

Ghana's Public-Private Partnership (P3) Projects: A Field-Level Investigation

Michael Opara¹, Colman K. Ozor², Elvis Agbadoku¹, Gilbert Danso¹, & Kennedy Kesse¹

¹ College of Business, Texas A & M University, Commerce, United States

² Department of Banking and Finance, Alex Ekwueme Federal University, Nigeria

Correspondence: Michael Opara, College of Business, Texas A & M University, Commerce, Texas, United States.
E-mail: Michael.opara@tamuc.edu

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Abstract

In this study we revisit Ghana's P3 policy outcome after 25 years of implementation using select projects recently executed in the country. Our central objective was to determine how Ghana's P3 policy implementation compares to global practices given the institutional challenges Ghana confronts regarding infrastructure delivery, especially its limited private sector capacity, a shallow capital market, and its inability to attract investments to meet overall developmental targets. We reviewed both institutional and academic literatures on Ghana's P3s experience and adopted a secondary data analysis method in uncovering central themes such as historical trends, key characteristics, financial models, and funding mechanisms.

We found that Ghana deviated from conventional P3 financing models and adopted an innovative multilateral financing approach for its P3 projects. Given that this approach has helped Ghana deliver critically needed infrastructure, we conclude that this project financing strategy could be an attractive alternative model of P3 infrastructure delivery for similarly challenged political and institutional jurisdictions.

Keywords: Ghana Public private partnership, Ghana PPP, Ghana P3, Bui Hydroelectric Dam, Tema Port Expansion, Tema Oil Refinery

1. Introduction

Since the early 1990s, public-private partnerships (P3s) have garnered significant policy attention from governments around the world (Boardman et al., 2016; Osei-Kyei et al., 2017; Opara et al., 2017). Under the P3 model, cooperation of government agencies and private sector consortiums has emerged as a popular strategy for providing public infrastructure and services in response to growing infrastructure demands and limited financial resources (Opara et al., 2017; Opara & Rouse, 2019). With P3 programs, governments at various levels are now able to tap into the expertise, skills, and resources of the private sector in developing and delivering public infrastructure (Chan et al., 2009). According to Boardman, Siemiatycki, & Vining (2016), P3s involve long-term contractual agreements wherein both risks and benefits are shared between the parties. P3s are appealing given that they may be employed to complement government resources with private sector investment, especially when it pertains to the growing demand for public infrastructure. P3s have become well-known as a management strategy and alternative infrastructure delivery model in various jurisdictions. However, despite the enthusiasm of the public and private sectors, P3 policy implementation has advanced slowly and the number of troubled or failed projects has increased, especially in developing nations (World Bank 2015). Developing countries, such as Ghana face a crushing need for infrastructure to support economic growth. While the P3 model has become widespread, several emerging economies have not adopted P3 as a major asset delivery model. On the contrary, Ghana has been able to attract substantial multilateral partners to help with its infrastructure delivery, thus motivating our interest in the undertaking this study.

Against this contextual backdrop, this paper aims to investigate Ghana's P3 projects, and address the following questions: (1) How did P3s emerge and evolve in Ghana? (2) What are the key characteristics of major P3 projects in Ghana, and how do they compare to global P3 practices? (3) What are the financing models and funding mechanisms employed in Ghana's P3 projects?

Adopting a comprehensive literature review of major P3 project executed in Ghana over the past 25 years, we find

that Ghana was successful in attracting multilateral global financing as part of its P3 delivery strategy. While this may not be consistent with standard P3 financing models, it has assisted Ghana deal with a dire infrastructure need and bridge the gap between its private and public sectors of the economy. This study contributes to the growing literature on the theory of P3 financing for emerging economies. By re-imagining how financing can be mobilized for public infrastructure delivery, Ghana demonstrates that innovative public finance alternatives can be a viable practical option in P3s.

The subsequent sections of this paper are structured as follows: Section 2 provides a review of existing literature on P3s, traces the evolution of P3s in Ghana, and unveils Ghana's P3 approach compared to global P3 practices. Section 3 describes the methodology adopted. Section 4 presents the research findings using three recent projects as models. Lastly, section 5 presents a fuller discussion of Ghana's P3 policy and its relevance and implications for other institutionally similar jurisdictions.

2. Literature Review

2.1 Overview of P3s

Public-Private Partnerships (P3s) have gained popularity as a strategy of delivering important infrastructure across the globe (Grimsey & Lewis, 2004; Opara et al., 2017). The governments of developed, emerging, and Sub-Saharan African nations face a growing level of infrastructure shortage in public utilities (Boardman et al, 2016; Grimsey & Lewis, 2004). Similarly, the increasingly constrained fiscal position, appropriations, and budgets of most governments have motivated the need for private sector investment to supplement the limited resources of the government (Boardman et al, 2016; Grimsey & Lewis, 2004; Opara & Ozor, 2023). Grimsey and Lewis (2004) consider P3 as a contractual relationship between a governmental entity and a private sector consortium for the delivery of public infrastructure and/or services while sharing the risks and benefits involved.

P3s have continued to gain prominence as a management practice as well as an alternative infrastructure delivery model in many jurisdictions and across institutional contexts (Opara & Rouse, 2019; Opara et al., 2021). According to Boardman et al. (2016), P3 research has made substantial strides in several multi-disciplinary domains since its inception in the mid-1990s. Furthermore, it was reported that P3s frequently produce projects on schedule and under budget. The concept of P3s has generally been applied to all types of public and private sector partnerships, including those for the construction of roads, schools, hospitals, correctional facilities, sports facilities, libraries, and public housing among other things.

One of the key expectations of governments is to give their citizens access to public, social, recreational, and community infrastructures. P3s have become a common response to the severe funding issues or budgetary limits that governments around the world are currently facing (Opara, 2020). The deployment of P3s is not restricted to national and regional governments. Martin (2018) reports that local governments are increasingly considering and/or deploying P3s as a means of delivering infrastructure and public facility projects. Part of the attraction to P3s is that several studies have demonstrated a strong positive correlation between infrastructure availability and economic productivity (MOFEP, 2011). However, many governments are simply unable to meet their infrastructure needs, primarily due to financial and fiscal constraints (MOFEP, 2011; Maryouri, 2013; Opara et al., 2021). This is the motivation to engage the private sector to augment governmental effort in providing these infrastructures and close the infrastructure gap.

2.2 P3 Structures, Forms, and Models

P3 agreements typically define the form that the P3 procurement would take at the initiation stage. P3 structures employ a variety of approaches; some include the construction of new "Greenfield" facilities, while others focus on the operation or expansion of pre-existing "Brownfield" assets (Jacobi, 2009). Since the early 1990s, multiple P3 models have been adopted across many countries. These models range from simple JV agreements to design-build-operate to the extensive DBFOM model (Opara et al., 2021). It is crucial that all parties fully understand the precise form and legal structure of the P3 being proposed for each given project. Opara & Ozor (2023) posits that the distinction between green-field and brown-field P3 is that the former focuses on building new infrastructure while the latter is concerned with the redevelopment of existing public assets. Dominic et al. (2015) points out that a government's objectives tend to dictate not only the kind of procurement method adopted but also the P3 model employed. Some scholars contend that the level of risk that each party in P3 arrangements is exposed to can serve as the basis for categorizing P3. Public-private partnerships can be categorized in a variety of ways largely driven by the degree of involvement of the public and private sectors and the extent of risks assumed by each partner (Opara & Ozor, 2023; Opara, 2018).

According to the World Bank (2020) P3 can be used as a procurement tool in a variety of ways, such as

management and leasing contracts, concession agreements/contracts, greenfield projects, brownfield projects, divestitures (sales of assets), management and outsourcing contracts. Concession is the P3 category that tends to receive the most attention when decisions on public infrastructure procurement are being made (Davies & Fairbrother (2003). Most developing and developed nations in Africa and Asia use concessions rather than joint venture P3s for most of their public asset development initiatives (Olatunji et al., 2016). Concession is the exclusive right given by a government to a private firm to provide, manage, and maintain an asset for an extended length of time in compliance with performance conditions. The concession period typically lasts for 25 to 30 years after which the facility and its operation reverts to the government. Ndonye et al. (2014) contend that the private sector ought to have had enough time throughout the concession period to charge customers enough to pay their costs for financing ongoing operations and capital expenditures.

Public-private partnerships come in a variety of forms depending on the private party's level of involvement and risk tolerance. The terms of a P3 are typically outlined in a contract or agreement to define the responsibilities of each party and explicitly allocate risk (Opara, 2018). There are multiple P3 contract models depending on funding and which partner is responsible for owning and maintaining assets at various stages of the project (Hanna, 2022). These models, or combination of models, offer the partners different roles, responsibilities, and financing options (Opara, 2014). Opara & Ozor (2023) suggests that these models are frequently characterized by the degree of involvement and risk distribution between the private and public partners. Despite having various nomenclatures, some of the models have similar operations.

Among several, Opara & Ozor (2023) highlighted some dominant P3 models:

- Build-Operate-Transfer (BOT)
- Build-Operate-Own (BOO)
- Build-Lease-Transfer (BLT)
- Build-Transfer-Operate (BTO)
- Build-Own-Operate-Transfer (BOOT)
- Build-Own-Operate-Remove (BOOR)
- Build-Rehabilitate-Operate-Transfer (BROT)
- Design-Build-Finance-Operate (DBFO)
- Design-Build-Finance-Transfer (DBFT)
- Design-Build-Finance (DBF)
- Design-Build-Operate (DBO)
- Design-Build-Finance-Operate-Manage (DBFOM)
- Operate and Maintain (O&M)
- Operate-Maintain/Manage (OMM)

The P3 models described above can either be applied to new assets (greenfield) or existing assets (brownfield). DBFO, according to Jacobi (2009), further illustrates the extent to which the private sector assumes financial risk and responsibility in the project, in contrast to DBOM, which does not include financing. Brownfield projects typically involve the transfer of responsibility for upgrading and managing existing public assets to a private consortium. In either scenario, an important feature of a P3 is that the assets or services are defined in terms of output rather than inputs, i.e., what is required, rather than how it is to be done.

2.3 P3s in Ghana: A Historical Perspective

The Government of Ghana (GoG), like many developing countries, confronts challenges in providing infrastructure and basic public services, which hinders expansion of the economy. This is demonstrated by the fact that many schools are now held in open spaces rather than in properly built classrooms, there are more potholed and crowded roads, frequent power outages, poorly maintained recreation centers, inadequate water treatment systems, and many rural areas of the nation lack basic infrastructure (Damoah et al., 2020).

To close the infrastructure gap, the government was motivated to collaborate with the private sector. In Ghana, P3s were first introduced in the early 1990s but their significance in public infrastructure delivery and discourse only increased in the 2000s, as the private sector steadily provided financial support to regions where the public sector was short on funds (Owusu-Manu et al., 2021). Ghana codified its P3 agreements and procedures in 2011 under the Public Private Partnership Act, a P3 policy framework managed by the Ministry of Finance and Economic

Planning. Most of Ghana's infrastructure projects fell under the Greenfield category of P3s, with these projects spanning across various sectors of the economy (Opara & Ozor, 2023). It was reported that Ghana had invested approximately \$10 billion since 1990, on a total of 31 projects. Major P3 investments include the Tema Port Expansion Project, Takoradi Integrated Container and Multi-Purpose Terminal Project, Tema Oil Refinery Project, Bui Hydroelectric Dam Project among many others. According to the World Bank, Ghana's P3 projects cuts across many sectors and levels of government.

2.4 P3 Projects in Ghana compared to Global Best Practices

P3 procurement needs to be strategically thought out and executed to guarantee the effective implementation of policy. Osei-Kyei et al. (2022) in their study of P3s in Ghana state that Ghana's P3 strategy must adhere to global best practices to ensure value for money. They further highlight some of the best practices such as transparency and competition, favorable legal framework, right project identification, capacity building, stakeholder engagement, and appropriate risk management that enable P3 project success.

2.4.1 Transparency and Competition

According to P3 literature on international best practices, transparency and competitiveness are essential for boosting public trust in government agents and, more importantly, in P3 agreements. To ensure transparency, (public sector) contracting authorities have a responsibility to make contract information public without necessarily disclosing key contract details. Furthermore, competition is critical in guaranteeing value for money. Projects that are being proposed must be publicized and provide a level and fair bidding environment for investors. In other words, contracting agencies are always in a superior negotiating position when there is competition.

2.4.2 Legal Framework

Frameworks for P3 legislation and policies are crucial for directing and guiding the implementation process. According to the Organization for Economic Co-operation and Development (OECD), the establishment of "a clear, predictable, and legitimate institutional framework supported by competent and well-resourced authorities" is essential for the governance of P3s. Regulations that impact P3 operations ought to be clear, transparent, and adaptable to changing environmental and policy conditions.

2.4.3 Project Identification

The effective implementation of P3 projects requires the identification and procurement of the right public facilities based on strong technical, social, and economic rationale. Thus, there is a need for a comprehensive national infrastructure plan that incorporates input from all stakeholders. This plan should guide the identification and procurement of P3 projects, emphasizing the importance of strict policy adherence regardless of the party in government.

2.4.4 Capacity Building

Improving the expertise of local professionals, including public servants, is crucial for the advancement of public-private partnerships (Opara et al., 2022). Many local practitioners, especially those in the public sector, lack sufficient understanding and knowledge of P3 project management. To address this, it is recommended to regularly conduct seminars and short courses focusing on P3 negotiations and general implementation strategies for practitioners.

2.4.5 Stakeholder Engagement

Stakeholders play a vital role in the effective execution of P3 projects. It is essential to involve stakeholders such as civil society organizations, local communities, labour, and other unions right from the project's inception. Engaging stakeholders at later stages of project development should be avoided by P3 practitioners, as this can agitate the public and contribute to negative perceptions of P3 transactions. While various projects may necessitate different approaches to involve stakeholders, "community meetings" are generally recommended for P3 initiatives at the sub-national level. At the national level, holding press conferences is the preferred method to engage the general public, as both print/online media and town hall events serve as powerful communication channels.

2.4.6 Appropriate Risk Allocation

The significance of thorough risk identification and allocation cannot be overstated when practitioners aim for P3 success (Osei-Kyei et al., 2022). It is crucial to accurately identify and assign risks to the most suitable party. Contracting authorities should avoid retaining excessive risks or transferring an excessive number of risks to investors. The distribution of risks should be balanced to prevent favoritism toward one party, as this could lead to conflicts later. Drawing from past project experiences can aid in creating a comprehensive risk register. Furthermore, contracting authorities should consistently update the risk register to keep it relevant.

2.5 Financing of P3 Infrastructure

The ability of governments to secure financing from the private sector for infrastructure projects is an attractive and key feature of P3s. P3 finance might come in the form of long-term or short-term agreements. The design-build-finance model is the only type of P3 that is covered under the short-term agreement. In this kind of P3, the contractor provides the short-term funding required for the design and building of a project at a fixed fee (Martin, 2018).

Within the long-term category are three P3 types: design-build-finance-operate (DBFO), design-build-finance-maintain (DBFM), and design-build-finance-operate-maintain (DBFOM). The DBFOM P3 is the most dominant form due to its ability to finance massive infrastructure and facility projects typically between 20–50 years. Long-term contracts allow governments a way to spread out the repayment of facility or infrastructure project financing over several years, including design and construction costs.

Martin (2018) reports that P3s can be financed using either debt or equity financing. Equity refers to capital invested by sponsor(s) of the P3 project and other third-party private investors. Debt refers to borrowed capital from banks and other financial institutions. These could include bridge finance, bonds, and other debt instruments (for borrowing from capital markets). Repayment from the public sector and/or users is required over the project's lifetime to cover both principal and interest payments.

According to Engel et al. (2014), a P3 combines infrastructure service delivery and investment into a single, long-term contract. The project is financed and managed by a consortium of private investors, who also maintain and run the facilities for a considerable amount of time—typically 20 to 50 years—before handing over the infrastructure to the public sector at the conclusion of the contract. The private partner is compensated with a series of payments throughout the project's functioning. These payments cover the cost of the initial investment, also known as the capital expense (capex), as well as ongoing maintenance and operating costs, also known as the operation expense (opex). These streams of revenues are generated via user fees (e.g., toll road fees) or from payments made by the government agency from the general treasury.

3. Research Methodology

The study's objective was achieved by adopting a secondary data analysis approach, involving a comprehensive review of both institutional and academic literatures on P3s. Prior research on this subject matter, such as Opara and Ozor (2023); Osei-Kyei and Chan (2015) have used this approach of documenting P3 project experiences based on secondary data sources from current literature. Spanning 25 years (2000-2024), this methodology was considered most appropriate to fully capture the emergence and evolution of P3s in Ghana, drawing from a variety of sources such as academic publications, government reports, and reliable databases specializing in infrastructure projects and P3s. While the decision on the sources used were made to meet the objectives of the study, we focused on and prioritized sources that were adjudged credible and objective representation of project events (see Hensengerth, 2011; Kunateh, 2011), and academic publications in reputable journals, such as Accounting Forum, Critical Perspectives on Accounting, Auditing, Accounting and Accountability Journal, European Journal of Business and Management, Public Administration Quarterly, and Australian Journal of Public Administration amongst others (see Appendix A for details of the major sources employed for this study).

The data gathered was categorized into themes for in-depth analysis, covering historical trends, key characteristics, financial models, and funding mechanisms. Additionally, the study adopts a comparative analysis approach by contrasting the characteristics of major P3 projects in Ghana with international best practices both to enhance a nuanced understanding of Ghana's P3 landscape and contextualize Ghana's P3 experiences and practices within its institutional setting.

4. Findings

4.1 The Bui Hydroelectric Project

The Bui hydroelectric project is located on the Black Volta River, at the southern end of Bui National Park and transverses both Brong-Ahafo and Northern Regions. According to former President John Mahama, the commissioning of the project brings Ghana one step closer to its goal of becoming a major power producer in West Africa. The project was for hydropower generation and to support agriculture ventures. The Dam is Ghana's third largest hydroelectric dam with a capacity of 400mw. The project was a collaboration between the government of Ghana and Sino Hydro, a Chinese construction company. The construction of the Dam began in December 2009 and was completed and commissioned in December 2013 (Ghana Web, 2017).

4.1.1 Cost and Financing

The Bui Dam built by China Sino hydro Corporation, was financed by the government of Ghana and the Chinese Exim Bank. The Bui Power Authority Act 2007 (Act 740) was enacted by the Parliament of Ghana establishing the Bui Power Authority (BPA) to plan, execute and manage the 400MW project. The project was executed as part of Ghana’s P3 Build-Operate-Transfer by Sino hydro for US\$622 million. The Exim Bank of China largely financed the Dam for the Chinese government. The Chinese government had two strategic approaches towards the extension of loan facility to foreign countries.

The government had a financial package which involved commercial and concessional loans (Brautigam, 2010). Cocoa beans were used to secure the financial agreement as collateral. According to the Ministry of Finance, until the Bui Dam becomes operational, the Chinese government guaranteed to purchase 30,000 tonnes of cocoa per year from Ghana at the going world market prices (Hensengerth, 2011). Meanwhile, during the Bui Dam construction and prior to generating revenue to service the loan, the proceeds from the sale of cocoa are placed in an escrow account (a trust account) held by the China Exim Bank as security for loan repayments, with a moratorium that ensures only interest payment can be made during construction. Any excess funds in the escrow account reverts to the Ghanaian government. (Hensengerth, 2011). When the cocoa agreement expires and Bui Dam becomes operational, 85 percent of the proceeds from sales of energy generated by the dam will be deposited in an escrow account held by China Exim Bank to service the debt. The remaining 15 percent will meet the Bui Power Authority’s general administration costs. The project was build-operate-transfer (BOT) by Sino Hydro Corporation. Since the dam operates through a state-owned company, the Bui Dam's capital assets were attributed to the government. Therefore, revenues from capital rents, i.e., electricity sales, were collected directly by the government and added to the general state budget to cover loan repayments (Nechifor et al., 2022). Table 1 shows an outline of the Bui Dam project.

Table 1. Project profile for the Bui Dam

	2009	2013	2016	2025	2029>2033	2067
Construction	2009 >2012					
Impoundment ¹		2010 > 2016				
Electricity generation				2013 > 2067		
Loan repayment		2013 > 2024	2013>2032			
Cocoa exports			2010 > 2029			

Source: Hensengerth, 2011

¹Impoundment refers to a situation where a third party holds funds until certain conditions are met.

In the case of the Bui dam agreement, the China Exim Bank controlled the escrow account (2010-2016), which was a collateralized loan arrangement between the government of Ghana and the China Exim Bank.

Hensengerth (2011) stated that the Ghanaian government initially had difficulty finding potential investors for the project. Further, Anane (2015) reports that the World Bank refused to fund the project due to intense stakeholder opposition and concerns around the project's environmental impacts. Eventually, the Chinese Exim Bank provided additional funding of \$168 million needed to complete the project, a budget overrun of 27% (Kunateh, 2011). The financial details of the Bui Dam are summarized in Table 2.

Table 2: financial modalities for the Bui Dam

Type of credit	Amount ¹ USDS'million	Interest rate	Amortization period	Grace period
Buyer’s credit	292	2 % over CIRR ²	20 years	5 years
Concessional loan	270	2%	20 years	5 years
Ghanaian government loan	60	–	–	–
As of March 2023				
Principal paid	\$277,362,717			
Interest paid	\$62,388,531			
Loan balance	\$14,637,283			

Source: Hensengerth, 2011

²CIRR – Commercial Interest Reference Rates are the official lending rates of Export Credit Agencies.

Facing financial difficulties, Ghana was able to secure favourable repayment arrangement with the Chinese

government. At the time the loan agreement was made, Ghana wanted a 30-year repayment period and a 1% interest rate. The Chinese offer for the buyer's credit was 1.1 % over CIRR, which was around 5.75%. The initial repayment schedule was for 12 years with a grace period of 5 years. According to the Ministry of Finance, after multiple rounds of negotiations, in June 2020, the Chinese and Ghanaian negotiators agreed on a 20-year repayment schedule for the buyer's credit (Hensengeth, 2011). This put the total interest rate for the buyer's credit at 7.7%.

4.2 Tema Port Expansion Project

The Tema Port P3 project was designed to increase the handling capacity from 1 million twenty-foot equivalent units (TEU) to 3.5 million TEU per annum. The project was awarded to China Harbour Engineering Company (CHEC) Ltd and AECOM Consulting (Ghana) Ltd by Meridian Port Services (MPS). The project commenced in October 2016, with completion anticipated by 2019. MPS is executing the project as part of the Ghana Port and Harbour Authority (GPHA) master plan for the development of Tema Port. MPS had secured the necessary funding for the project from the International Finance Corporation (IFC). Meridian Port Services is part of Balore Africa Logistics, A.P. Moller-Maersk (APM) Terminal, and GPHA. The expansion will help create more employment for Ghanaians, help accommodate the world's largest container ships, and improve cargo handling services.

4.2.1 Cost and Financing

The financing for the project came from a consortium of financial institutions. International Finance Corporation (IFC) announced a financial package of \$667m to fund the first phase of the expansion project, which includes \$195m from IFC itself and \$472m from the Bank of China, the Industrial and Commercial Bank of China, South African-based Standard Bank, and Dutch-based development bank Financierings-Maatschappij voor Ontwikkelingslanden N.V. (FMO). According to then Ghana's President John Mahama, "Government has no contribution or financial liability in respect of this project; the entire financing has been by the GPHA and its partners, Meridian Port Services (MPS)."

The government of Ghana granted a 20-year concession to Meridian Port Services Limited (MPS) to run the Tema Port in a formal contract agreement. According to Lawer (2019) the project is managed by MPS, a joint venture between Ghana Ports and Harbours Authority (30%), APM Terminals (35%), and African Global Logistics (35%).

The Tema port expansion is a project that is a public-private partnership between the GPHA, representing the Government of Ghana, and MPS. It involves upgrading and significantly expanding Ghana's main seaport (Kwofi, 2019). International Corporation Finance provided about \$195million from its reserve, and the remaining balance of \$472million was borrowed from the Bank of China, Dutch development finance company FMO, South Africa's Standard Bank, and Industrial and Commercial Bank of China. The Tema port expansion is under a 20-year build-operate and transfer (BOT) by Ghana Port Services Consortium (GPSC) to own and manage the container terminal (Obilie-Odei, 2006). Ghana Port and Harbour Authority (GPHA) will provide the main construction of the terminal. GPHA will further provide the terminal with all necessary equipment, while the consortium will handle the management, expertise and operation of the terminal while paying royalties to the Ghana Port and Harbour Authority (GPHA).

As part of the project implementation, an environmental and social impact assessment study (ESIA) was prepared, and stakeholders were engaged in planning to identify and capture their concerns, ensure inclusive growth, and avoid causing harm or destroying 'things of value' to the local communities and all relevant stakeholders. Also, a driving motivation for the project was to enhance the port's competitiveness as a leading maritime hub in West Africa. China Harbor Engineering Company and AECOM were the primary contractors responsible for project implementation. With a formal groundbreaking ceremony on November 16, 2016, the expanded port was opened for use on July 3, 2019, and the project was officially completed on April 30, 2020. About 80% of imported goods to Ghana are handled at Tema Port.

The project cost is categorized into three (3) cost phases: civil, mechanic, and renewal. The main mechanical costs are purchasing of cargo handling equipment. Maintenance costs include maintaining port facilities and are estimated as a fixed proportion (1 % for structures, 4 % for handling equipment) of the original construction costs, excluding dredging and reclamation costs. Considerations should be given to renewal costs for cargo handling equipment once they reach the end of their economic life.

Table 3. Costs profile of the Tema Port Master Plan

Items	Costs \$'000
Civil Works	250,262
Equipment	79,200
Total	329,462
Maintenance Costs for Structure	1,313
Maintenance Costs for Equipment	3,168
Total (per year)	4,481

Source: Japan International Cooperation Agency (n.d.)

4.3 Tema Oil Refinery

The Tema Oil Refinery (TOR), situated in the country's coastal industrial base, is a byproduct of Ghana's post-colonial industrialization effort, in which the country's first administration following independence engaged foreign investors as strategic partners in several important industrial projects. TOR commenced operations in 1963 as a refinery and was built and operated by the Ghanaian Italian Petroleum (GHAIP) Limited. Ghana's TOR, with a capacity of 45,000 barrels per stream day continues to be a significant crude oil refinery in Ghana (Boakye et al., 2022).

4.3.1 Cost and Financing

The refinery operated on a fee-based revenue model, turning crude oil from multinational companies into refined petroleum products (Turkson, 1990). However, in the 1970s, a wave of nationalization swept the nation, and by April 1977, TOR was entirely owned by the state and was operated as a tolling facility until 1996, when the government switched to vertical integration as its primary economic model. As a result of this change, TOR was able to recover the costs of refining, operational earnings, and crude oil by selling refined items on the market.

The corporation faced both political and commercial risks because of this strategy change. These issues were mostly caused by the accumulation of debt brought on by price controls and excessive governmental overreach. TOR's overall debt load reached unmanageable levels by 2003, and thus TOR needed government assistance to remain as a viable business entity (Boakye et al., 2022).

To raise funds for TOR's debt repayment, the (Tema Oil Refinery) Debt Recovery Fund Act, 2003 (Act 624), which was enacted by Parliament, imposed a tax on petroleum customers (Adam, 2014; Acheampong & Ackah, 2015). According to Boakye et al. (2022), TOR's debt load accessible to the public indicates that it owes \$320 million following as of the 2003 fiscal year. Boakye et al. (2022) found that the primary reasons behind TOR's debt accumulation problem are operational difficulties, a lack of accountability, and political intervention. The political system regularly enforced low-quality sole-sourcing contracts, which caused losses and questionable claims against Ghana's TOR. Furthermore, for the most part, TOR's operations have been inefficient and commercially unprofitable.

5. Discussion and Conclusion

5.1 Financial Dynamics and Global Disparities in P3 Financing

The financial dynamics of Ghana's Public-Private Partnerships (P3s) present a distinctive contrast to global financing practices, primarily revolving around equity and debt financing. Unlike many countries where private contractors often play a pivotal role in funding P3 projects through a mix of equity and debt, Ghana's P3s have largely relied on multilateral agencies for financial support. This unique financing structure is a response to the constraints posed by Ghana's limited capital market, making it challenging for private entities to fund large-scale P3 initiatives. The inability of private contractors to finance P3 projects in Ghana adds a layer of complexity, amplifying the necessity for external financial support.

This financial dynamic aligns with a recent publication in the New York Times by Cohen (2023), titled "Crisis and Bailout: The Tortuous Cycle Stalking Nations in Debt." Cohen (2023) reports that the Government of Ghana faced a substantial debt of \$63.3 billion at the close of 2022. What makes this debt situation particularly profound is that it extends not only to foreign creditors but also includes domestic lenders such as pension funds, insurance companies, and local banks. These entities considered the government a secure investment, underlining the unique

financial challenges faced by Ghana. Stéphan Roudet, representing the International Monetary Fund's mission to Ghana, emphasizes the gravity of the situation, stating, "this crisis is much deeper than the type of economic difficulties Ghana has faced in the past." The lack of involvement by indigenous contractors in financing P3 projects, along with the constraints posed by Ghana's limited capital market is a significant contributing factor to this financial scenario. This brings attention to the critical role of external financial support, predominantly from multilateral agencies, in sustaining Ghana's P3 initiatives.

Furthermore, P3s in Ghana as shown by the findings of this study suggest a complicated history derived from a policy vacuum where no P3 policy existed prior to 1999/2000. Given its institutional environment (Opara et al., 2017), even with enacted policy in place, a learning phase ensued with a focus on brown field redevelopment projects and no experience with (new) green field P3 projects (Opara & Ozor, 2023). Importantly, constrained by limited local capacity and financing to implement P3s, the national government was compelled to re-envision alternatives to the conventional P3 financing models. With this convergence of forces, Ghana turned to multilateral financing to creatively deliver needed public infrastructure.

This study contributes to our knowledge on P3 policy enactment and evolution. First, it contributes to the growing literature on P3 policy enunciation and implementation from a developing country perspective in Africa (Opara & Ozor, 2023). Second, given the established model of financing P3s globally, the novel ways that Ghana financed its P3 (mainly via multilateral funding sources), presents a different but effective model for infrastructure delivery within the P3 umbrella. Third, by showcasing Ghana's P3s, we uncover how a developing country can reimagine the accepted model in P3 financing, especially where the capital market is undeveloped or non-existent, entrenched corruption is an operational barrier to attracting foreign investment, and the institutional environment is evolving, unstable and/or unpredictable (Opara et al., 2017). Overall, the results contribute not only to the specific needs of Ghana but also to the broader global understanding of effective P3 financing strategies in infrastructure development.

5.2 Implications for Future P3 Initiatives in Ghana

The distinctive financing approaches in Ghana's P3 landscape, coupled with the broader national debt context, hold crucial implications for the future development and implementation of P3 projects in the country. First, the reliance on multilateral agencies necessitates a careful examination of funding sources and an exploration of alternative financing models that align with the unique financial constraints faced by Ghana. The insights from the New York Times article further underscore the need for a comprehensive approach, considering both foreign and local debt sources. Second, the absence of independent or local contractors emphasizes the importance of fostering a conducive environment for private sector participation. Efforts to strengthen the local private sector, encourage entrepreneurship, and address barriers to entry can contribute to a more diversified funding source for P3 initiatives.

Ghana is not an isolated case of unique infrastructure financing for P3 projects. According to the Inter-American Development Bank (2021), Brazil aimed to encourage innovative models for private investment in infrastructure. This initiative aimed to enhance service quality, address the socio-environmental impact of investments, and stimulate economic growth and productivity. The Inter-American Development Bank approved a \$20 million loan for this purpose. The National Bank for Economic and Social Development, utilizing both IDB's funds and its own resources, would finance Public-Private Partnership (P3) projects. Chile has awarded more than 50 concessions for toll road projects and airports (Loaiza, 2018). Meanwhile, Chile's P3 energy initiatives predominantly received financing from international lenders and multilateral agencies.

In conclusion, the financial dynamics of Ghana's P3s reveal a distinctive reliance on multilateral agencies, deviating from the global norm of equity and debt financing. The New York Times article provides a broader context, illustrating the magnitude of Ghana's debt and the trust placed by local lenders in government investments. Acknowledging these challenges, future P3 initiatives in Ghana must navigate the complex financial landscape by diversifying P3 financing sources, promoting private sector involvement, and adopting strategies that align with the unique constraints of the country's capital market. The success of these endeavors will hinge on a comprehensive understanding of the identified best practices and a commitment to continuous improvement in project planning, execution, and management.

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Obtained.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendix A: Summary of Major Sources

Authors	Origin	Purpose	Type of Source	Research Design	Target Population	Conceptual/Theoretical Framework	Framework Proposed	Major Themes
Anane, M. (2015)	Ghana	Discuss the controversy over the proposed Bui hydropower dam in Ghana	Article	Descriptive	General public, policy makers	No	No	Environmental and social impacts of dam construction
Acheampong, T., Ackah, I. (2015)	Ghana	Analyze petroleum product pricing, deregulation, and subsidies in Ghana	Academic Paper (SSRN)	Analytical	Policymakers, academics	Energy security	No	Energy policy, economic implications
Adam, M. A. (2014)	Ghana	Advocate for socially sustainable petroleum pricing in Ghana	Journal Article	Descriptive/Analytical	Policymaker, academics	Social sustainability	Socially sustainable pricing model	Petroleum pricing, social impacts
Boakye, B. et al. (2022)	Ghana	Examine the impact of politics, taxation, and ethics on Ghana's Tema Oil Refinery	Journal Article	Case Study	Business professional, policymakers	Ethics, political economy	Recommendations for policy	Business ethics, political influence, taxation
Brautigam, D. (2010)	International	Discuss the role of China in Africa's international aid architecture	Working Paper	Analytical	Academics, policymakers	International aid, economics	No	Aid strategies, China-Africa relations
Boardman, A. E. et al. (2016)	Canada	Review the theory and evidence concerning public-private partnerships	Research Paper	Review	Academics, policymakers	Public policy, economics	Analysis of PPP effectiveness	PPP effectiveness, Canadian context
Brautigam, D. et al. (2015)	Sub-Saharan Africa	Discuss Chinese financed hydropower projects in Sub-Saharan Africa	Policy Brief	Analytical	Academics, policymakers	International development, finance	No	Hydropower projects, Chinese financing
Chan, A. P. et al. (2009)	China	Compare drivers for adopting public-private partnerships in China and Hong Kong	Journal Article	Comparative Study	Policymaker, business leaders	Public administration, business management	No	PPP adoption drivers, comparative analysis
Cohen, P. (2023)	International	Discuss the cycle of crisis and bailout in debt-stalked nations	Newspaper Article	Descriptive	General public, policymakers	Economics, international finance	No	Global debt crises, financial bailouts
Dominic, M. U. et al. (2015)	Nigeria	Review public-private partnership projects in Nigeria	Journal Article	Review	Academics, policymakers	Public-private partnerships	No	PPP performance, project evaluation
Davies, S., Fairbrother, P. (2023)	International	Define Private Finance Initiative and Public Private Partnerships	Journal Article	Descriptive	Academics, practitioners	Public finance, project management	Definitions of PFI and PPPs	PFI and PPP definitions and contexts
Damoah, I.S. et al. (2020)	Ghana	Discuss the rise and challenges of	Journal Article	Analytical	Academics, government	Public housing, policy analysis	No	Housing, PPPs, policy

		PPPs in Ghana's housing sector			officials		challenges	
Authors	Origin	Purpose	Type of Source	Research Design	Target Population	Conceptual/Theoretical Framework	Framework Proposed	Major Themes
Engel, E. et al. (2014)	International	Analyze the role of finance in public-private partnerships	Article	Analytical	Academics, finance professionals	Finance, economics	No	Infrastructure finance, PPPs
Grimsey, D., Lewis, M. (2004)	International	Provide a comprehensive overview of Public Private Partnerships worldwide	Book Chapter	Descriptive/Analytical	Academics, policymakers	Economics, project finance	No	Global PPP practices, project finance
Hensengerth, O. (2011)	Ghana	Explore interactions of Chinese institutions in Ghana's dam construction	Book Chapter	Case Study	Academics, policymakers	International relations, development economics	No	Chinese foreign policy, dam construction in Ghana
Hanna, K. T. (2022)	International	Define public-private partnership (PPP) Enable infrastructure build-out in the United States through public-private partnerships	Web Article	Descriptive	General public, policymakers	No	No	Overview of PPPs
Jacobi, J. (2009)	USA	Discuss the additional funding needs for the Bui Project	Report	Analytical	Business leaders, policymakers	Infrastructure development	Strategies for infrastructure build-out	PPP strategies, infrastructure build-out
Kunateh, M. A. (2011)	Ghana	Examine stakeholder participation and conflicts in Tema port expansion project	News Article	Descriptive	General public, business community	No	No	Funding needs, project financials
Lawer, E. T. (2019)	Ghana	Discuss government pressures regarding the Tema Port Expansion Project	Journal Article	Case Study	Academics, business leaders	Stakeholder management	Insights on managing conflicts	Stakeholder conflicts, infrastructure projects
Kwofi, M. (2019)	Ghana	Compare PPP financing mechanisms for infrastructure projects	News Article	Descriptive	General public, business community	No	No	Political pressures, infrastructure development
Maryouri, L. (2013)	International	Outline national policy on public-private	Conference Proceedings	Comparative Analysis	Academics, finance professionals	Public finance	No	PPP financing, comparative analysis
MOFEP (2011)	Ghana		Policy Document	Policy Analysis	Policymaker, business leaders	Public policy, finance	National policy	PPP Policy guidelines, PPP frameworks

<p>Martin, L. L. (2018)</p>	<p>USA</p>	<p>partnerships in Ghana Provide insights for local government managers on public-private partnerships</p>	<p>Journal Article</p>	<p>Descriptive</p>	<p>Local government managers</p>	<p>Public administration</p>	<p>Insights on PPP management</p>	<p>Local governance, PPP insights</p>
<p>Osei-Kyei, R. et al (2017)</p>	<p>International</p>	<p>Identify critical success criteria for public-private partnership projects</p>	<p>Journal Article</p>	<p>Delphi Study</p>	<p>International experts</p>	<p>Project management</p>	<p>Critical success criteria</p>	<p>PPP success factors, expert opinions</p>

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