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Mapping Procurement and Delivery Models in Belt and Road Initiative Infrastructure Projects: A Typological Analysis of West Africa

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About Article

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ABSTRACT

The Belt and Road initiative has become a principal source of infrastructure financing across West Africa. While substantial research exists on its geopolitical and macroeconomic dimensions, a systematic understanding of the operational mechanisms of its project delivery remains underdeveloped. This study addresses this gap by conducting a descriptive, typological analysis of both the procurement and delivery models governing major BRI infrastructure projects in West Africa. Through a documentary analysis of nine high-value transport and energy projects across four West African countries Nigeria, Ghana, Côte d'Ivoire, and Sierra Leone. This research identifies, catalogues, and categorizes the predominant contractual structures. The findings reveal a pronounced dual hegemony: the Direct Contracting (Sovereign Loan-Financed) Contract as the dominant procurement model, paired almost universally with the Engineering, procurement, and Construction (EPC) turnkey model. The findings reveal a pronounced dual hegemony: the Direct Contracting (Sovereign Loan-Financed) Contract as the dominant procurement model, paired almost universally with the Engineering, Procurement, and Construction (EPC) turnkey model. This paper concludes by presenting a definitive typology of BRI project execution in the region, arguing that this specific pairing constitutes a standardized template that prioritizes speed, control, and supply-chain dominance for Chinese entities, while transferring significant financial liability to host governments. The typology also provides a critical framework for future comparative research on project outcomes.

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1. INTRODUCTION

The Belt and Road Initiative (BRI), launched by China in 2013 (Chiebuka *et al*., 2025), represents some of the most ambitious transnational infrastructure development programs in history (Javaid & Legacy, 2024). In West Africa, a region characterized by a significant infrastructure deficit (Lu & Wilson, 2024), the BRI initiative has pledged and deployed billions of dollars for projects in transportation, energy, and other critical sectors (Nedopil, 2025). The academic and policy discourse surrounding the BRI in Africa has largely been dominated by macro-level analyses (Hobbs *et al*., 2023), focusing on its strategic drivers, debt sustainability implications (Bandiera & Tsiropoulos, 2020), and broader geopolitical contestation (Simonov, 2025).

However, a critical yet under-examined aspect lies at the operational level: the specific procurement and delivery models through which these projects are executed. The choice of the procurement model, either sovereign loan, public-private partnership (PPP), or suppliers' credit, defines the allocation of financial risk and ownership. Concurrently, the choice of delivery model, such as Engineering, Procurement, and Construction (EPC) or Design-Bid-Build (DBB), dictates the execution strategy and the distribution of construction risk and rewards among stakeholders. Understanding the interaction between these two layers is essential to moving beyond geopolitical rhetoric and understanding the how of BRI project delivery.

Despite the proliferation of BRI infrastructure in West Africa, there exists a significant research gap concerning a systematic and comparative analysis that disentangles procurement models from delivery models. The current discourse often treats the BRI model as a monolith, overlooking the crucial operational distinctions between how projects are financed and contracted (procurement) and how they are physically built (delivery). This study, therefore, asks: What are the predominant procurement and delivery models used in BRI transport and energy projects in West Africa, and how are they paired together? By mapping this typology, the research provides a foundational analysis that is a necessary precursor to future studies on model performance and impact.

The study aims to map the procurement and delivery models of BRI infrastructure projects in West Africa. Its objectives are to identify predominant models like Direct Contracting (Sovereign Loan-Financed) contracts and EPC, analyze their pairings, and create a typology. The research seeks to answer what models are used, how they are paired, and what this reveals about the standard BRI package. Ultimately, it will provide a framework to distinguish financial procurement from physical execution strategies.

The study's scope is limited to transport and energy projects executed by Chinese SOEs from 2010-2025. It focuses solely on mapping models, not assessing their outcomes. The paper is structured as follows: a theoretical framework, followed by the methodology, findings, discussion, and conclusion.

2. LITERATURE REVIEW

To analyze the conceptual structure of BRI projects, a clear understanding of global standard procurement models is essential. This framework provides the categories for our subsequent typology.

2.1. Conceptualizing procurement models

Procurement models define the overarching financial and contractual strategy for securing a public asset (Awuah *et al*., 2022). They answer fundamental questions of financing, ownership, and risk allocation at the macro level between the public authority and the private market (The World Bank, 2024). This research focuses on three primary models relevant to the BRI context:

i. Direct contracting (sovereign loan-financed) contract: model where the host government secures a loan (typically from a foreign policy bank) and acts as the project owner. Directly contracting a builder. The government bears all financial and operational risk. Within the BRI context, the predominant model is Direct Contracting financed by a sovereign loan. This describes a process where a host government receives a loan from a Chinese policy bank on the condition that the construction contract is awarded directly to a specific Chinese SOE without a competitive tender.

ii. Public-private partnership (PPP): A long-term contract where a private entity finances, builds, and often operates an asset, recovering costs through user fees or government availability payments (The World Bank, 2014). Risk is shared between the public and private partners. Common Variants include.

- *Build Operate Transfer (BOT):* The private entity finances, builds, and operates the facility for a concession period to recover its investment and make a profit, after which ownership is transferred back to the public authority (Augenblick & Custer, 1990).
- *Build Own Operate Transfer (BOOT):* Similar to BOT, but the private entity holds ownership title during the concession period (Bashiri *et al.,* 2011)

These models leverage private finance and expertise but involve lengthy negotiations and require a robust regulatory framework (Augenblick & Custer, 1990).

2.2. Conceptualizing delivery models

Delivery Models, in contrast, govern the execution phase of the project (Sallam, 2021). They define the relationship between the client (which could be a government or a private special purpose vehicle) and the contractor, determining the allocation of design, construction, and performance risk (Mohd Noor *et al*., 2022). This analysis focuses on two key delivery models:

2.2.1. Engineering, procurement, and construction (EPC)/ turnkey model

In an EPC contract, a single contractor is responsible for all activities from design and engineering, through procurement of materials and equipment, to construction and commissioning, delivering a fully functional turnkey asset for the client (Hansen, 2015). This model offers the client a single point of responsibility, potentially resolving disputes and streamlining project delivery. The contract is typically a lump sum of fixed prices, transferring the risk of cost overruns during construction to the contractor. However, this often results in a higher initial bid office to cover this risk (Liu *et al*., 2020).

2.2.2. Traditional design- bid- build (DBB)

This is a sequential process where the client first hires a

consultant to complete all designs. Once designs are complete, contractors are invited to bid solely on the construction work based on those designs. This model often leads to a longer project timeline (Airports Council International-North America, 2012) and a potential adversarial relationship between the designer and builder (Bajari *et al.*, 2009), with the client bearing most of the risk for design errors (Washington State Department of Transportation, 2015).

2.3. Synthesizing the framework: A two-tiered analytical lens

The theoretical innovation of this framework lies in its application of the two-tiered lens to the BRI. It moves beyond treating BRI projects as a monolithic model and instead provides the tools to deconstruct them into their core components. This allows for the hypothesis that a single procurement model (e.g., a sovereign loan) can be executed via different delivery models, and conversely, a single delivery model (e.g., EPC) can be deployed under different procurement strategies. This framework is not merely descriptive; it enables the systematic categorization and subsequent analysis of how risks and responsibilities are allocated in what is often described as the standardized "BRI Package."

This dichotomy between procurement and delivery models is particularly important for analyzing the BRI because of its distinctive characteristics. As a state-led initiative involving policy banks and state-owned enterprises, the BRI differs from other international infrastructure programs that rely more heavily on competitive procurement and diversified delivery mechanisms. Thus, examining procurement and delivery separately provides a conceptual tool to capture how financing structures and execution strategies may interact in distinctive ways under the BRI framework.

3. METHODOLOGY

3.1. Research design

The study employs a qualitative, descriptive research design centered on a multiple case study approach (Baxter & Jack, 2010) (Shinija, 2024). The design is ideal for developing a typology, as it allows for the in-depth examination of a phenomenon within its real-world context. The research is guided by an interpretivist philosophy, which seeks to understand complex social phenomena (like international procurement) through the analysis of texts, reports, and documents that reflect the experiences and perspectives of various stakeholders.

3.2. Case selection and study population

A purposive sampling strategy was used to select information-rich cases. The study population was defined as all physical infrastructure projects in West Africa meeting these criteria.

i. Sector: Transport (rail, port, highway) and Energy (power generation)

ii. Financial value: minimum project value of 100 million USD.

iii. Financing: primarily financed by Chinese policy banks (China Exim Bank, China Development Bank) or major Chinese commercial banks.

iv. Status: Reached financial close, and we are under construction or completed between 2010-2025

From this population, nine projects were selected to ensure diversity across project type and host country:

i. Lagos- Ibadan Railway (Nigeria, Transport)
ii. Abuja-Kaduna Railway (Nigeria, Transport)
iii. Lekki Deep Sea Port (Nigeria, Port)
iv. Zungeru Hydropower (Nigeria Energy)
v. Kaleta Hydropower (Guinea Energy)
vi. Souapiti Hydropower (Guinea Energy)
vii. Abuja Keffi Highway (Nigeria Transport)
viii. Port of Abidjan Expansion (Cote d'Ivoire, Port)
ix. Wellington-Masiaka to Highway (Sierra Leone, transport)

From this population, nine projects were selected to ensure diversity across project type, host country, and to include variance in procurement models.

3.3. Data collection and analysis

Data was collected exclusively through systematic documentary analysis of publicly available sources. The primary foundation for identifying projects and their financial structures was AidData's Global Chinese Development Finance Dataset, Version 3.0 (2023). A comprehensive and peer-reviewed repository tracking Chinese official finance worldwide. This primary data was rigorously triangulated with information from the following source types to ensure validity and depth: Government and Institutional Documents, Chinese Sources, Research Data-based, News Media & Industry Reports.

Data was extracted into a standardized matrix for each case, focusing on variables such as Contractual terminology, financing structure, involved parties, and reported responsibilities. The data was then analyzed by classifying each project into the predefined theoretical categories (EPC, PPP, etc.) based on its identifying features.

A key limitation of this study is its reliance on documentary analysis of publicly available sources. While triangulation across multiple datasets and reports was undertaken, such sources may not capture the full nuance of contractual arrangements, including confidential side agreements, undisclosed risk allocation mechanisms, or informal political negotiations. Consequently, the typology developed here should be read as a robust but partial representation of BRI delivery mechanisms.

4. RESULTS AND DISCUSSION

This chapter presents the result of the systematic documentary analysis. The primary finding is a striking lack of diversity in project execution models. The results reveal a near-complete standardization on a single model pairing across the region, with only limited exceptions that prove the rule. The evidence is summarized in Table 1 and analyzed thematically below.

4.1. A region standardized: The sovereign loan + EPC dominance

The most salient finding is the overwhelming hegemony of a single approach: procurement via Direct Contracting (Sovereign Loan-Financed) contract coupled with delivery via the Engineering, procurement, and Construction (EPC)/ Turnkey model.

This pairing accounts for 77% of the projects studied. This model is applied consistently across all four sampled countries

(Nigeria, Ghana, Guinea, and Cote d'Ivoire) and four sectors (rail, highway, energy, and ports). The consistency indicates a highly streamlined, off-the-shelf "BRI package" offered by Chinese policy banks and state-owned enterprises (SOEs), prioritizing turnkey delivery and Chinese control over the supply chain while transferring financial liability to host governments.

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4.3. The Exceptional Cases: PPP Procurement, [Persistent EPC Delivery]

Only two projects deviate from the sovereign loan procurement model, and both utilize Public Private Partnership (PPPs). Crucially, however, both still default to the standard EPC model for delivery.

Their evidence demonstrates that alternative procurement structures are feasible within the BRI framework, particularly for revenue-generating transport assets. However, their adherence to the EPC delivery model underscores that the paradigm for physical project execution remains exclusively and consistently Chinese.

These deviations highlight an important nuance: both PPP cases (Lekki Port in Nigeria and Wellington-Masiaka Highway in Sierra Leone) involved assets with clear revenue-generation potential, making them attractive for private-sector participation. The reliance on PPPs in these cases suggests that the standardized sovereign loan + EPC package may be less viable where repayment is expected to be sustained by project-level revenues rather than sovereign guarantees. However, the persistence of the EPC model even under PPP procurement underscores that Chinese SOEs retain dominance in physical delivery, suggesting that flexibility exists in financing, but not in execution strategy.

4.4. The Exceptional Cases: PPP Procurement, [Persistent EPC Delivery]

Table 1 synthesizes the model pairings identified across all case studies, providing a definitive typology of BRI project execution in West Africa.

Table 1. Typology of procurement and Delivery models in BRI Projects in West Africa

Project	Country	Sector	Procurement Model	Delivery Model	Contractor	Key Identifying Features & Validation Sources
Lagos-Ibadan Railway	Nigeria	Transport	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	China Civil Engineering Construction Company (CCECC)	(The Export-Import Bank of China, 2021) (Custer *et al.*, 2023) (AidData, 2023)
Abuja-Kaduna Railway	Nigeria	Transport	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	China Civil Engineering Construction Company (CCECC)	(AidData, 2023) (Custer *et al.*, 2023)
Abuja-Keffi Highway	Nigeria	Transport	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	China Harbour Engineering Company	(Federal Ministry of Works, 2024) (Custer *et al.*, 2023) (AidData, 2023)
Port of Abidjan Expansion	Côte d'Ivoire	Transport	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	China Harbour Engineering Company	(Custer *et al.*, 2023) (The Export-Import Bank of China, 2021)
Zungeru Hydropower	Nigeria	Energy	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	Sinohydro Corporation Limited and China National Electric Engineering Company	(Vanguard, 2023) (Custer *et al.*, 2023)
Souapiti Hydropower	Guinea	Energy	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	China International Water & Electric Corporation (CWE)	(China Three Gorges Corporation, 2020) (Custer *et al.*, 2023)
Kaleta Hydropower	Guinea	Energy	Direct Contracting (Sovereign Loan-Financed)	EPC/ Turnkey	China International Water & Electric Corporation (CWE).	(Aljounaidi *et al.*, 2018) (Custer *et al.*, 2023)

Lekki Deep Sea Port	Nigeria	Transport	PPP (BOOT)	EPC/ Turnkey	China Harbour Engineering LFTZ Enterprise (CHELE)	(Custer *et al.*, 2023) (Infrastructure Concession Regulatory Commission, 2023)
Wellington-Masiaka Highway	Sierra Leone	Transport	PPP (BOT)	EPC/ Turnkey	China Railway Engineering Corporation 7th Bureau	(Custer *et al.*, 2023) (International Monetary Fund, 2021)

4.5. Synthesis of findings

The analysis, encompassing ten major projects across four West African nations, leads to an unequivocal conclusion: the procurement and delivery landscape for BRI infrastructure in West Africa is defined by a dual hegemony.

i. Procurement Hegemony: The overwhelming use of the sovereign loan financed contract model. Eight of the ten projects are financed via loans from Chinese policy banks (Primarily China Exim bank) to the host government, which then directly awards the contract to a chinses SOE.

ii. Delivery Hegemony: The near universal application of the EPC/turnkey model for execution. All ten projects, regardless of their procurement model, utilize the EPC delivery model.

Sovereign Loan+ EPC emerges as the standardized "BRI package" for large scale infrastructure in west Africa. The two exceptions prove the rule and reveal nuance within the typology.

The Lekki Deep Sea Port and wellington-Masiaka Highway demonstrate that the PPP procurement model is viable for large, revenue-generating port assets, though it still utilizes the standard EPC delivery model for construction.

5. CONCLUSION

In conclusion, the BRI's operational footprint in West Africa is defined by a dual hegemony: sovereign loan procurement and EPC delivery. Together, these mechanisms constitute a standardized template that accelerates project execution, consolidates Chinese control, and minimizes risk exposure for Chinese entities. While PPPs introduce limited flexibility in financing, they do not alter the fundamental dominance of EPC delivery. This dual hegemony thus provides the clearest explanation of how the BRI operates at the project level, with significant implications for host states and for future comparative research

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