lifecycle. They facilitate intergovernmental coordination by delineating responsibility for social impacts across institutional boundaries and enhance public–private and community partnerships by offering predictable channels for dispute resolution and remedy. In doing so, they lower transaction costs, manage social risk, and ensure continuity in infrastructure delivery. However, SIAs are often perceived as mere permitting hurdles rather than ongoing governance tools, especially where public participation is weak, disadvantaged communities are underrepresented, and SIA specialists frequently conduct SIA components. This "associational mentality "leads to social issues and conflicts that later emerge as protests or litigation rather than being addressed through structured mechanisms. Effective grievance systems also serve as accountability mechanisms by offering transparent, accessible, and time-bound processes for lodging and resolving complaints. They bolster trust and legitimacy in governance arrangements, but when grievances are ignored or informally managed, collaborative governance becomes merely symbolic, reinforcing power imbalances and undermining partnership credibility.

In this framework, conflict management and grievance systems are directly connected to Digital Systems, Monitoring, Evaluation & Learning, which operationalise feedback loops. Integrating grievance data into digital monitoring platforms enables institutions to identify systemic issues, track recurring conflicts, and incorporate social intelligence into decision-making.

The approach also transforms conflict from a reputational threat into a governance tool that supports institutional learning and adaptive management. Building institutional capacity, therefore, necessitates clear legal mandates for grievance systems linked to infrastructure and EIA/EMPr/SIA processes. Institutionalising these mechanisms enables infrastructure governance to move beyond procedural consultation toward sustained, accountable, and adaptive engagement within complex political, legal, and historical contexts.

This is because officials are trained in conflict management and mediation; integrated data systems enable grievance trends to inform risk registers and performance indicators; and oversight by independent bodies enforces accountability and ethical standards. Such systems close the feedback loop in the Sustainable Infrastructure Governance Framework by converting complaints into learning, design changes, and improved trust in public infrastructure delivery. So a robust collaborative governance & partnership, along with conflict management and grievance systems, directly contributes to Sustainable Infrastructure Governance outcomes, particularly in terms of legitimacy and public trust, resilience, and equity. Institutionalising these mechanisms enables infrastructure governance to move beyond procedural consultation toward sustained, accountable, and adaptive engagement within complex political, legal, and historical contexts.

DISCUSSION

The findings in this study reinforce the central argument in the literature that sustainable infrastructure governance depends primarily on the institutional capacity and governance integration rather than on policy frameworks or financial resources alone. Consistent with institutional capacity theory, the analysis indicates that infrastructure failures in South Africa are largely driven by systematic governance weaknesses, including fragmented mandates, weak oversight systems, limited technical capacity and poorly integrated monitoring and information systems. These findings support scholarship that conceptualises institutional capacity as a multidimensional construct shaped by leadership, organisational systems, accountability mechanisms, and the broader political-institutional context, rather than by technical skills alone.

The study also confirms insights from the infrastructure governance literature that emphasise the importance of lifecycle planning, intergovernmental coordination, and accountability mechanisms in maintaining infrastructure sustainability. Evidence from the analysis shows that fragmented planning systems, siloed budgeting processes and weak maintenance prioritisation contribute significantly to infrastructure deterioration. These patterns reflect broader governance challenges identified in both South African and International studies, which highlight the role of institutional fragmentation and weak coordination in undermining infrastructure performance.

A key insight emerging from the study concerns the relationship between internal institutional capacity and collaborative governance. While collaborative governance is widely promoted as a mechanism for addressing complex public-sector challenges, the findings indicate that its effectiveness depends heavily on the strength of internal governance systems. This aligns with collaborative governance theory, which emphasises that effective collaboration requires capable institutions, strong leadership and clear accountability arrangements. In contexts where internal governance capacity is weak, collaborative mechanisms risk becoming symbolic processes that do not translate into improved governance outcomes.

The analysis further highlights the influence of political-institutional dynamics on infrastructure governance. Political interference, patronage-based appointment and short-term political incentives can undermine professional decision-making and weaken institutional accountability systems. These dynamics support political economy perspectives which argue that institutional performance is shaped not only by formal governance structures but also by underlying power relations and incentive systems.

Integrating these insights, the study advances a more comprehensive understanding of sustainable infrastructure governance. The findings demonstrate that institutional capacity building, collaborative governance and infrastructure governance should not be treated as separate policy domains but as interconnected components of a broader governance system. The conceptual framework proposed in this study reflects this integration by linking internal governance systems, collaborative governance mechanisms and political-institutional context to infrastructure outcomes. In doing so, the framework provides a structured analytical lens for understanding persistent infrastructure governance failures and offers a foundation for future empirical research and policy reform.

CONCLUSION

This study explored institutional capacity building as a key factor in sustainable infrastructure governance in South Africa by synthesising secondary literature, policy documents, and institutional reports. Analysis reveals that ongoing infrastructure failures are not mainly due to policy gaps or resource limitations but stem from systemic institutional weaknesses rooted in governance architecture, organisational design, and political–institutional dynamics. The findings show that institutional capacity deficits are multidimensional and mutually reinforcing. Weak leadership, fragmented mandates, politicised administration, inadequate financial and risk management, limited data integration, and poor performance oversight collectively hinder infrastructure planning, maintenance, and lifecycle sustainability. These structural constraints indicate that isolated technical or training interventions are insufficient for achieving lasting improvements.

The study also demonstrates that while collaborative governance is crucial for legitimacy and coordination, it cannot make up for weak internal governance systems. Partnerships and stakeholder mechanisms are effective only when institutional capacity, fiscal discipline, contract management capability, and oversight systems are already established. Thus, collaboration enhances rather than replaces strong internal governance. By integrating institutional capacity building, infrastructure governance, collaborative governance, and political economy dynamics, the proposed Sustainable Infrastructure Governance Framework provides a coherent explanation for infrastructure underperformance. It underscores the interdependence between internal governance systems, collaborative mechanisms, and contextual conditions, emphasising governance alignment as central to achieving equitable, efficient, and resilient infrastructure outcomes. Although the framework has not been empirically tested, it offers a structured foundation for future sector-specific and municipal research. More broadly, the study highlights that sustainable infrastructure reform requires integrated institutional strengthening, the professionalisation of technical functions, lifecycle-based financial management, and enhanced oversight to support adaptive and accountable governance.

RECOMMENDATIONS

The implications of this study go beyond national governance reform and are directly relevant to the strategic role of Development Finance Institutions (DFIs). DFIs play a crucial role in strengthening infrastructure systems by not only financing projects but also supporting institutional capacity, governance reform, and coordinated infrastructure planning. The findings suggest that sustainable infrastructure outcomes depend on aligning financial investment with robust governance systems, professionalised technical capacity, and integrated monitoring frameworks. In this context, DFIs can contribute by supporting institutional strengthening initiatives, promoting lifecycle-based infrastructure planning, facilitating public-private-community partnerships, and encouraging the adoption of integrated governance and data systems across infrastructure sectors. By aligning financing strategies with institutional capacity development and governance reform, DFIs can enhance the long-term sustainability, accountability, and development impact of infrastructure investment.

In line with the DFIs mission to enhance public-sector capability and infrastructure delivery, the following strategic actions are proposed:

- Strengthen institutional architecture and intergovernmental coordination by clarifying mandates across different government levels and institutionalise structured coordination platforms that connect planning, budgeting, implementation, and maintenance. Infrastructure governance should be managed as a lifecycle system rather than as project-based expenditure.
- Professionalise leadership and technical capacity by implementing competency-based appointments for senior infrastructure roles and shielding technical functions from political interference. Develop internal engineering, financial, and contract management capacity to reduce reliance on consultants and enhance project execution.
- Embed financial sustainability and lifecycle risk management. Incorporate lifecycle costing, maintenance prioritisation, and structured financial risk assessment into medium-term budgeting frameworks. Also, enhance performance oversight mechanisms to ensure fiscal discipline and asset preservation.

- Invest in integrated digital monitoring and performance systems by creating interoperable data platforms that link infrastructure planning, financial management, risk registers, and monitoring systems. This will support evidence-based decision-making and early risk detection, both crucial for adaptive governance.
- Align collaborative partnerships with institutional readiness because public–private–community partnerships should be preceded by governance and capacity assessments. Collaboration must reinforce internal accountability systems and fiscal oversight, rather than substitute for weak institutional capacity.
- Address political–institutional constraints. Sustainable reform requires safeguarding administrative autonomy, strengthening oversight mechanisms, and limiting short-term political prioritisation of capital expansion over maintenance.

Collectively, these recommendations support a shift toward integrated, fiscally resilient, and institutionally robust infrastructure governance systems that deliver equitable and sustainable development outcomes.

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ASSESSING THE EFFECTIVENESS OF INFRASTRUCTURE PUBLIC–PRIVATE PARTNERSHIPS USING A PPP EQUILIBRIUM FRAMEWORK

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ABSTRACT

The purpose of this study is to assess the effectiveness of public-private partnerships (PPPs) as infrastructure development strategies by using a novel PPP Equilibrium Framework, which evaluates PPPs based on their ability to generate outcomes that benefit the interests of society, the state, and private entities. The methodology followed a case study analysis using the PPP Equilibrium Framework. The case studies included the Gautrain Rapid Rail Link, Tanesco Power Purchasing Agreement, Dakar-Diamniadio Toll Road, and Maputo Port. The findings show that PPP effectiveness and long-term sustainability are strongest when projects maintain balanced outcomes that satisfy the interests of the state, private sector, and society, particularly across fiscal sustainability, service delivery performance, and socio-economic development objectives. The study faced limitations in sourcing data on PPP project outcomes, as most projects lack social and economic impact analyses, which reduced the number of usable case studies and constrained the analysis to only the available outcome-based data. Practical implications are provided for policymakers to use the framework as a guide for structuring PPP projects and as a tool for assessing their potential effectiveness. Importantly, the framework highlights the need for balanced governance arrangements, transparent accountability mechanisms, and robust monitoring systems to ensure that PPPs deliver sustainable value. This study therefore contributes to the broader discourse on infrastructure governance by offering a structured approach to evaluating PPPs and by emphasizing the importance of aligning project outcomes with long-term developmental priorities.

Keywords: Public-private partnerships, Equilibrium framework, Infrastructure development, Sustainability.

INTRODUCTION

A public-private partnership (PPP) is defined as a contract between a public sector institution and a private sector party, where the private party performs a function that is usually provided by the public sector and/or uses state property in terms of the PPP agreement (National Treasury, 2021). PPPs involve the private party delivering public goods and services for a fee paid for by the public sector, while most of the technical, financial, and operational risk is transferred to the private party. Key characteristics of a PPP include contracts that are typically 5 to 30 years in duration where the private sector is involved with design, construction, financing, and implementation. Payment to the private party occurs based on agreed outputs related to the provision of services and/or infrastructure (NBI, 2019). PPPs are not simply the outsourcing of functions, or a donation by a private party for a public good, or privatization of state assets and/or liabilities. They are a way to allow the public sector to spread payments for large projects over the project's lifetime by making annual or monthly payments to the private sector.

In the developed world, PPPs have been significant in the development and delivery of infrastructure. In the United Kingdom for instance, their private finance initiative which started in 1992 has facilitated the delivery of almost 800 projects ranging from car parks to tolled highways, power plants and schools which were valued at more than £56 billion (Garvin & Bosso, 2008). PPPs have become a key infrastructure delivery mechanism, particularly in developing economies where infrastructure financing gaps, fiscal constraints, and technical capacity limitations restrict traditional public procurement approaches. PPPs allow governments to crowd in private sector capital, technical expertise and operational efficiencies to support infrastructure development and service delivery. In South Africa, the PPP strategy for infrastructure delivery has faced several challenges over the years but has been relatively successful with 35 PPP projects having been completed from 1998 to 2022 with an overall value of R91.4 billion (National Treasury, 2022).

Despite the increasing adoption of PPPs globally and across Africa, PPP performance outcomes remain mixed across sectors and regions. Existing PPP evaluation approaches often focus on compliance with regulatory processes or financial value-for-money assessments, with limited focus on broader socio-economic and institutional performance outcomes. This study addresses this gap by applying an outcome-based PPP Equilibrium Framework that simultaneously assesses socio-economic outcomes of PPP infrastructure projects. Therefore, this study aims to assess the effectiveness of infrastructure PPPs using the PPP Equilibrium Framework through qualitative case study analysis. The study evaluates how balanced outcomes across the interests of the state, private sector and society influence overall PPP performance outcomes. The rest of this paper is divided into sections such as the literature review, methodology, analysis of the public-private partnership equilibrium framework, results of the case study, discussion of the results, conclusion, limitations and recommendations.

LITERATURE REVIEW

The National Treasury initiated a review of the PPP regulatory framework in 2019, which was completed in 2022, and made recommendations to the framework to improve its effectiveness and encourage private-sector participation. The review findings indicated that certain aspects of the PPP regulatory framework compare well with international benchmarks. Nonetheless, there are critical gaps and challenges that need to be addressed to improve the operational environment. The review recommended legislative changes to improve the selection, prioritization, planning, financing support mechanisms, procurement, implementation, and monitoring of PPPs. These changes will enhance application and practice to improve the reliability of results and raise confidence in the overall PPP framework (National Treasury, 2022). The recommendations can be found in Table 1.

Table 1: Recommendations of Public Private Partnership framework review

Finding	Recommendations on amendments to National Treasury Regulation 16
Policy	
• No overarching infrastructure policy framework that mainstreams PPPs as part of fiscally prudent planning processes	• Develop an integrated public investment management system and PPP policy • Define roles of key institutions
PPP legal and regulatory framework and guidelines	
• Multiple and time-consuming approvals • Lack of accountability for procuring institutions • Lack of clarity on the treatment of unsolicited proposals • Dwindling private-sector capacity and poor public engagement	• Exempt low-value projects (R1 billion and below) from procurement approvals • Set a clear time frame for approvals by regulator • Make it mandatory to continue PPP once feasibility study shows value for money, risk transfer and affordability • Provide guidance on treatment and incentives for unsolicited proposals • Clarify roles of different entities in managing fiscal commitments and contingent liabilities • Develop financing support mechanism to enhance bankability of PPP projects • Revise exemption clause to enable monitoring of exempt PPP projects • Adjust the BEE requirements for PPPs
Inadequate institutional arrangements	
• No centralised approach to identifying and screening PPPs • No capacitated PPP regulator and no defined guidelines to perform functions • Lack of capacity and skills in procuring institutions at provincial and national levels and PPP Unit • Dwindling private-sector capacity and poor public engagement	• Centralise the identification of PPP projects • Establish function to screen and prioritise all infrastructure proposals, including PPPs with a screening tool for public investments • Explore feasibility of provincial infrastructure funding agencies • Establish full-time capacitated PPP regulatory unit with operating guidelines • Develop guidelines, tools, and methodologies to monitor and report on fiscal commitments and contingent liabilities • Promote collaboration and coordination with private sector through PPP forums, policy, and public consultations as part of PPP project cycle

Shortcomings in the PPP project life cycle	
• Lengthy, rigid, and costly feasibility studies with some projects proving unfeasible after the process • Slow pace of implementation of PPP projects, in particular delays in the procurement process • Lack of sector focus and customized approach for key sectors • Poor contract management – prone to delays • Lack of preparedness at exit management stage	• Make pre-feasibility studies mandatory for high-value projects at inception • Review and calibrate requirements for value for money and public-sector comparator requirements based on project size, nature, and complexity • Require non-negotiable draft PPP agreement with request for proposals • Amend PPP manual to calibrate project preparation requirements according to size, sector, and complexity and define where a one-stage bidding process would be allowed • Engage transaction advisors throughout PPP project cycle

Source: National Treasury (2022)

While the National Treasury review primarily focuses on improving the legislative, regulatory, and institutional mechanisms to enhance the operational environment and private-sector participation in PPPs, it does not assess the actual socio-economic outcomes of PPP projects or whether these projects balance the interests of society, the state, and private entities. This study addresses this gap by introducing the PPP Equilibrium Framework, providing an outcome-based evaluation tool that measures the effectiveness of PPPs in achieving tangible benefits for all stakeholders, rather than only focusing on compliance with regulatory and procedural guidelines.

RESEARCH METHODOLOGY AND METHOD

Qualitative data were collected through case studies to utilise the Public-Private Partnership Equilibrium Framework in assessing the effectiveness of public-private partnerships as infrastructure development strategies. The framework uses an outcome-based indicator assessment approach across the three core pillars of the framework, namely the state, society and private sector. For each pillar, documented outcome indicators were analysed and the assessment was conducted using documented project outcome evidence available from institutional reports, economic impact studies, and sector performance assessments. This structured approach ensured consistency in the comparative analysis across the selected case studies and allowed for the identification of equilibrium or distortion across the stakeholder interests in the framework. Qualitative case study methodology is appropriate for PPP evaluation given the complexity of PPP structures, institutional arrangements and stakeholder relationships, and is preferred as an outcome-based approach; unlike the National Treasury review, which focuses on legislative, regulatory and institutional improvements and private-sector participation, this study addresses the gap in assessing actual socio-economic outcomes by introducing the PPP Equilibrium Framework to evaluate whether PPPs deliver balanced, tangible benefits to society, the state and private entities. While data availability was a necessary case selection criterion, cases were also selected to ensure sector diversity, geographic representation and PPP structural variation. Nonetheless, potential selection bias is acknowledged as a limitation of the study. The case studies included were the Gautrain Rapid Rail Link, the Tanesco Power Purchasing Agreement, the Dakar-Diamniadio Toll Road, and the Maputo Port. The assessment of each case study was based on their impact on society, the state, and the private sector.

Analysis of the public-private partnership equilibrium framework

Garvin and Bosso (2008) proposed a PPP Equilibrium framework that can be used to assess the effectiveness of PPPs and promote structured thinking about PPP arrangements (Figure 1). The PPP equilibrium framework is more focused on the outcomes of PPP projects and not the regulatory and legal framework of PPPs.

Garvin and Bosso (2008) stated that the objective of a PPP program is to develop and sustain the PPP market through establishing an equilibrium amongst the interests of the society, state, industry and market. The range of balance, which is a measure that assesses the effectiveness of PPPs through their ability to maintain the interests of the society, state, industry, and markets, can also be seen at the center of Figure 1.

The rationale behind the range of balance is that each PPP project should equally satisfy the interests of society, states, markets and industry. If one aspect (say the state) has its interests satisfied more than the other aspects (society, industry and markets) then the range will be out of balance (distorted) and skewed towards the state interest quadrant. In the PPP Equilibrium framework, the state is the elected body governing a jurisdiction. Society is the citizens employed and living within the jurisdiction. Industry is the business that provide services and goods to the state and society within the jurisdiction. The market is the financial system that allows investors to exchange wealth and risk over time (Garvin & Bosso, 2008). The PPP program must satisfy all the aspects of the equilibrium framework as otherwise the program will suffer from bias towards a particular quadrant or from instability if no interest is observed at all.

Performance measurement theorists believe that outcomes are more important than output as the output is not necessarily an indication of the effectiveness of the PPP program. As infrastructure is often a public good, the public has a right to expect satisfactory service at a reasonable price, where benefits are shared equally. The state and society demand more than an economic premium for granting the private sector the right to develop and operate public goods (Garvin & Bosso, 2008). The private sector has the expertise, agility and incentive to provide higher quality services at an affordable price, at a faster rate, which is also environmentally friendly. If the private entity is unable to meet these expectations, then the risks of transferring these responsibilities to the entity could be too great.

The PPP Equilibrium framework suggests that PPP projects should have improvements in areas such as quality of service, price/cost of service, time of service availability, level of environmental impacts and equitable distribution of social benefits in comparison to traditional infrastructure delivery methods. The review in this study takes a different approach to that of others as this review uses a revised PPP Equilibrium framework to assess the effectiveness of PPP projects. This provides a different perspective to assess PPP projects by analysing their ability to maintain the interests of the state, the private sector (markets and industry interests) and society.

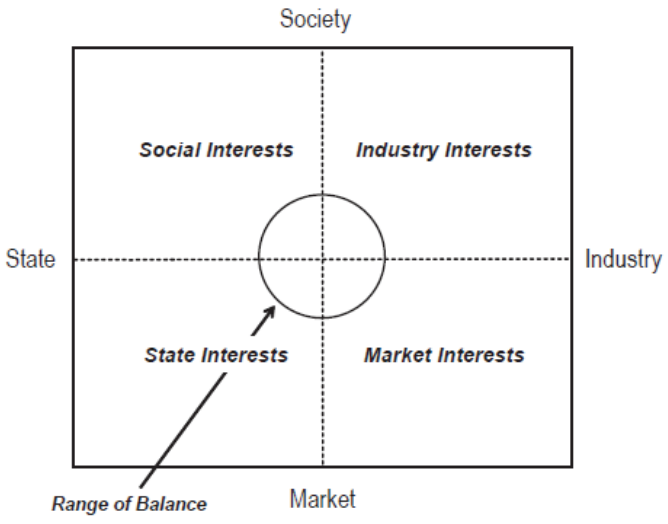

Figure 1: PPP Equilibrium Framework

Source: Garvin & Bosso (2008)

To measure the impact of the PPP projects on the interests of society, the state and the private sector, this study makes use of data for each of the following indicators listed in Table 2. It is worth noting that some of the measured indicators can serve the interests of more than one party (for example GDP benefits the interest of society, the state and the private sector).

For the purpose of this study, the impact is limited only to one party (for example the private sector). A major limitation to this approach is the lack of available data on indicators for the outcomes of PPP projects. To overcome this approach, only case studies with relevant data were selected. Each sector (state, private and society) has a varying number of measured indicators, due to data constraints. As such, only documented measurement indicators are included. It is worth noting that some indicators (such as GDP) can fall into all three sectors, as they have an impact on all three sectors. For purposes of this study, however, such indicators will be constrained to two sectors at most.

Table 2: Adopted Public Private Partnership Equilibrium Framework

PPP Equilibrium Framework	Measured Indicator
The State	• Fiscal Impact (contributions to Government Revenue) • Gross Fixed Capital Formation Impact
The Private Sector	• GDP (value added to the national or provincial economy) • Quality of service • Cost of Service
The Society	• Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities • Impact on Household income • Climate change impact • Quality of service • Cost of Service

Source: Author's Compilation

RESEARCH RESULTS OF THE CASE STUDIES' ANALYSIS

Gautrain Rapid Rail Link in South Africa

Background

The Gautrain Rapid Rail Link project is an 80km rail project between Johannesburg and Pretoria, intended to ease traffic congestion and facilitate travel (GMA, 2019). This project included the construction of 15km of tunnelling and various viaducts, stations, parking bays and depots. In addition to the rail, the project company also provides bus links to the train stations to facilitate access to the rail network from people's residential areas. The procuring authority was the Gautrain Management Agency, and the private company was Bombela Concession Company (Pty) Ltd. This resulted in the Gautrain Management Agency providing financing in the form of a $3 billion grant while Bombela Concession Company raised $360 million in debt, and $70 million in equity (Global Infrastructure Hub, 2021). Government support was the main source of funding as it was agreed that the required capital was far greater than what the private sector could invest and recover from user fees. The procuring authority committed most of the funding for the PPP project and as such, much of the risk, including land acquisition risks, was retained by the Gautrain Management Agency. However, the cost of relocation of the utilities and road improvements around the stations was transferred to the private entity. The services provided by Bombela Concession Company and the operations contractor met and exceeded targets of availability and punctuality for all trips scheduled. Safety, security, and cleanliness targets have also met and exceeded, which resulted in customer confidence in the Gautrain.

PPP Equilibrium Framework Project Outcomes Analysis: Gautrain Rapid Rail Link

The Gautrain PPP has documented data on the outcomes of the PPP project. The Gautrain had a positive impact on rejuvenating several inner cities in Johannesburg and Tshwane. The Gautrain PPP project resulted in 34 000 direct jobs created during the construction phase and about 87 000 indirect jobs.

A further 245 000 jobs were created because of property development induced by the Gautrain. The PPP project also resulted in R20 billion total GDP impact added to the provincial economy during the construction phase and for each year of the Gautrain's operations R1.7 billion has been added to the provincial economy (GMA, 2019). The Gautrain improved the quality and reliability of public transport, which has always been widely available in South Africa, but has not always met the required standards. It resulted in the easing of traffic congestion within the Johannesburg-Tshwane corridor, which has allowed for efficient transportation and facilitated the movement of people. The use of the Gautrain has also had positive implications for the environment as carbon emissions from the Gautrain are considerably lower per passenger than for private vehicles. Energy use by rail is three to five times more efficient than cars per person per kilometer based on full capacity and as such, the Gautrain reduces the contribution to climate change. The use of the Gautrain also results in a significant reduction in the number of road accidents, fatalities, and injuries (GMA, 2019). With all its success, the Gautrain service has also attracted criticism from society, as the service is more expensive than other means of public transport, which creates inequality, as the services are now only available to members of society who can afford them.

Table 3: PPP Equilibrium Framework Project Outcomes Analysis: Gautrain Rapid Rail Link

	State	Society	Private Entities
GDP (value added to the provincial economy)			R20 billion
Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities		366 000	
Climate change impact		Energy use by rail is 3 to 5 times more efficient than cars per person kilometer	
Capital formation Impact	R46 million (through property development)		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive -)		- Relatively Expensive	
Impact on Household income		R3.2 billion	
Check for satisfying the interests of each criterion (✅ or ❌)	✅	✅	✅

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

Source: Gautrain Management Agency (2019)

Maputo Port in Mozambique

Background

The Mozambican national ports and rail authority, CFM (Portos e Caminhos de Ferro de Moçambique) entered a joint venture with a private consortium led by the British Mersey Docks and Harbour Company to upgrade the port of Maputo (Porto De Maputo, 2019). The consortium took control of the port which included the Maputo cargo terminals and the Matola bulk terminals in April 2003. The consortium includes a Swedish construction company Skanska, a Portuguese terminal operator Lisont, and a Mozambican company Gestores. The agreement is for a 15-year concession to finance, reinstate, operate, and upgrade the port of Maputo (Farlam, 2005).

The consortium owned 51 percent of the Maputo Port Development Company (MPDC), while the Mozambican government and CFM owned the other 49 percent. The financiers of the project include Standard Corporate and Merchant Bank, the DBSA, the DFIs of the Netherlands and Sweden as well as the Nordic Development Fund and Finland's Finnfund. The PPP agreement stipulated that the MPDC provides all marine services within the Maputo Bay Port jurisdiction area. The concession includes the designated port areas for international shipping within Maputo and the coal terminal of Matola port. An investment of $70 million was made by the consortium to rehabilitate and develop the port by modernizing port equipment, quays and transport connections by road and rail to neighbouring countries. Due to difficulties during the protracted contract negotiations, which led to a strained relationship between CFM and Mersey Docks and Harbour Company, the 51 percent ownership changed to Gringrod and DP World (Fischer & Nhabinde, 2012).

PPP Equilibrium Framework Project Outcomes Analysis: Maputo Port

The upgrading and expansion of the port contributes annually to an average GDP of $345 million (in constant 2018 prices). The upgrading and expansion of the port generated 33 815 employment opportunities and led annually to further capital formation of $1.04 billion. These impacts include the construction effect, operational effect, and reinvestment effect of saving that are generated by the project. It is important to note that if the broader impact is considered (including the impact on international trade), the total impact of the upgrading and expanding of the port will be seven times bigger than that of the port only (Conningarth Economists, 2022). The Government revenue consists of $79 million from taxes related to the project (directly and indirectly) and the total fiscal impact (including the direct, indirect, and induced impact) amount to approximately $605 million in nominal values on average over the period of the project. The concession has increased efficiency and handling volumes at the Maputo harbour, while container movements per hour are improving and tending to international standards. Truck turnaround times have also improved as it has been reported that it was less than 25 minutes in April 2011, which was below the target time (Fischer & Nhabinde, 2012). Cargo through the port, such as sugar and coal has also increased. The rehabilitation work on this terminal had significantly increased fruit export volumes, with fresh produce terminals recording increases in the amount of first-class citrus passing through the port. It is estimated that 60 percent of all the freight traffic of the Maputo Logistics Corridor is destined to and generated by the Maputo Port. The Port of Maputo has also developed a training center, which provides training in several operational areas such as machine operators, tellers, and cargo storage (Porto De Maputo, 2019).

The improved services at the port have resulted in not only increased trade, but also increased productivity, competitiveness and reduction in delays, congestion, and logistical costs (Conningarth Economists, 2022). Reduced logistics costs result in reduced costs of production for businesses, which is in their best interest. The increased trade also affects the balance of payments for Mozambique, which then affects its foreign exchange market. The Maputo Port also has a fiscal impact, as government revenue consists of $79 million from taxes directly and indirectly related to the project, plus an additional $526 million which consists of government revenue from taxes related to the increase of economic activities due to the expansion of the port. This has allowed the state to invest in education and health, which increases the overall welfare of society (Conningarth Economists, 2022).

Table 4: PPP Equilibrium Framework Project Outcomes Analysis: Maputo Port

	State	Society	Private Entities
GDP (value added to the national economy)			$345 million
Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities		33 815	
Capital formation Impact	$1,0 billion		
Fiscal Impact (contributions to Government Revenue)	$79 million		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive)			+ Reduced logistics costs
Impact on Household income		$193 million	
Check for satisfying the interests of each criterion (✅ or ❌)	✅	✅	✅

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

Source: Conningarth Economists (2022): The average per annum impact outcomes resulting from the upgrading and expansion of the Port.

Tanesco Power Purchasing Agreement in Tanzania

Background

The Tanzanian state-owned electricity entity, Tanzania Electric Supply Company Ltd (Tanesco) and a private company Independent Power Tanzania Limited (IPTL) entered into a power purchasing agreement to build and run a 100 megawatt slow-speed diesel power plant at Tegeta, Dar es Salaam at a cost of $163.5 million, including an Engineering Procurement and Construction contract price of $126.39, and with a 'reference tariff' of $4.2 million per month plus 3.25 US cents per kWh of electricity actually produced. The final tariff will depend on actual costs incurred (Cooksey, 2002). IPTL was a joint venture between a Malaysian company (Mechmar Corporation of Malaysia) and a local investor, VIP Engineering and Management Ltd (Farlam, 2005). The contract between Tanesco and IPTL was finalized in 1997, but was soon marred by allegations of impropriety, negligence, and corruption as it had not been an open tender (Eberhard & Kapika, 2013). Without consulting Tanesco, IPTL deviated from the agreement terms and built a cheaper medium-speed diesel plant. This resulted in Tanesco serving IPTL with a notice of default and an intention to terminate their agreement (Cooksey, 2002). The World Bank's International Centre for Settlement of Investment Disputes ruled that the agreement should not be terminated but the capacity charge (which are payments that IPTL received based on how many MW of electricity they make available whether they are used or not) should be lowered to reflect the actual costs (Eberhard & Kapika, 2013). The plant was commissioned in 2000, without actually reducing the capacity charge and it was found that the power from the IPTL plant was very expensive relative to other plants in Sub-Saharan Africa at the time (Gratwick, et al., 2007). IPTL started supplying power to the national grid in 2002 and in 2007, IPTL was embroiled in another dispute between its local and foreign sponsors due to allegations of misappropriation of the proceeds from power sales. Due to this conflict, the IPTL plant was hardly operational around 2007 and later sued Tanesco $70 million for unpaid capacity charges (Eberhard & Kapika, 2013).

PPP Equilibrium Framework Project Outcomes Analysis: Tanesco Power Purchasing Agreement

The Tanzanian government agreed to pay for the power capacity regardless of whether it was needed, which resulted in IPTL receiving $40 million in capacity payments in the first year, while operating at less than 10 percent capacity in that year (SAIIA, 2008).

In addition, IPTL charged Tanesco $3 million in statutory costs monthly and in 2007, IPTL also sued Tanesco $70 million for unpaid capacity charges (Eberhard & Kapika, 2013). A study by the World Bank estimated that the cost of power outages to the Tanzanian economy in 2005 – a single year – was 4 percent of GDP, or nearly $2 billion (Africa Research Institute, 2017). Due to the inability of IPTL to solve the power issues in Tanzania and actually adding more to the financial burden of the country, the $2 billion value is estimated as a negative impact of the project on GDP in Tanzania. The Africa Research Institute (2017) has reported that the availability and cost of electricity is a major constraint to doing business in Tanzania. Around 88 percent of firms in the country have reported inadequate electricity as a key hindrance to their operations, which has negative impacts on the country's economic growth (Africa Research Institute, 2017). The state company Tanesco purchased electricity from IPTL for over 12 US cents per unit.

This was significantly higher than the electricity which Tanesco produced itself, which was between 7 and 9 US cents per unit (Farlam, 2005). As such, society was paying more for electricity with IPTL than they would have paid with Tanesco alone. This led to society questioning the need for IPTL, and as such it was discovered that no feasibility study was conducted to justify the need for the Independent Power Producer. If the feasibility study had been conducted, it would have been determined that the problem in Tanesco was not insufficient generating capacity but rather a lack of gridlines (Farlam, 2005). This PPP project was evidently marred by corruption, as there was no proper bidding processes and the project was approved by a few government officials without consulting the necessary stakeholders.

Table 5: PPP Equilibrium Framework Project Outcomes Analysis: Tanesco Power Purchasing Agreement

	State	Society	Private Entities
GDP (value added to the national economy)			- $2 billion
Fiscal Impact (contributions to Government Revenue)	- $3.2 million Capacity payments per month (average)		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive)		-12 US cents per unit (relatively expensive)	
Quality of service			< 10 % generation capacity
Impact on Household income		-5 US cents per unit (Households paying 5 US cents per unit more than usual for electricity)	
Check for satisfying the interests of each criterion (✅ or ❌)	✅	✅	✅

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

Source: Farlam (2005); Africa Research Institute (2017); Ghanadan & Eberhard (2007)

Dakar-Diamniadio Toll Road in Senegal

Background

The Dakar Diamniadio Toll Highway project consists of the construction, servicing, and maintenance of a toll highway between Dakar and Diamniadio (34 km), also serving the new international airport located 42 km from Dakar (AfDB, 2023). The project was intended to improve mobility between Dakar and Diamniadio and provide communities affected by the construction of the highway access to basic social and economic services (World Bank, 2021).

The project was expected to expand the densely populated capital city and integrate it with the rest of the country and sub-region which will directly benefit the society, businesses, and the overall economy. The project was also expected to reduce congestion and travel time by more than half (Jonga, 2021). The PPP component of the road consisted of the 20.4 km Pikine–Diamniadio section, which was concessioned to Société Eiffage de la Nouvelle Autoroute Concédée (SENAC), which is a Senegalese special purpose company owned by the Eiffage Group (a leading construction group internationally) (World Bank, 2010). The Government of Senegal signed the concession contract with SENAC in 2009, and the preparation of the concession was facilitated by The National Agency for the Promotion of Investments (APIX). APIX was expected to consolidate the institutional framework and develop contractual arrangements for the Dakar–Diamniadio Toll Highway project and was supported by the Public-Private Infrastructure Advisory Facility. The Government of Senegal was highly committed to the project as the President was the first person to drive on the road and pay the toll fees. The Government also held stakeholder engagements with members of the society to discuss the structural options for the road and socio-economic drivers of the willingness to pay. The public sector component of the road which consisted of 20.4 km of the road segment Pikine-Patte d'Oie was financed by the Government together with the African Development Bank and the World Bank (Jonga, 2021).

PPP Equilibrium Framework Project Outcomes Analysis: Dakar-Diamniadio Toll Road

The Dakar-Diamniadio Toll Road resulted in the creation of 800 jobs during the construction phase and a further 130 jobs after the launch phase (Centre for Public Impact, 2018). This has created positive economic impacts for the local population. Human mobility has also increased by 1.34 percent, as a result more people have access to security, transport, administrative, health and education services in Dakar City Centre (Fetzer, 2015). It had been reported by the World Bank that Dakar's traffic troubles were costing Senegal at least 0.64 percent of their 2008 GDP which amounts to approximately $86 million per year (Gainer, 2016). Senegal's APIX reported that the losses were actually more than twice as large at approximately $205 million per year (Africa Research Institute, 2017). Therefore, the estimated positive impact of the Dakar-Diamniadio Toll Road on GDP in Senegal can amount to $205 million in savings due to the improved road infrastructure. As one result of the project, vehicle travel time has also sharply decreased from one and a half hours to between 15 to 30 minutes. Tolls revenue also generates approximately $100,000 per day for the Senegalese government. The lower travel time also results in less vehicle air pollution, a positive environmental impact.

Table 6: PPP Equilibrium Framework Project Outcomes Analysis: Dakar-Diamniadio Toll Road

	State	Society	Private Entities
GDP (value saved to the national economy)			~ $205 million (per year)
Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) - number of job opportunities		930	
Climate change impact		+Less pollution due to reduced travel time	
Capital formation Impact	~ $448 million		
Quality of service		+Human mobility increased by 1.34 %	+Travel time reduced from 1.5 hours to between 15 – 30 minutes
Fiscal Impact (contributions to Government Revenue)	~$100,000 per day		
Cost of Service (How much does society pay for the services – either relatively affordable + or relatively expensive)			+Relatively Affordable Toll Fees Motorcycles (~$1.50) Cars (~$2.50) Lorries (~$5.00)
Check for satisfying the interests of each criterion (✅ or ❌)	✅	✅	✅

*Blank cells can either mean the indicator is not measured for the sector or there is no available data for that indicator for the sector.

Source: Centre for Public Impact (2018); Fetzer (2015)

DISCUSSION

Lessons Learnt on Outcome-based Assessment of Public-Private Partnerships

The success of PPP projects has historically been based on the number of PPP transactions and overall project value. Not enough data has been collected on the socio-economic outcomes of PPP projects. The case study analysis has shown that successful PPP projects have direct or indirect positive impacts on the society, the state, and the private sector. These were the Maputo Port, the Gautrain, and the Dakar-Diamniadio Toll Road. A failed PPP project was that which had negative direct or indirect impacts on the society, the state and the private sector. This was the Tanesco Power Purchasing Agreement project. Therefore, regardless of how much spending has been allocated to a PPP project, what should matter more is the impact which the PPP project has had on the interests of society, the state, and the private sector.

This was evident in the Tanesco Power Purchasing Agreement, where large sums of money were spent on the project, yet the services provided were poor and expensive. This study suggested the following measures regarding assessing the likely impact of a PPP project on society, the state and the private sector:

The State

- The fiscal impact of the PPP project, which entails increased revenue for the Government either from taxes or tolls fees.

- Capital formation as a direct result of the PPP project, which has been known to have positive impacts on economic growth (Pasara & Garidzirai, 2020).

The Society

- Employment Creation (creation of new jobs for skilled, semi-skilled, and unskilled workers) during the construction phase of the PPP and after.
- Following from employment creation, an analysis of the impact of the PPP on household income. Directly because of employment due to the PPP project, or indirectly through positive externalities of the PPP project.
- Climate change impacts on the PPP, through reduced greenhouse gas emissions, pollution, or energy usage.
- Improved quality of service being utilized by individuals due to the PPP project.
- Affordability of the services generated by the PPP, to avoid unintended inequalities in terms of access to the service.

The Private Sector

- Positive contribution to the gross domestic product due to the PPP project. Economic growth has been known to improve the ease of doing business in Sub-Saharan Africa, which subsequently creates private sector growth (Muhanika, 2021).
- Improved quality of service being utilized by businesses due to the PPP project.
- Affordability of the services generated by the PPP, to avoid unintended inequalities in terms of access to the service.

Public-Private Partnership Lessons Learnt Based on The Four Analysed Case Studies

- **Political Commitment**

Government commitment and support to a PPP project contributes to the overall success of the PPP project. This has been evident in the Maputo Port, Gautrain and Dakar-Diamniadio projects. The government provides support with regards to financial and technical assistance as well as oversight of the project. In the Tanesco and IPTL projects, disputes between the private entity and the state-owned entity contributed to the project's ultimate failure.

- **Stakeholder Engagement**

Stakeholder engagement is critical in ensuring that the PPP project meets the needs and expectations of the society and the private sector. This was evident in the Dakar-Diamniadio Toll Road project where the society was engaged, and their inputs taken into consideration especially regarding the relatively low toll fees which rendered the service affordable. Lack of consultation on the ground resulted in high service costs regarding the Gautrain and the Tanesco Power Purchasing Agreement which created unintended consequences of unequal access to the services.

- **Experienced, Ethical and Capable Concessionaire**

The private sector entity in the PPP agreement must have the necessary experience and capabilities to undertake the project. Otherwise, the services provided will be of sub-standard quality. Bombela Concession Company (Pty) Ltd, Gringrod and DP World and SENAC all had the necessary expertise and capabilities to deliver high quality services. IPTL, on the other hand, delivered very sub-standard quality and had unethical practices, due to its lack of capability and experience.

- **Strong involvement of development institutions in both public and private financing**

Projects like the Maputo Port and the Dakar-Diamniadio attracted financing from development finance institutions such as the DBSA, the African Development Bank, the Agence Francaise de Developpement and the World Bank. Development Finance Institution participation in PPP projects brings not only the much-needed finance but technical support as well as their vast knowledge and expertise in infrastructure delivery.

- **Clear and visible benefits**

  This goes back to the outcomes of PPP projects. Successful PPP projects have clearly identified benefits, whether it is improved and affordable services, employment creation or increased household income. Visible benefits ensure community participation, admiration, and support.

CONCLUSION

This comparative analysis demonstrates that the effectiveness of PPPs as infrastructure development strategies depends not only on the regulatory, legal, and financial frameworks but also on their ability to generate balanced outcomes for society, the state, and private entities. The application of the PPP Equilibrium Framework revealed that projects such as the Gautrain Rapid Rail Link, Maputo Port, and Dakar-Diamniadio Toll Road were successful because they delivered tangible socio-economic and environmental benefits across all stakeholder groups. Conversely, the Tanesco Power Purchasing Agreement illustrates that projects can fail despite significant financial investment if stakeholder interests are misaligned, feasibility studies are inadequate, and ethical and operational standards are not met. These findings underscore the need to shift the evaluation of PPPs from a compliance and transaction-focused approach to an outcome-based approach that prioritizes balanced benefits, transparency, and stakeholder engagement.

LIMITATIONS

The findings are analytically rather than statistically generalisable, as the case studies aim to support structured thinking on PPP outcome conditions rather than universal conclusions. Although the cases cover multiple sectors and African regions, PPP outcomes depend on country-specific institutional, regulatory and macroeconomic factors. The study was also limited by a lack of detailed social and economic impact data for many PPP projects, which reduced the number of usable case studies and constrained the analysis.

RECOMMENDATIONS

The study recommends that PPP projects should be assessed and implemented using an outcome-based approach, such as the PPP Equilibrium Framework, to ensure balanced benefits for society, the state, and private entities. Effective stakeholder engagement, rigorous feasibility studies, and transparent monitoring are critical to align projects with societal needs, avoid inequalities, and manage risks. Governments should ensure private partners have the necessary expertise, capacity, and ethical standards, while strong political commitment and the involvement of development finance institutions can enhance project financing, technical support, and overall success. Practical implementation mechanisms aligned to the PPP Equilibrium Framework can include PPP equilibrium scorecards for project appraisal and monitoring, strengthened PPP performance monitoring functions within PPP regulatory environments, and the incorporation of socio-economic outcome reporting requirements into PPP contracts.

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