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Africa Takes the Wheel

THE ROLE OF HOST STATES IN SHAPING OUTCOMES OF CHINESE-SUPPORTED POWER GENERATION PROJECTS IN AFRICA

BY NAA ADJEKAI ADJEI

ABSTRACT

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Chinese companies have played a leading role in transforming Africa's infrastructure landscape. From roads to power stations, Chinese firms have been active in building mega infrastructure projects in the region. Discourse on the outcomes of Chinese-supported infrastructure projects has mainly focused on the role of China in shaping these projects, with limited analysis of the role of African host states and their actions (or inactions) contributing to the project outcomes. This working paper considers how host states exercise agency to influence the outcomes of Chinese-supported hydropower plants in Ghana and Uganda. In doing so, the paper analyses the financing and construction of hydropower plants by the Export-Import Bank of China and Sinohydro in Uganda and Ghana using semi-structured interviews and document analysis. It finds that despite the same Chinese actors undertaking similar projects in the two countries, Ghana had more positive investment outcomes with projects mainly built on time, at a cost-competitive price and to an acceptable quality, whilst Uganda had less than ideal outcomes, with projects being delayed, expensive and burdened by multiple defaults. This paper draws on the lessons from the Bui Hydropower Plant in Ghana and the Karuma Hydropower Plant in Uganda to provide policy recommendations for African host states to achieve positive project outcomes when undertaking Chinesesupported power generation projects.

Acknowledgments: The author is grateful to Kevin P. Gallagher, Zara Albright and colleagues at the Boston University Global Development Policy Center for their insights and feedback during the preparation of this working paper. I am also grateful to Wikus Kruger and Anton Eberhard from the Power Futures Lab at the University of Cape Town for their overall guidance during the research process. I would also like to thank my interviewees for taking the time to participate in the study and being open in their engagements with me.

INTRODUCTION

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Africa has the lowest electrification rates in the world and is in a power crisis. Over 40 percent of the continent's population does not have access to electricity, 98 percent of which are in sub-Saharan Africa (International Energy Agency, 2022; Moses, 2023). It is also the only region with declining electrification rates (Collier & Cust, 2015). This electricity deficit has impacted the continent's economic growth by reducing productivity, stunting job growth and increasing business costs (Mensah, 2024). A critical reason for this electricity deficit is persistent underinvestment in generation infrastructure in the region. Previously, African governments financed and constructed large-scale power generation plants, but limited fiscal resources and the population's competing needs have limited their ability to ring-fence large sums of money to develop the power generation infrastructure required to meet their country's electricity needs (Briceño-garmendia et al., 2008; Calitz & Fourie, 2007; Kaplan, 2021; Ruiters, 2013). These fiscal constraints have accelerated the need for alternative investors who have the capacity to develop the required power generation facilities. Chinese investors have been critical in helping the region address its electricity infrastructure shortfalls.

Chinese companies have installed over 25 GW of generation capacity in the region, making up more than 15 percent of sub-Saharan Africa's installed generation capacity (Boston University Global Development Policy Center, 2022). Despite their undeniable contribution to the power sector in sub-Saharan Africa, the price and investment outcomes of these projects have varied. Chinese companies have been observed to construct both low- and high-quality infrastructure projects in Africa, with some projects seen as affordable and others more expensive (Bénazéraf, 2014). This working paper aims to shed light on the reasons for these varied outcomes, with a focus on the role of the host state in shaping project outcomes. The outcomes examined are cost, timely project delivery and compliance with specifications. This paper contributes to a growing body of literature analyzing how host states in the region exercise agency during the planning, negotiation and implementation of Chinese-supported power generation projects (CSPs), explaining the varying and sometimes contrasting project outcomes in different countries.

This research aims to understand the role of host states in shaping the outcomes of Chinesesupported power generation projects. In doing so, this paper considers two case studies: the Karuma hydropower plant in Uganda, which was relatively expensive, completed after the scheduled date and suffered several quality challenges, and the Bui hydropower plant in Ghana, which was built primarily on schedule, is of high quality and relatively cost competitive. These plants are suitable comparators, as they were financed and constructed by the same Chinese companies, the Export-Import Bank of China (CHEXIM) and Sinohydro, respectively. The working paper analyzes insights from the Bui and the Karuma hydropower plants to offer actionable recommendations to policymakers in African host states. Extracting and applying lessons from the successes and challenges experienced in these projects may enhance governments' capacity to plan, develop and manage mega infrastructure projects with Chinese investors.

This paper is structured as follows: This first section introduces the paper. The second section provides an overview of Africa-China engagement in power generation projects. The third section consists of

a literature review of host state agency in relation to Chinese infrastructure projects in Africa. The fourth section details the methodology used in the study, while the fifth and sixth sections present the case studies of the Karuma and Bui Hydropower plants, respectively. The seventh section offers a comparative analysis of the findings from each case study and discusses critical outcomes. The paper concludes with policy recommendations.

OVERVIEW OF AFRICA-CHINA ENGAGEMENTS IN THE REGION'S POWER SECTOR

Over the last 10 years, interest in China's activities in Africa has surged dramatically. However, interactions between China and Africa are not recent, as their engagements can be traced back nearly 2,000 years (Links, 2021; Powanga & Giner-Reichl, 2019). Africa has served as an important partner for China. Since 1950, with only one year as an exception, the first official overseas visit of the year by the Chinese Minister of Foreign Affairs has been to an African nation (Vines & Wallace, 2023). This underscores Africa's importance to China, a sentiment further emphasized by the numerous tours Chinese leaders have undertaken across the continent. Further, China played a pivotal role in supporting African nations during their liberation struggles, while African countries backed China's bid for membership in the United Nations (Powanga & Giner-Reichl, 2019; Zhao, 2011). Since then, China and Africa have deepened their relations, engaging in projects across energy, infrastructure, healthcare, manufacturing and trade sectors (Brautigam, 2009; Salidjanova, 2011). Despite these positive interactions, the relationship has faced several challenges, including political, labor and debt sustainability issues, which have posed obstacles to their cooperation (Brautigam, 2021; Brautigam & Wang, 2021; Human Rights Watch, 2011; Lema et al., 2021; Ofodile, 2009; Singh, 2020; Were, 2018). These issues, although noteworthy, are not the primary focus of this paper and will only be discussed where vital to the projects under examination.

Chinese firms have considerably impacted the region's installed generation capacity. As discussed, Chinese-supported power generation projects comprise 15 percent of the region's installed generation capacity. Further, Chinese-supported power generation infrastructure is present in at least 27 of the 46 countries in sub-Saharan Africa. Regarding the type of power generation infrastructure that has been built, the primary technology Chinese investors implement is coal-fired power plants, as illustrated in Figure 1. These installations have reached over 10 GW, accounting for 42 percent of their total installed generation capacity in the region. However, in the last quarter of 2021, Chinese leader Xi Jinping declared that China would cease funding new coal projects abroad and instead step up support for renewable energy in developing countries. Since this announcement, Chinese companies in Africa have initiated no new coal-fired power plants (Chen & Shen, 2022). Hydropower ranks as the second most prevalent technology, with Chinese investors having installed about 9.4 GW, representing 38 percent of their capacity in the region. Gas power plants follow, with a capacity of 3.6 GW, making up 14 percent of their installations. Wind, oil and solar technologies represent 2.5 percent, 1.6 percent and 1.3 percent, respectively (Boston University Global Development Policy Center, 2022).

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Figure 1: Generation Mix of CSPs in SSA



Source: Author's elaboration based on Boston University Global Development Policy Center, 2022.

Africa's renewable energy sector is slowly taking off. However, Chinese companies have had low levels of engagement in this sector relative to their expertise and experience (Chiyemura et al., 2021). Several factors contribute to this, including the reluctance of African governments to offer guarantees for smaller renewable energy projects, the high coordination costs for Chinese institutions, which deter them from undertaking smaller projects, and the preference of China's overseas investment policy for larger ventures (Ayele et al., 2021). Despite their slow engagement in the region's renewable energy initiatives, the global shift towards renewables, decreasing costs of these technologies, China's dominance in manufacturing and constructing these technologies, and China's new focus on smaller projects may prompt increased Chinese engagement in the non-hydro renewable energy projects in the region (Ray, 2023; United Nations Development Programme, 2018).

In addition to understanding the scale of CSPs in the region, it is critical to understand how Chinesesupported projects have been implemented. Chinese overseas investment has been characterized by state-backed capital (Kaplan, 2021). This has meant that most CSPs in the region have been implemented using Chinese overseas development finance. China's development finance institutions (DFIs), CHEXIM and the China Development Bank (CDB), have played a crucial role in developing CSPs. CDB offers commercial loans, but their engagement in the region's power generation sector has been relatively limited. CHEXIM offers concessional and non-concessional loans to host governments to construct power projects - typically using an engineering, procurement, construction, plus finance model (EPC+F), as illustrated in Figure 2 (Li et al., 2022).

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Figure 2: China's EPC+F model



Source: Adapted from Deloitte Consulting, 2017.

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Using this mechanism, the Chinese EPC contractor assists the host state in gaining finance from China's DFIs. Once they receive this finance, the host state constructs the requisite infrastructure using the services of the Chinese EPC contractor and pays the loans to the Chinese DFI using the proceeds from the sale of electricity. Various security arrangements are implemented to serve as collateral for the loan, including government guarantees, resource-backed finance, state-backed insurance, diplomatic relations and cross-default clauses(Kaplan, 2021). The DFIs may use any combination of these security instruments, depending on the project. Although Chinese private sector firms are increasingly developing power projects in the region through foreign direct investment (FDI), this paper focuses on state-sponsored projects, as this is how the two projects that form the subject of the case studies were developed. Further, it is also the primary way Chinese firms develop power generation infrastructure in the region (Li et al., 2020; Shen, 2020).

The broad overview of China's involvement in the region's power generation sector highlights the substantial impact of Chinese companies. From developing approximately 15 percent of the region's power generation infrastructure to undertaking projects in over half of the countries in sub-Saharan Africa, their contribution to the continent's installed generation capacity cannot (and has not) gone unnoticed. Substantial research has been conducted to understand how Chinese state-sponsored finance operates in developing power generation projects in the region (Brautigam, 2009; Brautigam & Hwang, 2019; Li et al., 2022; Shen, 2020; Shen & Power, 2017). However, research has paid less attention to the role of African host states in shaping the outcomes of Chinese-supported projects.

Although lagging when compared to research in understanding China's role in developing projects, there has been increased interest in examining the manner and extent to which host states in the region exercise agency in their engagements with Chinese counterparts. This research includes studies on host state agency in Chinese-supported projects in the region spanning infrastructure, healthcare and education sectors (Soulé-Kohndou, 2016; Taylor, 2020; Wang, 2021). These studies

have revealed that it is vital for host states to exercise agency during all stages of the project, including planning, negotiating, developing and operating phases (Chiyemura et al., 2022). Given their unique investment landscape and infrastructure requirements, each country in the region needs to exercise its agency to determine the types of investments required and optimal investment models to achieve the most favorable and balanced outcomes for the country and Chinese investors undertaking the projects (Albert, 2018; Chiyemura et al., 2022; Links, 2021).

This paper evaluates how host states shape the outcomes of Chinese-supported power projects in sub-Saharan Africa. The next section considers the literature on host state agency, which forms the analytical framework of this study.

EXAMINING LITERATURE ON AFRICAN HOST STATE AGENCY IN ITS ENGAGEMENT WITH CHINA

As indicated, much of the existing literature on Africa-China relations focuses on China's role in the parties' engagements, often assuming that China dictates the terms, pace and nature of these engagements, while African counterparts are almost passive receivers of Chinese investment (Gadzala, 2015). This view is flawed for two reasons: firstly, China is not a single, unified and monolithic entity, rather, Chinese-supported power projects involve a complex web of institutions and actors, each often pursuing individual interests (Chiyemura, 2020). Secondly, and more relevant to this study, the prevailing assumption overlooks how African host states actively shape their engagements with Chinese firms or institutions involved in local projects. Earlier views perceived host states in the region as docile recipients lacking the capacity, autonomy and skill to influence the outcomes of Chinese-supported projects (Hanauer & Morris, 2014; Marfaing & Thiel, 2013; Park et al., 2016). These views stemmed from the apparent power imbalance between China and the host states, given China's global economic and political influence and its leading role in financing and constructing infrastructure in the region (Links, 2021). Failure to assess how host states in the region have shaped the outcomes of Chinese-supported projects not only presents an incomplete picture of the parties' engagements but also limits the opportunity to enhance Africa's capacity during these engagements. Recent discourse that acknowledges the role host states play in shaping their engagements with Chinese counterparts challenges the reductionist assumptions that African host states lack autonomy and skill. This new perspective offers a critical and nuanced lens to understand the outcomes of Chinese-supported power generation projects (Chiyemura, 2019; Links, 2021). To unpack this agency, the fundamentals of the phenomenon must be discussed: What is agency? How is it exercised? What constrains it?

Agency has been defined as the ability of individuals to apply their skills, knowledge and competencies in innovative ways to benefit their communities or themselves (Taylor, 2015). Orton (2009) describes agency as human behavior which is purposive and directed to making decisions in pursuit of the actor's interests. It refers to the individual qualities, capacity and motivation that actors can draw on to achieve their goals (Orton, 2009). Although Orton (2009) and Taylor (2015) provide helpful descriptions to begin understanding agency, it is essential to note that there is no universally agreed-upon definition of agency. Further, it is widely recognized that the capacity or ability of an agent to act is significantly influenced by the surrounding structures (Ereker, 2013; Orton, 2009). This has ignited discourse on the agent-structure problem (Berejikian, 1992; Desler, 1989; Wendt, 1987). The central issue that is considered in the agent-structure debate is the extent to which individuals can undertake independent action, and it involves an analysis of how much individual behavior is shaped or limited by social structures (Deacon, 2004). Analyzing actions based on the assumption that agents operate in isolation or that structures exist without agents would be challenging (Wight, 2006). Therefore, recent discussions favor a balanced approach, recognizing the interconnectedness

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of agency and the broader structural context (Ereker, 2013). This paper adopts a balanced approach to investigate whether and how African hosts exercised agency in implementing Chinese-supported power projects (Giddens, 1984).

In addition to understanding what agency is and how it may be constrained, it is critical to understand the various spheres within which it may be exercised. Understanding how host states in the region exercise agency involves recognizing the roles of multiple actors who influence and implement both formal and informal rules and laws (Chiyemura et al., 2022). Key host state actors in Chinese-supported projects in the region include the presidency, government ministries and departments, specialized agencies and regulatory institutions, state-owned companies, politicians, and well-connected elites (A. W. Gadzala, 2015). Research often examines the role of political elites, such as presidents, in advancing Chinese-supported projects (Allawi & Changfeng, 2018; Ogwang & Vanclay, 2021; Wang, 2021). Within this discourse, Wang (2021) applied the political championship theory to Chinesesupported railway projects in Kenya and Ethiopia, finding that executive leaders' involvement was crucial in overcoming challenges and achieving successful outcomes. The intentions of leaders incentivized subordinates and reduced resistance, leading to better project results (Wang, 2021).

Besides political elites, bureaucrats and technocrats play vital roles in project outcomes. Their expertise and day-to-day involvement impact the pace of project delivery, the quality of the infrastructure built, and the cost at which the project is realized (Chiyemura, 2019; Chiyemura et al., 2022). In addition to actors who directly represent the state, non-state entities, including sector associations, community groups, private companies, labor unions and other interest-based associations, can also exercise agency in infrastructure projects (Gadzala, 2015). Host state agency comprises a complex network of actors from various institutions, not limited to the actions of a single entity (Jessop, 1990). Having provided a high-level overview of what agency is and how a host state can exercise it, we shift focus to discourse on host states in Africa-China engagements.

Despite the initial and still dominant approach to research on Africa-China relations, which focuses on China, recent studies have shifted towards understanding the manner and the extent to which host states in the region exercise agency when engaging with their Chinese counterparts. Research into this area has examined the (i) reintegration of African agency into these relations (Mohan & Lampert, 2013), (ii) creation of space for Africa to exercise agency in its engagements with Chinese institutions (Lampert & Mohan, 2015) and (iii) the need to uncover the agency exercised by African states in these interactions (Corkin, 2013). More recent research has begun analyzing how host states shape the terms, conditions and outcomes of Chinese-supported infrastructure projects, including energy projects (Chiyemura et al., 2022; Mohan & Lampert, 2013; Wang, 2021). Importantly, research into the exercise of host state agency in Africa-China relations finds that host states in the region tend to exercise their agency at the beginning of the project, particularly during negotiations. However, most states do not consistently exercise agency throughout project implementation, which may result in less-than-ideal project outcomes (Phillips, 2019).

Chiyemura (2019) analyzed how Ethiopia shaped the outcomes of wind farms that were financed and constructed by Chinese companies. His research employed process tracing to consider the different spheres where Ethiopia exercised agency in developing its Chinese-supported wind projects. This study is notable for its emphasis on the influence of the host state on the outcomes of Chinese-supported power generation projects. This approach contrasts with the predominantly China-centric analysis commonly found in discussions of Africa-China engagements. It also offers an analytical framework for this working paper.

Chiyemura (2019) found significant collaboration between the host state and the Chinese investors during the project development. He discovered that contrary to the prevalent assumption in existing literature that emphasizes China's motivations and role in these projects, both African and Chinese

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actors actively shape these engagements. In addition, Chiyemura (2019) revealed that both parties had their own motivations and drivers for undertaking the projects, making their collaboration logical and mutually beneficial.

Further, Chiyemura (2019) found that Ethiopian actors had numerous opportunities to influence their interactions with Chinese counterparts, and they did so. He identified several critical areas where Ethiopian actors asserted their agency within the project implementation and management process. We consider each of these aspects except those relating to labor relations and technological transfer, as they do not immediately impact the price and investment outcomes of the projects. This included leading energy sector planning and policy development, initiating the project negotiation process, and forming joint project management teams. These spheres form the framework within which the exercise of agency is analyzed in the case studies, and detailed in Table 1.

Area	Area Action Taken by the Host State (Ethiopia)
Policy and Planning	Exercised autonomy in preparing energy plans and policies for the wind farms.
Brokering Engagement	Facilitated and brokered engagement between themselves and Chinese stakeholders, essentially who brokered the deals.
Initiating Formal Negotiations	Commenced the formal negotiation processes with its Chinese counterparties for the development of the power plants.
Feasibility Studies	Undertook responsibility for carrying out the feasibility and financial studies, which it undertook with the German Society for International Cooperation (GIZ)-Technical Expertise for Renewable (TERNA), in collaboration with EEPCo, to conduct comprehensive feasibility and financial studies.
Environmental and Social Impact Assessment (ESIA) Studies	Assumed responsibility for performing the ESIA studies by collaborating with contractors, Ethiopia Electric Power, and various Ethiopian institutions. This process involved documenting the impacts, mitigation strategies, and management procedures to maximize benefits and reduce negative effects.
Land and Compensation	Undertook the land allocation and compensation processes for affected persons.
Financial Agreement	Negotiated and influenced the terms and conditions of financing and project delivery schemes.
Project Implementation	Established joint project management offices and involving consultants and local universities as to implement large-scale infrastructure projects more successfully.

Table 1: Overview of Ethiopian Agency in Shaping the Outcomes of the Chinese-supported Adama and Ashegoda Wind Farms

Source: Adapted from Chiyemura, 2019.

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Each of these areas is explored in detail:

I. Policy and Planning

Energy policies that have legislative support are essential to facilitate investment in power generation infrastructure. Ideally, these policies create consensus between government and sector stakeholders by clarifying the country's power structure and clearly outlining the role of private and public sector participants. This is especially important in the region since many countries have hybrid power systems and have not fully implemented the standard model of reform (Eberhard, 2013; Eberhard et al., 2017). Further, the policy should outline the investment opportunities in the country's energy sector. When considering investments, investors analyze the existing and proposed legislation and policy to effectively price risk (Musasike et al., 2024). Clear enabling legislation and policy create a more conducive and attractive investment environment. Power sector planning is also crucial for governments because, unlike many other resources, electricity cannot be stored, save in the case of systems using batteries or pump storage technologies. Therefore, timely and accurate power sector plans need to be made to meet the country's electricity requirements in a cost-competitive and efficient manner (Gadzanku, 2019).

II. Brokering and Negotiating

When considering the exercise of agency in the brokering process, this working paper considers who identified the need for the power generation infrastructure and initiated interactions between the host state and the Chinese stakeholders. Simply put, this aspect considers who was responsible for brokering the deal (Chiyemura, 2019). In considering who initiated the deal, we also consider at what stage or organizational level this brokering took place, in order to ascertain the parties' intentions in engaging with one another, the levels or spheres through which agency was exercised and where the interactions begin, develop and end. Considering the brokering process is also critical in understanding the decision-making process, which impacts the structure and outcomes of the project, as these are often determined during the brokering/ beginning phase of the project.

In addition to brokering the project at the beginning, the negotiation process is one of the critical phases during which host states can exercise agency. Therefore, it is crucial to consider the host states negotiation strategy or experience during the project. During this phase, host states typically adopt negotiation strategies in which they try to maximize their outcomes whilst preserving their relationship with the Chinese counterparties (Lewicki et al., 2010). In considering the host state's agency during the negotiation of the project, this working paper considers who undertook negotiations for the host state and what was negotiated.

III. Feasibility Studies

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Feasibility studies involve a detailed review of the project's parameters and used to ascertain whether a project is economically, technically and operationally feasible (Chiyemura, 2019). The scope of a feasibility study includes assessments of the technical, financial, environmental, social and legal aspects of the projects and includes carrying out environmental impact studies, tariff calculations and securing licences (Bandaru et al., 2021; Musasike et al., 2024).

IV. Environmental and Social Impact Studies

As indicated, environmental and social impact (ESI) studies are usually carried out during the feasibility study phase of the project (Musasike et al., 2024). ESI studies evaluate the impact, mitigation and management processes to highlight the project's real opportunities

while aiming to prevent or minimize any adverse effects (Bandaru et al., 2021). This tool is implemented to help identify and prevent any potential conflicts from occurring early through appropriate mitigation measures (Omenge et al., 2020). It is also used to facilitate democratic decision-making processes and often includes public consultation processes, which may lead to the acceptance or rejection of the proposed project (Chiyemura, 2019; Larsen et al., 2018). Should the ESI study be positive, then a permit is typically issued by the responsible government agency. This permit is essential, as it is a requirement for funding from most financial institutions, including CHEXIM (Chiyemura, 2019).

V. Land and Compensation

Securing land access rights is essential in project development because, without this, there is no place for the project infrastructure to be built. This is a critical aspect of project development, and similar to the environmental permit, lenders will not provide project finance for a project where developers have not secured land rights. Securing land rights for large-scale projects typically involves relocating communities, who will then need to be compensated. Even where communities are not relocated, it is commonplace for developers to make payments (whether financial or in-kind) to local communities for the use of their land (Kerr et al., 2017).

VI. Financial Agreements

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The key reason that these assessments are carried out and one of the critical outcomes of the feasibility study is the business case for the project that can be used to raise finance (Musasike et al., 2024). Notably, a project cannot raise finance unless the earlier stages are carried out adequately, as this is how project risks are identified and allocated. These aspects impact the pricing of the project. Developers will then need to negotiate the terms of finance based on the outcomes and findings of these stages. During financial negotiations, host states have the opportunity to influence the terms and conditions of the loan, including the project structure and financing terms such as interest rate, events of default and security packages (Chiyemura, 2019, 2020). Each of these impacts the price of the project and its cost competitiveness.

VII. Project Implementation and Management

Once finance has been secured, the parties can begin developing the project. Project implementation and management is the final stage, where plans and ideas materialize (Chiyemura, 2019). The construction phase of the project is crucial and impacts schedule and cost performance (Brookes & Locatelli, 2015). During project development, various stakeholders, including state and non-state actors, seek to influence and, where possible, dominate the project. Different tactics are employed to achieve this, including resistance, contestation, bargaining, cooperation and passivity.

This section presents the conceptual framework of host state agency, which forms the basis of this paper's analysis. As this is one of the seminal studies assessing the exercise of host state agency in the development of Chinese-supported power generation projects in the region, this working paper relies on the discussed metrics developed by Chiyemura (2019). By focusing on the host state, this paper shifts perspective to understand the complex nature of these projects from a host state perspective. The next section considers the methodology employed in carrying out this research.

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METHODOLOGY

A comparative case study was carried out on two hydropower plants in Uganda and Ghana to explore how countries receiving Chinese-supported projects can influence their outcomes. These projects were undertaken by the same Chinese companies, with CHEXIM providing the funding, Sinohydro undertaking the EPC component of the project and Sinosure providing the insurance packages. In Ghana, the Bui hydropower plant is examined, a crucial case due to the country's relative success with the project. The Bui plant was completed on schedule, competitively priced and met the agreedupon specifications. Given this success, it is essential to understand Ghana's role in shaping and ensuring positive project outcomes.

Conversely, the Karuma hydropower plant in Uganda is also analyzed, which has faced significant challenges. The plant was initially slated for commissioning in 2019 but was delayed by 54 months and is expected to become fully operational in September 2024. It was constructed at a relatively high cost and experienced severe quality challenges, including cracks in the dam wall and spillages in the powerhouse. This project suffered chronic delays, budget overruns and quality issues, making it crucial to assess the host state's role in preventing the "unravelling" of Chinese-supported projects (Nduhura, 2019). Essential information on these projects is set out in Table 2.

	Ghana's Bui Hydropower Plant	Uganda's Karuma Hydropower Plant
Lender	CHEXIM	CHEXIM
EPC contractor	Sinohydro	Sinohydro
Insurer	Sinosure	Sinosure
Capacity	404 MW	600 MW
Technology	Hydropower	Hydropower
	Rolled compact concrete dam	Run of river
	Francis turbine	Francis turbine
Commissioning	2013	Expected in September 2024
Cost	\$790 million	\$1.69 billion
Cost per MW	\$1.95 million	\$2.8 million
Quality	No material defects reported	Cracking concrete found in several parts of the dam. Leakages in the powerhouse.
Delay	3.5 months	54 months (ongoing)

Table 2: Information on the Bui and Karuma Hydropower Plants

Source: Author's elaboration.

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Two main methods are employed to gather data: semi-structured interviews and document analysis. Using these methods allowed for data triangulation, enhancing the credibility of the study's findings (Eisenhardt, 1991). These interviews were vital for engaging participants to obtain information on various aspects, including project development, structure, key parties involved, project outcomes and reasons for these outcomes. The interviewees included government officials, financial, legal, and technical advisors from the host state, employees of host state agencies (including management in the legal and finance departments and chief executive officers), as well as representatives from think tanks and academia.

Document analysis, the second method, entailed a thorough and systematic review of essential texts to derive meaning and understand Chinese-supported power generation projects in the region (Bowen, 2009). The documents analyzed included loan and security agreements, annual reports of the implementing agencies, reports of parliamentary proceedings and project reports from external consultants. These documents provided critical additional information to supplement the interview data. Moreover, the documents offered valuable historical insights and allowed for tracking the development of the projects (Bowen, 2009). Combining these methods ensured a comprehensive analysis of the Chinese-supported projects under review. Having provided the methodology and framework for analysis, we operationalize the framework and turn to a discussion of the case studies.

CASE STUDY: GHANA

Ghana boasts one of the highest electrification rates in sub-Saharan Africa and has an overcapacity of electricity (Energy Commission, 2022). Despite the country's advancement in providing its citizens with power, it has faced and continues to face numerous challenges in its electricity supply industry. From 1984-2016, Ghana grappled with severe electricity shortages (Malgas, 2008), primarily due to overreliance on hydro and thermal sources (Acheampong et al., 2021). In response to the various power crises, Ghana set an ambitious policy target to increase its installed generation capacity to 5000 MW by 2015 (Eshun & Amoako-Tuffour, 2016). Although it did not meet this target within the stipulated time frame, this drive for increased capacity attracted significant investment, including from Chinese investors, who have been trailblazers in Ghana's energy sector.

Ghana and China share a long-standing diplomatic and developmental relationship (Odoom, 2017). The countries formalized their diplomatic ties in 1960 after Ghana gained independence, and over the years, they have become important allies (Chau, 2007; Sandnes, 2022). Ghana has supported China's diplomatic efforts internationally, including advocating for China's inclusion in the United Nations, as emphasised by Ghana's first president, Kwame Nkrumah, during his inaugural speech at the UN General Assembly (Odoom, 2017). In turn, China has been a crucial development partner for Ghana, financing several economic initiatives, including energy sector projects (Gutman et al., 2015). Figure 2 summarizes key events in the Ghana-China relationship, particularly regarding Chinese support for Ghana's energy sector.

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Source: Author's elaboration.

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During the 1960s, Ghana and China strengthened their diplomatic ties by signing several important agreements. These included the Treaty of Friendship, the Economic and Technical Cooperation Agreement, which provided Ghana with a 20-year interest-free loan of 7 million Ghana pounds, and the Trade and Payments Agreement, ensuring annual trade volumes of 4 million Ghana pounds. The Cultural Cooperation Agreement also facilitated exchanges in arts, science and culture, while the Protocol on Economic and Technical Cooperation saw China providing equipment, training materials and technical assistance to help develop Ghana's industries (Chau, 2007; Peking Review, 1961). These agreements were foundational for training, trade, investment and cultural exchanges between the two nations. However, a 1966 coup which ousted President Nkrumah strained the countries' relationship, leading to severed diplomatic ties until 1972 (Chau, 2007; Odoom, 2017). By the early 2000s, the parties had rebuilt their diplomatic and economic relations. Over the last two decades, Chinese private investors have injected over \$4 billion into Ghana's economy, making China Ghana's largest trading partner (Ghana Investment Promotion Centre, 2022).

Regarding the energy sector, in 2010, when the countries celebrated 50 years of diplomatic relations, China provided Ghana with a \$3 billion facility to support energy infrastructure development (Ministry of Finance, 2014). Chinese companies have since become trailblazers in Ghana's energy sector. They were the country's first independent power producers (IPPs) and operate Ghana's largest solar photovoltaic (PV) plants. Beyond infrastructure projects, Ghana and China collaborated on the China-Ghana South-South Cooperation on Renewable Energy Technology Transfer project, one of the outcomes of which was the preparation of Ghana's Renewable Energy Master Plan in collaboration with China's Ministry of Science and Technology. This section explores Ghana's experience with Chinese investors in developing the Bui hydropower plant, the country's first power generation project supported by China. It aims to understand how Ghana exercised its agency to influence the project's outcomes.



Bui Hydropower Plant

The Ghanaian government and its Chinese counterparts began building the 404 MW Bui hydropower plant in December 2008 and completed it in 2013. The plant is located between the Brong-Ahafo and Northern regions on the Black Volta River. As Ghana's second largest hydropower facility, the Bui Dam was intended to address the development disparity between Northern and Southern Ghana (Gocking, 2021). It serves multiple purposes, including electricity generation and support for agricultural activities such as irrigation and fisheries (Government of Ghana, 2007; Kirchherr et al., 2016). The dam features a 108-meter-high roller-compacted concrete gravity structure, five spillways, a surface powerhouse, three Francis turbine-generators of 133 MW each, a 4 MW turbinette (mini hydro), a switchyard, four 161 kV transmission lines extending 240 km and a permanent bridge (Bui Power Authority, 2019). Key information about the Bui Dam is in Table 4.

Project	Bui Hydropower Dam
Capacity	404 MW
Cost	\$790 million
Cost per MW	\$1.95 million
Technology	Hydropower
Procurement process	Direct negotiation
Contract	EPC+F
Equity partner	Government of Ghana
Lender	CHEXIM
Security	An escrow account is used to collect revenue from the sale of electricity. The Project Assets
Development period	2008-2013
Planned project duration	56.5 months
Extended project time	60 months (overrun by three months)
Borrower	Government of Ghana, through the Ministry of Finance
Sponsor	Bui Power Authority (BPA)
EPC contractor	Sinohydro Bureau 8, a subsidiary of Sinohydro Corporation
Owner's Engineer	Coyne et Bellier
Offtaker	Electricity Company of Ghana

Table 4: Project Summary of the Bui Hydropower Plant

Source: Author's elaboration.

Procurement and Development

The procurement and development of the Bui Dam has a lengthy and intricate history, with the potential for a hydropower plant at the Bui Gorge identified as early as 1925. Throughout the years, multiple events influenced its progress both positively and negatively. Key events in the Bui Dam's development are outlined in Table 5.



Table 5: Key Events in the Development of the Bui Hydropower Plant

Date	Event
1925	The potential for a hydropower plant at Bui Gorge was identified.
1970s-1985	Four successive coups hinder the World Bank's ability to advance the project.
1992	The government of Ghana commissioned feasibility study by Coyne et Bellier.
1998	Droughts cause low water levels in Akosombo and Kpong dams, leading to an electricity crisis.
1999	Establishment of Bui Development Committee and Secretariat to identify developers.
2001	Government of Ghana (GOG) discontinued plans to develop the Bui hydropower plant, indicating the cost-effectiveness of thermal plants.
2002	Bui project revisited; new Bui Development Committee established.
2005	Ministry of Energy and Sinohydro sign memorandum of understanding (MOU).
2005	The Ministry of Energy commissions Environmental Resources Management, a consulting firm from the United Kingdom, to undertake a new Environmental Impact Assessment (EIA). A previous study was conducted in 2001 by BKS Acres and the Volta River Authority.
2006	Ghana commissions updated feasibility study.
2006	Ghanaian President approaches China and Russia for assistance with developing the Bui hydropower plant and China announces funding support at the Forum on China-Africa Cooperation (FOCAC).
2007	EPC contract signed; finance agreements concluded; Bui Power Authority (BPA) established.
2008	Field studies and construction begin.
2013	First and second generators inaugurated; project handed over to BPA.

Source: Author's elaboration.

In the 1960s, Ghana focused on building its first hydropower plant, the Akosombo hydropower plant. The next plant to be built was the Bui Hydropower plant. However, a series of coups between 1970-1985 halted the World Bank's efforts to advance the Bui hydropower project, despite its progressed plans (Fink, 2005). Post-coup, in 1992, the Ghanaian government revived its plans to develop the Bui hydropower plant and tasked the French firm Coyne et Bellier with conducting a feasibility study. The 1998 drought intensified Ghana's need for new power generation, prompting plans to develop the Bui Dam and thermal plants (Hensengerth, 2011).

In 1999, Ghana established the Bui Development Committee and Secretariat to find suitable developers for the hydropower project. Halliburton Brown & Root contractors were chosen, and the Volta River Authority (VRA) signed an memorandum of understanding (MOU) with them to develop the Bui Dam (Hensengerth, 2011). This agreement was cancelled in 2001, with the government opting to pursue thermal plants due to their lower costs (Hensengerth, 2011).

In 2002, the government again revisited the Bui Dam project, reconstituting the Bui Development Committee. The World Bank withdrew its support due to increasing international opposition to the social and environmental impacts of large dam projects (Gocking, 2021). The Bui Power Authority (BPA) launched a competitive bidding process, attracting only one proposal (Hensengerth, 2011). Following the poor response, the Ghanaian government sought assistance from Russia and China, leading to a presidential delegation visiting China to secure financial backing (Interviewee 1; 2). In 2006, Ghana announced that CHEXIM would provide a loan to finance the Bui hydropower plan. China's president confirmed financial support at the Forum on China-Africa Cooperation (FOCAC). An MOU was signed between the Ministry of Energy and Sinohydro to build the plant. In the same year, the Ministry of Energy commissioned a UK consulting firm to undertake a new Environmental Impact Assessment, after one had already been carried out by a different international contractor in 2001. In 2006, Coyne et Bellier was appointed to update the feasibility study.

The project began taking shape in 2007 with the signing of the EPC contract between the Ministry of Energy and Sinohydro, the finalization of finance agreements, and the creation of the Bui Power Authority to manage the project (Hensengerth, 2011). Coyne et Bellier, having conducted feasibility studies, continued as owner's engineers to assist the BPA with project oversight (Bui Power Authority, 2012; Government of Ghana, 2007). A power purchase agreement was also signed with the Electricity Company of Ghana (ECG). Construction of the Bui Dam started in December 2008 and concluded in December 2013.

Investment Model and Project Structure

The Ghanaian government wholly owns the Bui Dam. It was financed through Chinese statesponsored funds provided by CHEXIM and constructed by Sinohydro as the EPC contractor. Initially projected to cost \$622 million, the project experienced a 27 percent cost overrun (Kirchherr et al., 2016). This brought the total to \$790 million or \$1.95 million per MW. The government of Ghana contributed \$60 million in counterpart funding. CHEXIM provided the remaining amount through concessional and commercial loans. The initial financing structure involved two key instruments: a Buyer's Credit Loan (BCL) of \$292 million and a Government Concessional Loan (GCL) of RMB 2.1 billion. An additional loan agreement was signed to cover the cost overrun. The government of Ghana and Genertec International Corporation (a Chinese company) entered into a cocoa sales agreement (CSA) in which cocoa sales revenue was used to repay the GCL. An escrow account was created for electricity sale proceeds to secure the BCL, and project assets were used as collateral.

Price Outcomes

The total cost of the Bui Dam was approximately \$790 million, exceeding initial projections of \$622 million due to unforeseen cost overruns caused by the 2008 global financial crisis and additional development needs. Table 6 provides a detailed breakdown of the funding.

Table 6: Funding Breakdown for the Bui Hydropower Plant

Funding Source	Amount
Government of Ghana	\$60 million
CHEXIM (BCL and GCL)	\$562 million
Additional Loan (Cost Overruns)	\$168 million
Sum of project costs	\$790 million

Source: Author's elaboration.

The Government of Ghana was responsible for conducting the environmental and social impact assessments, executing the resettlement action plan, and securing the land for the project (Hensengerth, 2011). These expenses do not form part of the overall project costs mentioned earlier. Despite this, when calculating the price per MW of electricity, each MW was obtained for \$1,95

16



million. This is lower than the average cost of a World Bank-supported dam in the region, which is about \$2.8 million per MW (Jenkins et al., 2018).

When negotiating the finance agreements, technocrats within the Ministry of Finance were invited to the conversation for the first time (Interviewee 1). Before that, the brokering and negotiation of the project were undertaken at the presidential and executive levels. An interviewee involved in negotiating the finance agreements indicated that the project's overall structure had already been agreed upon, and the Ministry of Finance technocrats were only invited to negotiate the finance terms, having been told that they should not present too many challenges during the negotiations. Conflicting reports suggest that negotiations were challenging (Interviewee 1). However, the Chinese counterparties were also amenable to many of the Ghanaian government's requests (Hensengerth, 2011; Interview 1, 2).

Critical issues in negotiating the finance documents included the ratio between commercial and concessional loans, grace periods, interest rates, the proportion of counterpart funding, and repayment terms. The Ghanaian government managed to reduce its counterpart funding requirement from 15 percent to 10 percent. However, it was unsuccessful in lowering the concessional loan's interest rate from 2 percent to 1 percent, increasing the concessional loan portion to 70 percent, or extending the concessional loan term to 30 years (Hensengerth, 2011). For the commercial loan, the government extended the loan term from 17 to 20 years but could not secure a lower interest rate (Hensengerth, 2011). This highlights that some of the loan agreement terms were negotiable, and the Ghanaian government exercised agency to obtain more favorable terms.

Performance Outcomes

Scheduled Performance

In terms of the EPC contract, the project was slated for completion in 56.5 months but took 60 months, resulting in a minor delay of three months (Interview 10). This delay was partly due to a strike over unionization rights for workers, which caused a temporary halt in construction (Hensengerth, 2011). Despite this, the project was largely delivered on time.

Quality

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On the Ghanaian side, the Bui power project was led by an experienced engineer who had undertaken his graduate education outside of the country, which focused on the optimal way to develop the Bui power plant. Upon his return to Ghana, he was headhunted to lead the development of the Bui hydropower project. During the project's construction, the BPA's technical team maintained rigorous supervision to ensure high quality. A senior engineer with the BPA noted their intense oversight, working alongside the contractors to ensure standards were met. This employee indicated that they monitored the work of Sinohydro constantly because they were aware that contractors often cut corners if left unchecked in a bid to maximize profit. The engineers working for the BPA worked long hours overseeing the work of Sinohydro to maintain quality. In addition to always being present on the ground during the project's construction, the BPA was also particular to ensure that the agreed materials and standards were adhered to during the project's construction. An interviewee from BPA described the confrontations with the Chinese contractors to uphold standards. He indicated that the BPA and Sinohydro had many disagreements regarding the quality of the project, often halting work for weeks at a time to resolve issues. A further critical aspect that influenced the timely and high-quality delivery of the Bui Dam was the support the government of Ghana received from its owner's engineer, who had experience with Chinese contractors. This support was crucial in maintaining proactive monitoring and quality control (Interview 1).

Ghana's Exercise of Agency in the Development of the Bui Hydropower Plant

Ghana exercised its agency in shaping the outcomes of the Bui hydropower plant in multiple ways. We apply the framework set out by Chiyemura (2019) to evaluate how Ghana could shape the outcome of the Bui Dam and ensure that it had favorable price and project outcomes.

I. Policy and Planning

Notwithstanding the delay in developing the plant, Ghana demonstrated significant agency in the policy and planning phase of the Bui hydropower plant. The planning of dams in Ghana officially begins with the National Development Planning Commission (NDPC), which includes hydropower projects in its planning cycles by identifying demand and supply gaps in the energy sector. The Bui hydropower plant was included in the 2006-2009 planning cycle. This decision to include Bui Dam in the NDPC's planning cycle was based on a dominant government policy initiated by President John Agyekum Kufuor. This inclusion in the planning cycle underscored a long-standing government priority to address the nation's energy needs, despite decades of unsuccessful funding attempts and temporary shifts towards thermal power.

In addition, in 2006, the Energy Commission, Ghana's technical regulator for the energy sector, released the Strategic National Energy Plan (SNEP), which laid out the energy sector development plan. In the SNEP, two of the country's three power generation asset planning scenarios included the development of the Bui hydropower plant. Ghana effectively aligned its energy infrastructure development with broader economic growth and poverty reduction strategies by integrating the Bui project into national development and energy sector planning. This proactive approach highlights the government's commitment to comprehensive and strategic planning to ensure that the Bui hydropower plant was developed.

II. Brokering and Negotiating

Ghana led the brokering and negotiating for the Bui hydropower project, and its efforts began at the highest levels of government. Ghana's agency in brokering and negotiating the Bui project was prominently displayed through the efforts of President Kufuor and his delegation undertaking a visit to China to request assistance with building the Bui Dam. In 2005, during the FOCAC, China announced its financial support for the Bui project, illustrating the success of Ghana's brokering. President Kuffour's actions also illustrate the political championship theory discussed by Wang (2021). Plans to develop the Bui hydropower project had been ongoing for years, encountering various challenges. However, when President Kufour stepped in to prioritize Bui's development by ensuring that it was included in national planning and directly reaching out to China for support to develop the project, the project was able to overcome the multiple hurdles plaguing its development for decades.

III. Feasibility Studies

Ghana exercised significant agency by commissioning Coyne et Bellier for the initial feasibility study in 1992 and an updated study in 2006. Coyne et Bellier's continued involvement as owner's engineers during construction reflects the strategic use of expertise to oversee and ensure the project's feasibility and success. This was especially important because Ghana had no previous experience with Chinese contractors, whereas Coyne et Bellier did. Therefore, notwithstanding Ghana's internal shortage of experience with Chinese investors, it could still ensure that projects were implemented successfully by outsourcing some of its functions to more experienced consultants.



IV. Environmental and Social Impact Studies

The Ghanaian government took responsibility for conducting environmental and social impact assessments, which were crucial for obtaining necessary permits and project approval. In 2005, the Ministry of Energy commissioned Environmental Resources Management, a UK consulting firm, to undertake a new Environmental Impact Assessment (EIA) after an earlier assessment by a different international contractor in 2001. These studies were critical for understanding and mitigating the project's social and environmental impacts.

V. Land and Compensation

The Ghanaian government was responsible for securing land and compensating affected communities. According to Kirchherr (2016), affected people were thoroughly consulted throughout their resettlement process. An international donor interviewed for this research noted that Ghana meticulously studied the shortcomings of the Akosombo Dam project, where 80,000 people were resettled on less-than-ideal terms with tribes being mixed, inadequate water supply and poor soil quality in their new dwellings. In the development of the Bui hydropower plant, Ghana consulted affected persons and carried out an improved resettlement process to avoid repeating past mistakes(Hensengerth, 2011).

VI. Financial Agreements

Ghana demonstrated agency in negotiating the financial terms of the Bui hydropower project, achieving mixed success. Key areas the Ghanaian government sought to negotiate included interest rates, grace periods, maturity dates and counterpart funding ratios. Ghana was successful in negotiating:

- Counterpart Funding: The government negotiated a reduction in its counterpart funding requirement from 15 percent to 10 percent.
- Loan Term Extension: For the commercial loan, Ghana successfully extended the loan term from 17 to 20 years.

However, there were areas where Ghana was less successful:

- Concessional Loan Interest Rates: Ghana was unable to secure a reduction in the interest rate on the concessional loan from 2 percent to 1 percent.
- Concessional Loan Proportion: The government could not increase the concessional loan portion from the 50 percent, initially offered to 70 percent.
- Commercial Loan Interest Rates: Ghana was unsuccessful with negotiating a lowe interest rate for its commercial loan.
- Loan Term Extension for Concessional Loan: Ghana was unsuccessful in lower the concessional loan term to 30 years.

Despite not achieving all desired terms, Ghana exercised agency to secure favorable financial conditions, and these efforts impacted the outcome of the project's cost. Importantly, Ghana did not simply accept the loan terms that it was presented with, but rather engaged directly and acted with agency.

VII. Project Implementation and Management

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During the project implementation and management phase, Ghana's agency was evident through the BPA's rigorous oversight of construction. Employing experienced engineers and proactively monitoring Sinohydro's work ensured high-quality standards were met. Despite

minor delays due to labor strikes, the project was largely completed on schedule, demonstrating effective management and coordination. The confrontations with the EPC contractors to uphold quality standards and support from the owner's engineer reflect Ghana's commitment to ensuring the project's success.

The development of the Bui hydropower plant showcases Ghana's significant exercise of agency across policy planning, brokering, negotiating, feasibility studies, environmental and social impact assessments, land acquisition, financial agreements, and project implementation. While external influences and challenges were present, Ghana's strategic decisions and proactive management highlight its robust role in realizing this critical infrastructure project with favorable price and investment outcomes.

CASE STUDY: UGANDA

Uganda is a notable example of a thriving and forward-moving electricity sector in sub-Saharan Africa. It was the first country in the region to reform its power sector fully and is one of only three solvent utilities in the region. The country's electricity sector is performing well. Despite this, Uganda's electricity supply industry has and continues to face challenges. This has included chronic electricity shortages and a relatively low energy access rate of only 45 percent in 2021 (Okoboi & Mawejje, 2016; van der Ven, 2020). Issues such as inadequate infrastructure investment, severe droughts and limited technical capacity have contributed to Uganda's low generation capacity (Fritz, 2021; Katutsi et al., 2021; Meyer et al., 2018). This section examines Uganda's experiences with Chinese-supported power generation projects, focusing on the role of the host state agency.

Uganda and China have a long-standing relationship dating back to 1962 (Shinn & Eisenman, 2012). Over the years, Uganda has sought Chinese funding for development projects across various sectors, including agriculture, health, sports, energy, roads and education. Uganda ranks third in Africa for FDI from China (Uganda Investment Authority, 2020). Chinese investors have provided significant financing for Uganda's energy sector, including 33 percent of the sector's funding from 2019-2024 (Fritz, 2021). They have constructed two major hydropower plants and signed an MOU for a third, the 840 MW Ayago hydropower plant. This sub-section focuses on the Karuma hydropower project.

Karuma Hydropower Plant

Development and Procurement

The 600 MW Karuma hydropower plant is on the Nile River in the Kiryandongo district. Plans for the plant began in 1995, but the project faced numerous delays (Fritz, 2021; Nduhura, 2019). Construction started in August 2013 and is estimated to become fully operational in September 2024. Table 7 outlines the timeline of key events in the development of Karuma.



Table 7: Key Events in the Development of the Karuma Hydropower Plant

Date	Event
1995	Conception of Karuma.
1996	Norpak granted exclusive rights to develop the project.
1999	Alleged bribery by Norpak to prioritise Karuma development.
2008	Norpak abandons the project following a funding dispute with the World Bank.
2009	Ministry of Energy and Mineral Development (MEMD) commissions Infratech to carry out feasibility studies and environmental impact assessments.
2010	MEMD runs an international bidding process for an EPC contractor.
2012	Bidder sues government of Uganda over the technical qualification of CWE.
March 2013	Inspectorate of Government suspends tender and recommends starting the bid process afresh.
March 2013	President Museveni and Chinese leader Xi Jinping discuss and agree on funding for Karuma.
June 2013	MEMD and Sinohydro sign MoU for Karuma.
August 2013	MEMD and Sinohydro conclude Commercial Contract for EPC; construction begins.
December 2013	MEMD appoints Uganda Electricity Generation Company Limited (UEGCL) and Uganda Electricity Transmission Company Limited (UETCL) as implementing agents.
May 2014	Financing secured from CHEXIM following a visit by the CHECIM President to Uganda.
December 2014	Ministry of Finance Planning and Economic Development (MOFPED) and CHEXIM enter into a Preferential Buyer's Credit Agreement.
February 2015	MOFPED and CHEXIM enter into a Buyer Credit Loan Agreement.
March 2015	Ugandan parliament approves loan request for Karuma.
November 2015	UEGCL and UETCL entered into a power purchase agreement
	UETCL entered into a power Sales Agreement with Umeme.
Present (2024)	Construction is ongoing, with four out of six units in operation.
September 2024	Estimated commissioning of the plant.

Source: Author's elaboration.

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Karuma was initially planned as a 200 MW plant, assigned to Norpak Ltd in 1996 as an independent power project. Norpak faced allegations of corruption and was unable to secure funding, leading to its withdrawal in 2008 (Fritz, 2021; Habati, 2012; Nduhura, 2019). The government of Uganda reclaimed the project and appointed Infratech to carry out feasibility studies and environmental impact assessment. The feasibility studies indicated that the plant could be designed as a 750 MW project. However, the government of Uganda opted to develop the project as a 600 MW plant based on recommendations from donor agencies, whom the government was approaching for financial support to construct the project (Fritz, 2021; Nduhura, 2019). Table 8 sets out the key terms of the Karuma hydropower project



Table 8: Project Summary of the Karuma Hydropower Project

Project	Karuma hydropower project
Capacity	600 MW
Cost	\$1.69 billion
Cost per MW	\$2.8 million
Technology	Hydropower
Procurement process	Direct negotiation (after a contested tender program)
Contract	EPC+F
Equity partner	Government of Uganda
Lenderv	CHEXIM
Security	An escrow account is used to collect revenue from the sale of electricity Repayment reserve account The Project Assets
Development period	2013-2024 (ongoing)
Planned project duration	60 months
Extended project time	Overrun by 56 months (ongoing)
Borrower	Government of Uganda, through the Ministry of Finance, Planning and Economic Development
Sponsor	Ministry of Energy and Mineral Development
EPC contractor	Sinohydro Bureau 8, a subsidiary of Sinohydro Corporation
Owner's Engineer	AFRY Switzerland Ltd (Previously Energy Infratech Pvt Limited (India))
Offtaker	Uganda Electricity Transmission Company Limited

Source: Author's elaboration.

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When the Ugandan government reclaimed the project in 2009, they implemented policies prioritizing hydropower development. Uganda's National Development Plan I (2010/11-2015/16) and II (2015/16-2019/20) specifically highlighted the Karuma project as crucial for advancing the country's development (Government of Uganda, 2015; National Development Plan, 2010). Uganda's commitment to expanding its generation infrastructure, as outlined in its energy policies, appears to have facilitated the pursuit of CHEXIM funding. This commitment was underscored by Uganda's explicit statement in its national development plans that it preferred to develop these projects on a concessional basis (Government of Uganda, 2015).

In 2010, the Ministry of Energy and Mineral Development (MEMD) issued a tender for an EPC contractor, which saw bids from several international companies, including three Chinese stateowned entities: Sinohydro, China Gezhouba Group Corporation and China International Water and Electric Corporation (CWE) (Biryabarema, 2012; Brautigam et al., 2015). The Ugandan evaluation committee ultimately awarded the bid to CWE, although they were less qualified than other bidders and allegedly misrepresented their experience in their submitted bid. This procurement process was largely unsuccessful due to disputes and allegations of impropriety during the bidding process. The government of Uganda's appointment of CWE as the preferred bidder resulted in a court process, seeking the bids to be re-evaluated and the eventual cancellation of the procurement process. In the end, President Yoweri Museveni intervened in the EPC contractor's appointment process, reversed the evaluation committee's decision and issued a presidential directive appointing Sinohydro as the preferred bidder, citing their competitive proposal (Ogwang & Vanclay, 2021). He also awarded CWE a smaller project, which had not been put out to tender.

Investment Model and Project Structure

Similarly to the Bui hydropower project, the government of Uganda owns Karuma and is responsible for its operation and maintenance. The MEMD is the project sponsor, and Uganda Electricity Generation Company Limited (UEGCL) is the implementation agent. CHEXIM provided loans on concessional and commercial terms, with UEGCL and Uganda Electricity Transmission Company Limited (UETCL) pledging project assets as loan security. Additional security included a sales collection account for revenue from the sale of electricity and a debt reserve account to ensure loan repayments. In this regard, the government of Uganda (through the Ministry of Finance) is required to deposit a minimum agreed amount under the loan agreement for a year (Parliament of Uganda, 2015). Although Uganda has notable natural resources, including oil, it deliberately decided not to use its natural resources as collateral for the loans.

Price Outcomes

President Museveni approached Chinese leader Xi Jinping during the 2013 BRICS Summit to discuss developing the Karuma hydropower plant. The project agreements indicate that the Karuma project was funded using an EPC+F model, meaning the EPC contractor also helped secure funding. However, the exact way this transpired is unclear, given that President Museveni had already started these discussions with Xi Jinping to fund the project.

The government of Uganda secured approximately \$1.4 billion in financing from CHEXIM, which was 85 percent of the EPC cost. The finance was made up of a preferential buyer credit (PBC) loan agreement, where CHEXIM made a loan of \$789 million to finance the EPC services provided by Sinohydro in the construction of the Karuma Hydropower Plant. This was a concessional loan with a fixed interest rate of 2 percent. The parties also entered into a buyer's credit loan agreement (BCL) for a loan of \$645 million The BCL is a commercial loan with an interest rate of LIBOR + 3.5 percent per annum.

The government of Uganda provided 15 percent counterpart funding, bringing the initial total project costs to just over \$1.69 billion. The project cost per MW was \$2.8 million, equal to the average cost of a World Bank-supported dam in the region of \$2.8 million per MW (Jenkins et al., 2018). However, additional costs not included in the initial estimate could increase the total cost by approximately \$550 million, making the project relatively expensive (ILF Consulting Engineers, 2015).

According to interviewees, during the negotiation of the finance documents, the preferential buyer's credit loan, i.e. the concessional loan, could not be modified. This included the interest rate, grace period and loan tenure (Interviewee 3). In addition, the Ugandan government wanted a more significant portion of the PBC relative to the EBC because the PBC's concessional terms made it more affordable (Interviewee 3). However, CHEXIM required a strict 55/45 split between concessional and commercial loans (Interviewee 3). On the other hand, the terms for the EBC were negotiable, and the Ugandan government managed to secure a lower interest rate (Interviewee 3).



Project Performance

Quality

Although it has not yet been commissioned fully, the Karuma hydropower plant has numerous quality challenges. Some issues included a single-lane road requiring cars from opposite directions to take turns using the road, cracking dam walls and leaking in the powerhouse (Interviewee 4). When construction of the Karuma hydropower plant began, the project was overseen by the MEMD, which had two electrical engineers overseeing the project. The MEMD had limited capacity to effectively manage the EPC contractor due to a lack of experience, project management capacity and staffing. Furthermore, the engineering consulting firm appointed as the owner's engineer lacked the necessary knowledge and skills, having only built a few roads in its small hometown. This firm was chosen due to its cheaper pricing bid, but it was not equipped to handle a mega project like Karuma. Additionally, CHEXIM did not appoint a lender's engineer to monitor construction. As a result, there was insufficient supervision of the EPC contractor during the critical early stages of the project.

Schedule

A significant challenge in completing Karuma has been the cracking concrete in several parts of the dam (Interviewee 4). This issue was caused by the materials used and temperature changes during the pouring process (Karubanga & Mugume, 2022; Interview 4). The EPC contract required an on-site cooling machine to prevent cracks, but the contractors failed to provide it, resulting in improper pouring temperatures and subsequent cracking (Interviewee 4). Once Ugandan officials realized this, they halted construction until the cooling machine arrived, causing about a year's delay. As of March 2024, the plant remains uncommissioned, representing a delay of over four years. This delay poses serious financial consequences for the government of Uganda, as loan repayments must begin once the grace period ends, regardless of revenue from electricity sales (Interviewee 5). Moreover, the government is required to place three months' worth of repayment funds in a reserve account one month before they are due, further straining public finances if the plant is not operational (Interviewee 5). Ultimately, the project has not been completed according to schedule.

Uganda's Exercise of Agency in the Development of the Karuma Hydropower Plant

I. Policy and Planning

Uganda's policy framework significantly influenced the Karuma hydropower project. The country's NDP I & II explicitly prioritised hydropower development, including Karuma, as a core project to advance national development. This policy backing facilitated the project's initiation and progression. The clear commitment to hydropower in Uganda's policy documents and for its development on a concessional basis created the opportunity for the government to pursue the project with Chinese investors. When Karuma was developed when Uganda did not have a power sector plan (Kruger et al., 2018).

II. Brokering and Negotiating

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President Museveni played a critical role in brokering and negotiating the Karuma project. His direct engagement at the 2013 BRICS Summit with Xi Jinping was important in securing Chinese funding for the project. This high-level engagement highlights Uganda's proactive approach to brokering deals and securing financial commitments. Despite procedural controversies, the presidential directive to appoint Sinohydro as the EPC contractor demonstrated decisive action to move the project forward. However, this approach also bypassed standard

competitive procurement processes, which could have ensured better pricing and adherence to legal and regulatory standards. President Museveni's actions align with literature on political championship theory, which indicates that where an influential leader exercises personal rule in a project, it helps accelerate project realization.

III. Feasibility Studies

When the project was reclaimed, the government of Uganda undertook feasibility studies, including an environmental assessment. These studies revealed to the government of Uganda that the project could be undertaken at a high capacity. The decision to expand the project capacity from 200 MW to 600 MW highlighted Uganda's strategic planning in enhancing the project's scope.

IV. Environmental and Social Impact Studies

Environmental and social impact studies were conducted as part of the feasibility phase. The government appointed consultants to carry out the environmental assessment report.

V. Land and Compensation

The Ugandan government was responsible for securing land for the project and relocating and compensating communities. The country has a robust displacement and resettlement framework. However, this process was poorly implemented, which led to the displacement of some community members residing near the project and ultimately intensified inequality and poverty (Fritz, 2021).

VI. Financial Agreements

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The financial agreements for Karuma involved significant negotiations. The negotiation process revealed Uganda's ability to secure a lower interest rate for the commercial loan, although it had limited influence over the concessional loan terms. The strict 55/45 split between concessional and commercial loans by CHEXIM and the predetermined terms for the preferential buyer's credit loan constrained Uganda's ability to fully optimize the financial structure. In putting up security for the loan, Uganda determined that despite its notable natural resources, including oil, it would not secure the loan in this manner and instead opted to pledge the project assets and offer government guarantees.

VII. Project Implementation and Management

The Karuma project was developed as turnkey, meaning that the contractor is responsible for delivering a fully operational facility. Turnkey projects generally imply that the contractor will effectively manage all aspects of the engineering, procurement and construction services. However, the development of the Karuma project encountered several challenges. Initial oversight by the MEMD was not quite sufficient due to limited technical capacity, staffing and experience, which affected the project's quality and timeline. In addition, the appointment of an inexperienced engineering consulting firm as the owner's engineer further exacerbated these issues. Ultimately, the MEMD did not have the capacity to manage the project and was unable to appoint a consultant with the expertise to help them.

Significant gaps in project management were highlighted by delays caused by cracking concrete and the lack of proper cooling machines during construction. Although the transition of oversight to the UEGCL improved management, critical missteps had already impacted the project's outcomes. These issues underscore the importance of effective project management and oversight throughout the construction phase to ensure timely and quality delivery.

The government of Uganda did not provide sufficient supervision until the project was well underway, and this lack of oversight led to several early mistakes, resulting in delays and higher project costs.

Conclusion of the Project

The Karuma hydropower plant has not met timelines, specifications or budget expectations. While Uganda demonstrated agency in policy, planning, brokering and negotiation of the project, the project also revealed areas where better oversight by the host state could have mitigated delays and cost overruns. The experience underscores the importance of the host state having robust procurement processes, effective project management and the need for experienced supervision in large infrastructure projects.

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COMPARATIVE ANALYSIS

Developing large-scale hydropower projects often involves complex interactions between host states and investors. Ghana's Bui Hydropower Plant and Uganda's Karuma Hydropower Plant provide insightful case studies into how different African countries exercise agency within these interactions, significantly shaping project outcomes. This section delves into the comparative analysis of Ghana and Uganda's approaches to developing their hydropower plants, focusing on the key areas in Chiyemura (2019), as illustrated in Figure 4.

Figure 4: Key Areas Where Uganda and Ghana Exercised Oversight in the Development of their Chinese-supported Power Plants



Source: Author's elaboration using Chiyemura (2019).

In examining these areas, we aim to highlight the varying degrees of agency exercised by each country and how structural factors influenced their capacities and decisions. The analysis ties into the agent-structure debate, exploring how Ghana and Uganda navigated their respective structural environments to achieve—or struggle with—their desired project outcomes. Through this lens, we gain a nuanced understanding of how African states can optimize their engagement with Chinese investors to enhance the success and sustainability of their Chinese-supported power generation projects, thereby contributing to broader economic development and energy security.

I. Policy and Planning

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Ghana and Uganda both demonstrated strategic planning in their respective hydropower projects. Ghana's Bui Hydropower Plant was part of a long-term policy developed by the NDPC and the Energy Commission, reflecting a well-coordinated effort that integrated hydropower development into national planning cycles. Similarly, Uganda's policy framework prioritized hydropower in its NDP I & II and specifically identified Karuma as a core project to the country's advancement. However, at the time, Uganda did not have specific energy

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sector plans. Both governments pursued the projects with clear policy commitments to their development. However, Uganda could have benefitted from an energy sector plan.

II. Brokering and Negotiating

Both countries displayed high-level engagement in brokering and negotiating their projects. Ghana's proactive approach was evident through the presidential delegation that visited China and in President Kufuor's direct request for assistance, which request was announced as approved during the 2006 FOCAC. This high-level engagement secured financial support and highlighted Ghana's strategic brokering and negotiation skills. Uganda similarly showcased proactive engagement, with President Museveni directly negotiating funding for the Karuma project at the 2013 BRICS summit. However, Uganda's approach bypassed a competitive procurement process, which was already in motion, leading to procedural controversies and potential inefficiencies.

III. Feasibility Studies

Both countries managed the feasibility stage of the project, appointing consultants of their choice to carry out this work.

IV. Environmental and Social Impact Studies

Both countries conducted environmental and social impact studies as part of their feasibility assessments.

V. Land and Compensation

The Ghanaian government effectively managed land acquisition and compensation, ensuring smooth project progression. Learning from the shortcomings of the Akosombo Dam, Ghana was more careful to undertake improved resettlement processes for the Bui Dam project. This proactive approach ensured better outcomes and highlighted the importance of learning from past mistakes. Although a robust displacement and resettlement framework existed in Uganda, its poor implementation led to significant social issues. This underscores the importance of not only having frameworks in place but executing them effectively to avoid exacerbating social inequalities.

VI. Financial Agreements

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Ghana demonstrated some negotiation capacity in securing favorable financial terms for the Bui project. The government managed to reduce its counterpart funding requirement from 15 percent to 10 percent and successfully extended the loan term for the commercial loan from 17 to 20 years. However, Ghana was less successful in other areas. The government could not secure a reduction in the interest rate on the concessional loan from 2 percent to 1 percent, increase the concessional loan portion to 70 percent, decrease the commercial interest rate or extend the concessional loan term to 30 years. These mixed results highlight the successes and limitations of Ghana's negotiation efforts.

Uganda secured a substantial loan from CHEXIM, covering 85 percent of the EPC cost, with the government providing the remaining 15 percent. Uganda successfully negotiated a lower interest rate for the commercial loan, which Ghana was not able to achieve. However, Uganda faced challenges similar to Ghana in increasing the concessional portion of the loan. Uganda had limited influence over the concessional loan terms, including a strict 55/45 split between concessional and commercial loans imposed by CHEXIM. Uganda also faced constraints in modifying the predetermined terms for the preferential buyer's credit loan, such as interest

rates and loan tenure. These negotiation outcomes reflect Uganda's partial success in optimizing its financial structure, highlighting areas where it was able to exert influence and where it faced significant limitations.

Ghana's and Uganda's efforts to increase the concessional portion of their loans were unsuccessful, underscoring some challenges in negotiating more favorable terms with CHEXIM. This comparison between the countries underscores the critical role of skilled negotiation in securing favorable financial terms and optimizing project costs while illustrating the structural constraints that can limit the ability to fully influence all aspects of financial agreements.

VII. Project Implementation and Management

Perhaps the most notable difference between Ghana's and Uganda's exercise of agency was in the project development phase. Effective project management and continuous oversight were crucial to Ghana's success in the Bui hydropower plant. The BPA ensured high-quality standards and timely delivery by maintaining rigorous supervision and involving experienced engineers who attended the site daily. The BPA appointed skilled owner's engineers with experience in similar projects and specific familiarity with the EPC contractor, Sinohydro. This collaboration provided essential technical guidance and ensured adherence to best practices.

In stark contrast, Uganda's Karuma Hydropower Plant faced significant challenges due to insufficient initial oversight by the MEMD. The MEMD expected a turnkey project and lacked the technical capacity, experience and staffing to oversee the project effectively. The employees of the MEMD who were responsible for the project did not attend the plant construction site daily, leading to considerable oversight gaps. The appointment of an inexperienced engineering consulting firm further exacerbated these challenges. This consultant did not have previous experience with such projects or working with the EPC contractor, Sinohydro, resulting in substantial quality and timeline issues.

The contrasting outcomes between the two projects underscore the critical role of robust project management and experienced supervision. Ghana's strategic leveraging of experienced consultants was vital for successfully delivering the Bui hydropower plant. In contrast, Uganda's Karuma project suffered from the absence of skilled supervision, highlighting the need for continuous and effective project management and the involvement of experienced consultants to ensure quality and timely completion, especially where the host country or implementing agency may have a skills gap.

POLICY RECOMMENDATIONS AND CONCLUSION

After considering Ghana's and Uganda's experiences with Chinese-supported power generation projects undertaken by the same Chinese actors, this study makes the following three policy recommendations to African governments:

1. Enhance Negotiation Capacity

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To maximize host state agency, there is a need to enhance the negotiating capacity of technocrats. It is important for host states to equip government officials with negotiation skills and a deep understanding of how state-backed Chinese agreements are generally structured. This ensures they can negotiate terms that are in their country's best interest and considerate of the investors' requirements, as it is evident from Ghana's and Uganda's experiences that there is some room for negotiation.

2. Enhance Project Management and Monitoring

African governments should establish a rigorous framework to oversee project progress from inception to completion, including regular site inspections and audits, to enhance project management and monitoring. Investing in technical training for local engineers and technical staff is essential to mitigate overreliance on the EPC and ensure effective project oversight. Implementing a regular reporting system on project progress, challenges and outcomes will keep all stakeholders informed and engaged. By building technical and managerial capacity within ministries and regulatory bodies and by training and employing skilled professionals, governments can ensure better oversight, effective project management and adherence to high-quality standards, thus mitigating risks of suboptimal execution and delays.

3. Leverage Expertise of Experienced Consultants

Governments should engage skilled consultants to provide technical guidance and oversight when in-house expertise is lacking. Ghana's strategic use of experienced consultants for the Bui project ensured thorough feasibility studies and high-quality project implementation, bridging any gap in local experience and ensuring projects meet international standards. Engaging experienced owner's engineers with a proven track record in similar projects is crucial to provide oversight and ensure quality. Additionally, continuously building the capacity of local institutions through partnerships with experienced international firms and organizations will enhance long-term project success and sustainability.

The comparative analysis of Ghana's Bui Hydropower Plant and Uganda's Karuma Hydropower Plant highlights the critical need for African governments to enhance their skills and capacity in managing large infrastructure projects. Both countries' experiences provide valuable lessons in negotiating favorable terms, managing project implementation effectively and learning from past experiences. To ensure positive project outcomes, it is essential for African governments to engage with Chinesesupported projects proactively. This includes strengthening technical and managerial capacities, honing negotiation skills, and utilizing skilled consultants where in-house expertise is lacking. By adopting these policy recommendations, African host states can better manage projects, ensuring they are completed on time, within budget and to the desired standards.

Effective agency is influenced by a supportive structural environment, robust regulatory frameworks, skilled negotiation teams and comprehensive planning mechanisms. This enables governments to navigate and leverage these structures to achieve favorable project outcomes. Structural limitations such as technical capacity, procurement processes and oversight mechanisms played significant roles in shaping project results in both countries. The analysis illustrates how structures can significantly influence the capacity of agents to act independently and effectively. The Bui and Karuma hydropower plants provide essential insights into the interconnectedness of agency and structure in infrastructure projects. Recognizing and addressing these factors can enhance the success and sustainability of such projects, contributing to overall economic development and energy security in the region. By taking decisive action to shape project outcomes, African host states can ensure that Chinese infrastructure investments meet their developmental goals and provide lasting benefits.

Ultimately, the critical learning that comes out of this study is that African host states play a significant role in shaping the outcomes of CSPs, and they are not passive receivers of Chinese investment. Therefore, it is important that they upskill themselves to effectively exercise agency throughout all project stages – planning, negotiating, developing and operating – to maximize positive project outcomes. This proactive engagement ensures investments align with national interests and deliver balanced positive outcomes for the host country and Chinese investors.



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