

國立政治大學亞太研究英語碩士學位學程  
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中國在撒哈拉以南非洲的基礎建設投資(2001-2019)

*China's Infrastructure Investments in Sub-Saharan Africa (2001-2019)*

Student: Hadelin Goffinet 高德蘭

Advisor: Yen-Pin Su, Ph.D. 蘇彥斌 教授

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## Abstract

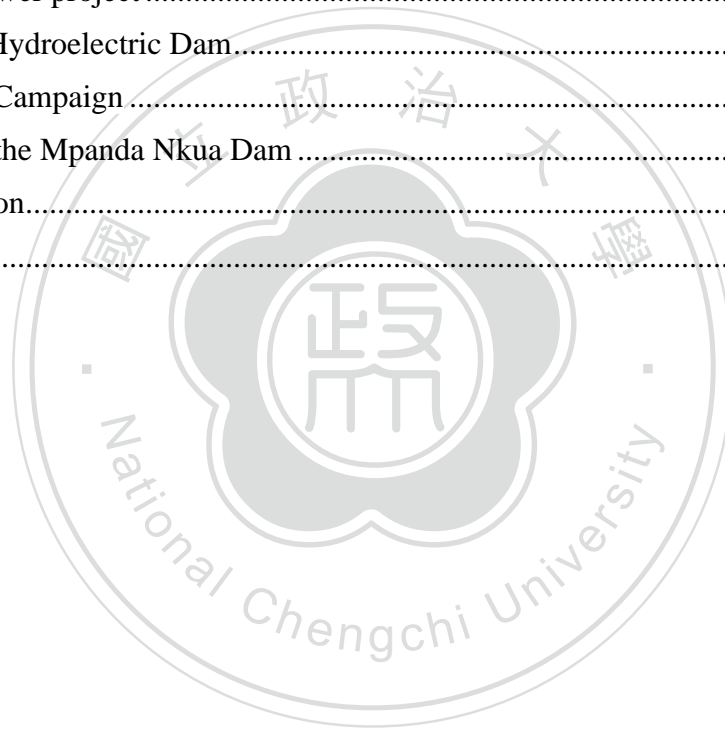
Recent literature suggests that China's investment in infrastructure projects in developing countries has been increasing. However, few studies have examined the features and strategies of Chinese infrastructure investments. To fill the gap in the literature, I constructed a comprehensive dataset of 67 large Chinese infrastructure projects in Sub-Saharan countries and employed quantitative analyses to test hypotheses regarding the relationship between the amount of money and risks of non-completion of these infrastructure projects. The empirical finding suggests that more expensive infrastructure projects under China's investment tend to have more chance to be suspended/canceled or postponed. To further examine under what conditions is China more likely to get the infrastructure projects completed, I conduct two case studies for the Mpanda Nkua Dam project and the Kafue Lower Hydroelectric Gorge project. Overall, this thesis demonstrates China's features and investment strategy containing three different levels of risks of non-completion for infrastructure projects. Moreover, this thesis shows that while more expensive infrastructure projects are remarkable, these projects are less likely to be completed, compared to the less expensive counterparts.

## Keywords

China, infrastructure projects, political economy, investment, risk, Sub-Saharan Africa.

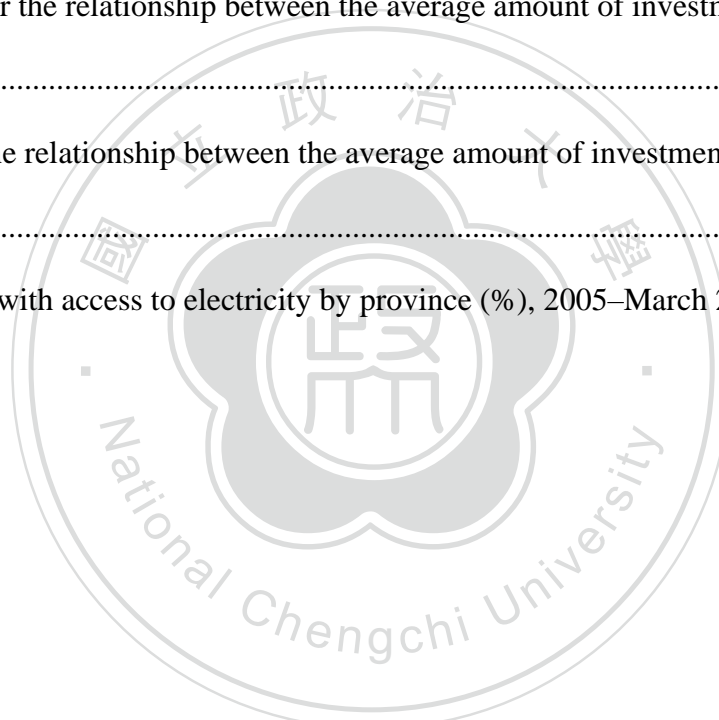
## Table of Contents

Chapter 1: Introduction .....	6
Chapter 2: Understanding China's Presence in Sub-Sahara Africa.....	10
2.1 Debates about China's Role in Developing Countries.....	10
2.2 Size and Risks: Hypotheses about Infrastructure Project Investments.....	13
Chapter 3: Empirical Analyses .....	18
3.1 Chinese Infrastructure Projects in Sub-Saharan Africa.....	18
3.2 Statistical Results.....	35
Chapter 4: Case Studies .....	39
4.1 Kafue Hydropower project .....	40
4.2 Mpanda Nkua Hydroelectric Dam.....	44
4.2.1 Anti-Dam Campaign .....	51
4.2.2 China and the Mpanda Nkua Dam.....	55
Chapter 5: Conclusion.....	61
References.....	64



List of Tables:

Table 1: Expected Levels of Risk Regarding Completion of China-Related Infrastructure Projects.....	17
Table 2: China-Related Infrastructure Projects in Sub-Saharan Africa.....	22
Table 3: Data Collection for Large China-Related Infrastructure Projects in Sub-Saharan Africa .....	23
Table 4: ANOVA for the relationship between the average amount of investment and the levels of expected risk.....	37
Table 5: T-test for the relationship between the average amount of investment and the likelihood of suspension.....	39
Table 6: Population with access to electricity by province (%), 2005–March 2008 .....	48



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## **Chapter 1: Introduction**

Since the government of the People's Republic of China (PRC) issued its first Policy Paper on Africa in 2006, China's involvement in Africa's politics and economy have expanded dramatically (Holslag and Van Hoeymissen 2010). China has become the largest trade partner and the main source of international public finance in Sub-Saharan Africa, surpassing the U.S. and European countries in 2009, starting from less than \$10 million USD in the 1980s to over \$198 billion USD in 2012 while covering more than 50 countries (Elliot and Wang 2014). In 2018, China's imports from Africa were equivalent to \$99.28 billion USD while the export was estimated by the General Administration of China to be \$104.91 billion USD, as reported in the Statistics on China-Africa Trade in 2018 (Ministry of Commerce 2019). Moreover, China pledged in the 2015 Forum on China-Africa Cooperation (hereafter FOCAC) that the country had delivered the \$60 billion USD promised to Sub-Saharan countries. In the 2018 FOCAC, Xi Jinping repledged similar promises, declaring that China will deliver \$20 billion USD in credit lines, \$15 billion USD in grants, interest-free loans and concessional loans, and \$10 billion USD in investment financing. On average, approximately 70% of the total amount of Chinese investment in Africa is for transport, energy and power, and mining (Edinger and Labuschagne 2019).

In recent years, China has drastically increased its infrastructural building projects in Sub-Saharan Africa by building stadiums (Angola, Senegal), government buildings (Congo, Ethiopia) or larger project such as dams (Ethiopia, Sudan, Zambia) and railways (Kenya). China is trying to exhibit itself as a leader in the infrastructure sector and use its own success to promote the Chinese construction model and methods (Dash et al. 2012). Based on the Belt and Road Initiative (BRI)<sup>1</sup>, since 2013, China has been investing in massive infrastructure projects in many developing countries, not only in Africa. A notable example of a Chinese-funded infrastructure project is the port in Gwadar in Pakistan; this project involved over \$60 billion USD based on the China-Pakistan Economic Corridor, which includes a collection of dams, solar panels, ports, roads, and railways projects (Chohan 2017). Another example of major infrastructure investment is in Latin America: the Coca-Codo Sinclair hydropower plant in Ecuador, which was completed in 2016 for \$1.68 billion USD (Su and Vargas 2017, 3). Nevertheless, the projects promised or loaned by Chinese investors do not necessarily turn out to be successful. Take Venezuela's \$7.5 billion

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<sup>1</sup> The BRI was called firstly "One Belt, One Road". It is also called "the Silk Road Economic Belt and the 21st-century Maritime Silk Road".

Tinaco-Anaco Railway project for example. This project was announced in 2009 but to this day, still shows no signs of possible continuation of the program due to local unrest and corruption (Gillespie 2016). This introduction to China's infrastructure investments highlights China's desire to exert its influence in the world through infrastructure.

This thesis does not aim to examine how China is planning to impose its influence through infrastructure projects but rather, intends to respond to a more fundamental question: What are the main features of China's infrastructure projects in Sub-Saharan Africa?

To begin, we need to introduce the regional situation of infrastructure in Sub-Saharan Africa. Using Afrobarometer<sup>2</sup> survey data, Balongo et al. (2016) show that there is a huge discrepancy in availability of infrastructure services among the majority of countries in the sub-continent. Among 35 African countries, most of the North-African countries ranked in the top 10 for access to electric grids; for instance, Egypt, Algeria, and Tunisia, respectively with 100%, 99%, and 98% accessibility, are the leading countries in Africa. Conversely, most Sub-Saharan countries rank below the average of 65%, including Mozambique with 50%, Tanzania with 44%, and Sierra Leone crawling at the bottom with a meager 25% accessibility. Balongo et al. (2016) also demonstrate that rural areas in the Sub-Saharan countries are the most affected by the disparity of infrastructure services. For instance, the difference in availability of electricity between rural and urban areas was estimated at 88% in Guinea (Balongo et al. 2016). Moreover, the inequality not only exists between countries and regions but also between different types of infrastructure services. For instance, while cell phone accessibility was made available for 93% of the population, only 54% have access to paved roads and 30% have access to basic sewerage infrastructure (Balongo et al. 2016).

New infrastructure investments in Sub-Saharan countries would help the region build a receptive environment for investment but also promote economic growth or reduction of poverty

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<sup>2</sup> Afrobarometer defines itself as an “pan-African, non-partisan research network that conducts public attitude surveys on democracy, governance, economic conditions, and related issues across more than 30 countries in Africa” (Balongo et al. 2016). The Swedish International Development Cooperation Agency (SIDA) made an evaluation of the 2011-2017 period of the Afrobarometer regional program, suggesting that Afrobarometer was created to “let the people have a say” on various subjects such as good governance, development, education, and infrastructure (Aggad et al. 2018). SIDA argues that the Afrobarometer offers access to high quality and reliable data to inform the government and provides opportunities of creating new dataset, external of the governmental data offers, which might have problems of limited coverage and being secretly hidden or not divulged (Aggad et al. 2018).

(World Bank 2014; Wantchekon 2014). The African Development Bank (ADB) mentions that closing the gap of infrastructure needs would potentially increase the GDP growth rate by 2 percent per year (Balongo et al. 2016). The desire for infrastructure is coming as much from the ordinary citizen as from the elites running the country. In response to the critical situation, political leaders convened under the African Union and funded a special program called “Programme for Infrastructure Development in Africa” (PIDA), which launched in 2011 (UNECA 2019). The goal of the program is to “promote socio-economic development and poverty reduction in Africa through improved access to integrated regional and continental infrastructure networks and services” (UNECA 2019). PIDA aimed to transcend the investment to a public-private sector partnership, planning to invest in 51 infrastructure projects. PIDA suggests that most of the investment will be awarded to countries located in the Sub-Saharan region, and sectors that were granted most of the funds are Energy and Transport (UNECA 2019).

Compared to PIDA’s initiative, China has made actual investment in infrastructure projects in Africa, and the amount of investment is remarkable. For instance, the Mambilla Power project in Nigeria, the Djibouti-Addis Ababa Railway, and the Railway connecting Port of Mombasa and Nairobi in Kenya are the three most expensive infrastructure projects invested by China, with each project costing more than \$3 billion USD. These mega infrastructure projects have attracted much attention from mass media and academia and offer more possibility to observe China’s features in infrastructure investment and its success or failure in megaprojects.

To address the question regarding the main features of China's infrastructure projects in Sub-Saharan Africa, this thesis focuses on examining the amount of investment promised by China and the risk of non-completion of these infrastructure projects. This study is expected to make two contributions to the literature of political science: First, this study aims to provide a better understanding of the characteristics of China’s infrastructure project investments in developing countries. Second, this study joins the debates of international political economy of developing countries. I choose to study China’s infrastructure projects in Sub-Saharan Africa because this region has been characterized with low investment levels for infrastructure, which has been related to multiple factors such as inadequate generation capacity, limited electrification, low power consumption, unreliable services, and endemic corruption (Ayittey 2000; Eberhard et al. 2011).



The findings of this study could provide useful policy implications for under-developed countries that wish to pursue higher levels of development owing to Chinese infrastructure investment.

In this study, I constructed a comprehensive dataset of 67 large Chinese infrastructure projects in Sub-Saharan countries, which allows me to analyze the size, risks, and investment strategies of each infrastructure project. I employ quantitative analyses to test hypotheses regarding the relationship between the amount of investment made by China and risks of non-completion of these projects. Specifically, two hypotheses are tested: the first suggests that more expensive infrastructure projects should have higher levels of risks of non-completion, while the second suggests that the likelihood for an infrastructure project to be suspended increases with the amount of investment. In addition to the quantitative analyses, I also conducted two case studies on the Mpanda Nkua Dam project and the Kafue Lower Hydroelectric Gorge project to demonstrate China's investment strategy in Sub-Saharan countries and examine the conditions under which China is more likely to complete the infrastructure projects.

Overall, this thesis demonstrates that China has used various strategies with different levels of risks for investing infrastructure projects. Moreover, this thesis shows that more expensive infrastructure projects are more likely to not be completed and therefore, could impact China's image as a competent builder in the region.

## **Chapter 2: Understanding China's Presence in Sub-Sahara Africa**

### **2.1 Debates about China's Role in Developing Countries**

There are two debates about China's role in developing countries. The first debate revolves around whether China's influence<sup>3</sup> is positive or negative for the developing countries. As some scholars contend, the predominance of Western powers in Africa and the U.S. hegemony in the world make the African political elites try to seek alternatives for reducing the impacts of these great powers on the domestic politics (Whitaker 2010). Under this condition, China successfully portrays itself as a new actor with the intention to promote the steady growth of China-Africa relations in the long term and defend a win-win cooperation. However, there are two different perspectives regarding the China-Africa relations. Some believe that promoting the "Chinese model" and abiding the new countries to the "Beijing Consensus"<sup>4</sup> offers opportunities to the African leaders for aid, investment, infrastructure loans (Zezeza 2008; Konings 2007). In contrast, other scholars portray China as a neo-colonialist and defend that the possible benefits of China's involvement in the region could not lead to its general improvement such as human rights, corruption (Rein 2012; Lumumba-Kasongo 2011). World Bank and IMF have complained that China's presence has undermined their efforts to relieve Africa's debt problem and reduce corruption (Campbell 2008, 92). Esosio and Tse (2015) argue that Africa is being bought entirely by the Chinese, and one reason is that they only use Chinese workforce for infrastructure rather than locals. Pitso (2015) suggests that China works "no string attached" with authoritarian and opaque regime in Africa. Despite these criticisms, Brautigam (2014) argues that some evaluations about China's involvement in Africa have been exaggerating, or merely myths.

However, it is for sure that more and more project or loans between China and the recipient country are almost one sided. For instance, Siciliano et al. (2018) argue that unlike Western countries, China's financing model for infrastructure projects often includes an element of resource swaps done in secrecy, which largely circumvent political accountability in the recipient country.

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<sup>3</sup> Goh (2016) defines the term "influence" as "the act of modifying or otherwise having an impact upon another actor's preference or behavior in favor of one's own aim".

<sup>4</sup> The Beijing Consensus was defined and created by Ramo (2004) as opposed to the Washington Consensus. The Beijing Consensus is based on three major points: 1) innovation-based development; 2) economic success measured by its sustainability and level of equality; and 3) self-determination. The implication of Beijing Consensus suggests that China is already a challenger to the U.S.

Gallagher and Porzecanski (2010) find that Chinese development banks and state-owned enterprises are often financing projects in return for guarantees of state-owned fossil fuel resources or other important primary products. Moreover, Gallagher and Porzecanski (2010) contend that the new challenge faced by Latin America due to China's massive investment, coupled with an absence of share standards for environmental issues and regional mechanisms to solve the possible emerging issues between the different actors, led the region to a race to the bottom of finance infrastructure projects with less important environmental restrictions and less social standards. This situation encouraged mass protest mobilization against the construction of the infrastructure projects, such as Chile's emblematic "Patagonia sin Represas," which finally succeeded in halting the HidroAysén dam project (Albrecht et al. 2020).

The second debate about China's role in developing countries revolves around China's development strategy. While China is adopting various development strategies on different subjects, the strategies might depend on certain conditions. For instance, Huang and Wang (2011) find that China's Outward Direct Investment (ODI) to OECD members is greater for countries whose service sector is the most advanced. Huang and Wang (2011) also indicate that China tends to invest more in countries where China exports more. On the other hand, Fukuyama (2016) argues that while China tries to export its political and economic model around the globe (especially in the Latin American and Sub-Saharan countries), China pays more attention to make massive investment in infrastructure such as road, ports, electricity, railways and airports. One consequence from China's oversea investment in infrastructure is that such investment helps economy growth in China (Dash et al. 2010).

Ellis (2009) argues that China's decision to invest depends on its historical interaction with the recipient country, or whether there is a Chinese community in the country or not. In other words, China tends to invest more in countries with strong ties with China and in countries with a sizable Chinese community. Chen et al. (2018) contend that China tends to invest more in weak governance environments. Development strategies used by China to integrate new markets vary in Sub-Saharan Africa. For instance, China might launch initiative for relieving a country's debt and later create a special economic zone for Chinese enterprises to make investment (Van Dijk 2009).

The literature reviewed above suggests that China's presence in Sub-Sahara Africa has become more and more significant throughout the years. China, on one hand, is criticized for the

way it acts without moral or ethical approach, while on the other, it is welcome by some local countries as it offers new opportunities for the continent. China's strategy to develop itself in the region takes various forms. As China's investments in the world have been increasing throughout the past decades, its infrastructure investments have been the cornerstone of China's strategy (Boden 2019).

Brautigam (2011b) suggests that China uses two types of official financing: Official Development Assistance (ODA) and Other Official Flows (OOF). The ODA are mostly granting concessional loans made by the government to a recipient country. In contrast, the OOF are "funds for firms from the donor country to subsidize or guarantee their firms' private investment in recipient countries, military aid, and export credits" (Brautigam 2011b, 204). Moreover, the OOF includes loans that are not concessional or a grant of less than twenty-five per cent and official bilateral transactions that focused mainly on export facility.

China is providing ODA through three different ways: grants, zero interest loans, and concessional (fixed-rate, low-interest) loans. The ODA financing is used for building infrastructure projects such as stadium, government building, but also grant African student scholarships and Chinese medical teams send overseas. Supposedly, the China's Ministry of Commerce is responsible for grant and zero-interest loan, however a vast amount of it is delivered by China Eximbank and China Development Bank. Eximbank represents the Ministry of Commerce as the official bank to grant zero-interest or low concessional loan to countries as ODA, while the China Development Bank does not offer any ODA and their interest rates are often much higher than the Eximbank.

China's government partnership in the past decades in Sub-Saharan Africa has been increasing. A few countries have received more aid than others and have been particularly targeted by the PRC for foreign investment, including Angola, Nigeria, and Sudan (Vines 2007). These countries have been witnessing a race between different donors for aid for them to gain access to their significant untapped natural resources (Dreher et al. 2013). The World Bank report (Butterfield et al. 2009) suggests that China's strategies in these countries have demonstrated that: "Chinese government-funded projects in Sub-Saharan Africa are ultimately aimed at securing a flow of Sub-Saharan Africa's natural resources for export to China" (Butterfield et al. 2009). Cheung et al. (2012) support this argument, indicating that China FDI and ODI are de facto

invested in countries with minerals and oil. However, Dreher and Fuchs (2012) find no real indication that China's aid program in undeveloped countries is driven by greed to access natural resources.

China's ODA is offered mainly for larger projects and required a sizeable use of Chinese goods (at least 50 percent of the project) and services (Chinese constructors' firms as contractors). China's concessional loan program in Sub-Saharan Africa as expanded throughout the years starting from 55 projects in the early 2000 (Broadman 2006) to 87 only a few years later (Brautigam 2011b). Brautigam (2011b) continues by showing that the Eximbank concessional loans rose from 800 million in 2006 to 10 billion in 2012. The China Development Bank, on the other hand financed the OOF about 30 projects between 2000 and 2010, and most of the loans were handed over Angola, South-Africa, and Botswana (Brautigam 2011b, 206-207).

In this thesis, I focus on analyzing infrastructure projects invested by China in Sub-Saharan countries for further understanding the strategies and risks of Chinese investments in the region.

## 2.2 Size and Risks: Hypotheses about Infrastructure Project Investments

The research question that this thesis aims to address is: What are the main features of China's infrastructure projects in Sub-Saharan Africa? More especially, What is the relationship between the amount of investment and the prospect of these projects? We build our hypotheses based on the analytical framework developed by Su and Vargas (2017) and theories about size and risk of infrastructure projects developed by Bent Flyvbjerg and others.

First, Su and Vargas (2017, 7) have developed a useful framework to analyze the investment strategies and the risk of non-completion of China-related infrastructure projects. As Burcar Dunovic et al. (2016) argue, the level of sensitivity to a large infrastructure project's success is significantly greater before the start of the construction than during the execution phase. In the same vein, Su and Vargas's (2017, 7) framework helps evaluate the risk of non-completion at the pre-construction stage. This framework is based on the ideas of Ellis (2014) and Gransow (2015). Ellis (2014) examines China-related infrastructure projects that have been mostly built for accessing resources for mining sectors. Ellis (2014) shows that China's actual investment was surprisingly modest in comparison of what they had promised to invest. Gransow (2015) argues

that China tend to make investment of infrastructure projects because this country has strong experience of building infrastructure.

In general, there are three forms of Chinese infrastructure investment: FDI, loans, and engineering and construction contracts. Gransow (2015) further distinguishes four types of Chinese infrastructure projects. The first is gift infrastructure programs for stadium, library, or government buildings. Those projects are paid by the Chinese government and are carried out by Chinese companies and workers. The second type is construction projects paid by Chinese investors, with loans coming from Chinese banks or private capitals owned by the Chinese partners. Those projects are mainly hotels and resorts built by Chinese companies and Chinese workers. The third type are projects paid by local governments via Chinese loans for roads, bridges, ports, and hydroelectric and thermoelectric facilities. The fourth type is “Infrastructure-for-resources loans”. The loans are incorporating all major Chinese actors in China, such as national oil corporations and state-owned banks.

Su and Vargas’s (2017) framework is a two-by-two table based on two dimensions: 1) main sources of loans and 2) main Chinese actor involved. The scenario in which an infrastructure project is supported by the PRC government but not financed by state-supported Chinese banks does not exist. The other three scenarios suggest three possible scenarios of risks for non-completion of a particular infrastructure project.

**Table 1: Expected Levels of Risk Regarding non-Completion of China-Related Infrastructure Projects**

		Main Chinese Actor Involved	
		PRC Government	Chinese Companies
Main sources of loans	State-supported Chinese bank	Low	Medium
	Sources other than state-supported Chinese banks	N/A	High

*Sources:* Su and Vargas (2017, 3)

As shown in Table 1, the scenario of low risk is when an infrastructure project receives a full PRC government support and loans from state-supported Chinese banks. One example is the Estádio 11 de Novembro in Luanda and the three other stadiums promised and built by China for more than \$500 million USD for the next Africa Cup of Nations (Will 2012). Second, the scenario of medium risk is when an infrastructure project involves Chinese companies with loans from state-supported Chinese banks. Because the main actor is Chinese companies, rather than the PRC government, the risk of non-completion is higher than the scenario in which the PRC government is the major actor. An example of this kind of infrastructure project is the 2001 Hydroelectric Dam in Imboulou in Democratic Republic of the Congo, financed by Exim Bank and contracted by China National Machinery & Equipment Import & Export Corp (CMEC) and Sinohydro (Butterfield et al. 2009). Third, the scenario of high risk is when an infrastructure project involves Chinese companies with loans from sources other than the state-supported Chinese banks. Since there are no support by the PRC government or the PRC-supported banks in this scenario, it is difficult to assess if this kind of project can be successfully completed or not, and therefore the expected risk of non-completion should be the highest compared to the other two scenarios.

Su and Varga's (2017) framework is useful for analyzing different levels of risks based on different combined scenarios of main Chinese actors and main sources of loans. To further examine the relationship between the amount of project investment and the level of risks of project non-completion, I rely on theories about size and risk of infrastructure projects developed by Bent Flyvbjerg and others. First, what is a megaproject? According to the Oxford Handbook of Megaproject Management: "Megaprojects are large-scale, complex ventures that typically cost 1

billion dollars or more, take many years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people" (Flyvbjerg 2017, 14). However, for some authors, a project that costs 100 million dollars could be considered as a megaproject (Brookes and Locatelli 2015).

Are the megaprojects the solution for infrastructure investment? Scholars like Sachs (2006) defend the idea that big challenges such as energy, water accessibility, etc., can only be solved thanks to big solutions (big infrastructure projects), while Schumacher (1973) or Lindblom (1979) argue that big infrastructure projects are not the best solutions. Are megaprojects viable? Flyvbjerg (2007) argues that the cost of megaprojects is likely to increase over time, and thus this kind of infrastructure project decrease the benefits on the long run. Expensive infrastructure projects involve more uncertainty for being completed (Buhl et al. 2003). One reason is that it takes more time to complete the project, and thus there will be more unexpected events and issues taking place during the construction period (Flyvbjerg 2007). Another reason is that it is more difficult to secure additional funding for megaprojects when it is necessary or urgent. Therefore, expensive infrastructure projects involve higher risk of non-completion. When a project was delayed, it often leads to renegotiation and reapproving from the funder and the contractor, which could once more elevate the risk of non-completion.

Focusing on hydropower megaprojects, Ansar et al. (2014) have analyzed the real cost of this kind of megaprojects and the possible issues during the construction period. Ansar et al. (2017) contends that the nature of dams is unique because dam projects are indivisible and discrete megaprojects, which suggests that an incomplete dam is completely valueless. Ansar et al. (2014) argue that "actual construction costs of large dams are too high to yield a positive return. Large dams also take inordinately long periods of time to build, making them ineffective in resolving urgent energy crises". The empirical analyses of Ansar et al. (2014) suggest that large hydropower infrastructure in Sub-Saharan countries have an average of 50% cost overrun, and thus the authors argue that alternative energies would be cheaper. Other studies have also demonstrated that large dams have poor economic, social and long-term performances (Bulan and Sovacool 2011; McCully 2001).

In conclusion, Flyvbjerg (2004) argues that larger infrastructure projects might face larger risks and problems. Ansar et al. (2017) show that large capital investment often leads to fragility



because small errors might magnify due to repercussions on the whole system. Nijkamp and Ubbels (1999) demonstrate that the costs of most infrastructure projects tend to be underestimated by the planners. In fact, the costs for large infrastructure projects tend to rise over time because of inflation, incompleteness of the estimation, and change or extension of the project (Ansar et al. 2014; Nijkamp and Ubbels 1999). Therefore, larger infrastructure projects are susceptible to face additional issues thus have higher levels of risk of non-completion. Here the risk of non-completion includes the possibility of being suspended, stalled, or canceled. Accordingly, we generate two testable hypotheses based on the previous literature review:

*H1: The amount of investment is positively associated with a higher level of risks of non-completion.*

*H2: The amount of investment is positively associated with the likelihood of being suspended.*



## **Chapter 3: Empirical Analyses**

### **3.1 Chinese Infrastructure Projects in Sub-Saharan Africa**

In this thesis, the goal is to empirically examine the relationship between the amount of project investment and the level of risks of project completion. Therefore, we examine this theoretical argument by testing our two hypotheses. The first hypothesis suggests that more expensive infrastructure projects should have higher levels of risks of completion, compared to less expensive infrastructure projects. The second hypothesis suggests that the likelihood for an infrastructure project being suspended increases with the amount of investment. To test our two hypotheses, we collected data for infrastructure projects based on the following criteria: 1) those with at least 50 million USD investment; and 2) those in which at least 50% of investment come from the People's Republic of China government or Chinese companies. We believe that these criteria ensure the selection of important Chinese-involved infrastructure projects. We focus on larger infrastructure projects not only because they are more important, but also because of the data availability. In other words, smaller infrastructure projects might be important as well, but due to the limitation of news coverage, we believe that it makes sense to focus on larger infrastructure projects.

The various data relied on for this dataset are from the CSIS' list of ongoing infrastructure programs in Africa (Cheatham et al. 2019), the World Bank (Butterfield et al. 2009), the China-Africa Research Initiative 2019 (Atkins et al. 2017; hereafter SAIS-CARI), the websites of Eximbank and the China Development Bank, the websites of local journals or newspapers, and official statements.

To test our two hypotheses, we construct three variables. We rely on the data sources mentioned above to construct the variable of suspension, which is a dichotomous variable for whether a given infrastructure project has been suspended or not. It is coded 1 if the project has been suspended or canceled, and 0 otherwise.

The second variable is the estimated amount of investment, and the data we used come from reports of the World Bank about China's investment in Sub-Saharan countries (Butterfield et al. 2008) and the website AidData ([www.Chinaaiddata.org](http://www.Chinaaiddata.org)). When AidData was publicized online, it claimed that its data embody the global Chinese finance in the world. However, Deborah

Brautigam (2013), a major specialist over China-Africa relationship, criticized that the data was mostly coded from media reports, and thus the data might not be sufficient to capture all Chinese investment in Africa. Brautigam (2013) indicated that out of the 20 mega projects funded by China that were listed on the website, 14 of them had been cancelled or even had not been initiated, and thus they should not appear in the dataset. Moreover, the amount of investment for some projects might be largely overestimated by AidData. For instance, Brautigam (2013) stated that the amount of investment for China's agricultural demonstration station in Mozambique is about 8 million, but AidData showed that the estimate is over 700 million.

In response, AidData began to improve the data quality by using not just mass media reports, but also insights from experts (including the project-specific information made available through Brautigam's blog), project-level data collected by other researchers, and official government data. In the following analysis, when there are discrepancies in the estimated amount of investment for certain projects, we took the average of the smallest and the largest estimates. as a result, our dataset for this thesis was triangulated with multiple sources of data and scholarly information. For instance, we also used Humphreys et al. (2019), which provides detailed investment information about ports and economic zones in Sub-Saharan Africa countries. We also relied on Deborah Brautigam (2011), which provide detailed information and critiques about China's investment in Africa.

Overall, we coded 67 projects in total for our dataset. As Table 2 shows, most of the projects are dams or power plants (35.8%), followed by ports (26.86%) and stadiums/government buildings (23.9%), while only 7.46% of these projects are roads/railways and 6% are airports. Regarding the total amount of investments, Table 2 demonstrates that the category receiving the most significant total amount of money is the dams and powerplants. The amount of Chinese investment on dams and powerplants is about 19 billion USD. Surprisingly, the second largest total of investment is the road and railway category. Although roads and railways projects only represent 7.46% of total China-related infrastructure projects, the amount invested is close to 9 billion USD. In addition, Table 2 indicates that, ports, follow closely in third position, receive a total amount of investment of 8 billion USD. Moreover, stadiums /government buildings and airports only represent 2 billion dollars for the former and nearly 700 million dollars for the latter. Overall, Table 2 enhances the

clear vision of China's investment in term of numbers of project and amount of money invested in different types of infrastructure projects in Sub-Saharan Africa.



**Table 2: China-Related Infrastructure Projects in Sub-Saharan Africa**

<b>Project type</b>	Road/ Railways	Dam/ Power Plant	Port	Stadium/Government Building	Airport
<b>Number of Infrastructure Projects/ Percentage</b>	5 (7.46%)	24 (35.8%)	18 (26.86%)	16 (23.9%)	4 (6%)
<b>Total Amount of Investment in million USD</b>	8758	18990	8096.5	2060.3	697

Source: Author.

The third variable for the empirical analyses is the expected level of non-completion risk, which is constructed based on Su and Vargas's (2017) theoretical framework. This variable is a categorical variable that differentiates the projects in our dataset into three categories: low-risk, medium-risk, and high-risk projects. The different levels of risks are determined by two dimensions: 1) whether the main Chinese investor is the CCP government or Chinese companies; and 2) whether the main source of financing is Chinese state-owned banks or not. To code the data for the variables of main Chinese investor and main financing source, we relied on data from AidData. For the purpose of our coding, when the information exfiltrated from other sources shows that the source from the loan is not known but it is described as an ODA, we assume that the loan is provided by the Eximbank.

**Table 3: Data Collection for Large China-Related Infrastructure Projects in Sub-Saharan Africa**

	<b>Project</b>	<b>Estimated Amount of Investment (US\$ millions)</b>	<b>Main Chinese Investor Involved</b>	<b>Main Sources of Loan</b>	<b>Year of Announcement</b>	<b>Current Status as of February 2020</b>	<b>Expected Level of Risk of Non-Completion</b>	<b>Suspension</b>
<i>Country</i>								
<i>Angola</i>	Four different Stadium: Tundaval, Ombaka, Chazi and Luanda Stadium	600	Sinohydro, China Jiangsu International, Shanghai Urban Construction Group Corporation/PRC government	Eximbank (ODA)	2008	Completed	Low	No
<i>Benin</i>	Adjarala hydroelectric project	Varying from 162 to 551	Sinohydro/PRC government	Eximbank	2004	Postponed	Low	Yes
<i>Cameroon</i>	Cameroon Yaounde Multi-functional Stadium	55	China Shanxi Construction Engineering Corporation/PRC government	Unspecified Chinese Government Institution probably Eximbank (ODA)	2001	Completed	Low	No
<i>Cameroon</i>	Deep seaport of Kribi	423	China National Electric Equipment Corporation, China Harbour Engineering Company Limited	Eximbank	2011	Completed	Medium	No

<i>Cameroon</i>	Deep seaport of Kribi: Phase II	680	China Harbour Engineering Company Limited	Eximbank	2017	In progress	Medium	No
<i>Congo</i>	Congo's parliament	58	Jiangsu Provincial Construction Lt/PRC government	Eximbank (ODA)	2017	In progress	Low	No
<i>Congo</i>	Imboulou Dam	Varying from 238 to 280	China National Machinery and Equipment Import and Export Corp; Sinohydro/PRC government	Eximbank	2001	Completed	Low	No
<i>Congo</i>	Ollombo Airport extension	Varying from 56 to 62	China Jiangsu International Economic Technical Cooperation Corporation/ PRC government	Eximbank	2007	Completed	Low	No
<i>Congo</i>	Rehabilitation Maya-Maya International Airport	Varying from 160 to 180	Weihai International Economic & Technical Cooperative Co/PRC government	Eximbank	2007	Completed	Low	No
<i>Djibouti/ Ethiopia</i>	Djibouti-Addis Ababa Railway	4000	China Railway Group and China Civil Engineering Construction Company /PRC government	Eximbank, Development Bank of China and the Industrial and	2011	Completed	Low	No

			Commercial Bank of China					
<i>Equatorial Guinea</i>	Expansion of Bata Port	Varying from 300 to 650	China Communications Construction Company/First Harbor Engineering Company/PRC government	Eximbank	2007	Completed	Low	No
<i>Ethiopia</i>	Africa Union's headquarters	200	China State Construction Engineering Corporation/ PRC government	Unspecified Chinese Government Institution probably Eximbank (ODA)	2006	Completed	Low	No
<i>Ethiopia</i>	Gibe III Dam	420	Dongfang Electric/ PRC government	Industrial and Commercial Bank of China	2010	Completed	Low	No
<i>Ethiopia</i>	National Soccer Stadium	120	China State Construction Engineering Corp/PRC government	Unspecified Chinese Government Institution	2016	Completed	Low	No
<i>Gabon</i>	Stade de l'Amitié Sino-Gabonaise	50	Shanghai Construction Company/PRC government	Unspecified Chinese Government Institution	2008	Completed	Low	No



<i>Ghana</i>	Two major constructions of stadium (Sekondi Takoradi and Tamale Stadium) + renovation of two others	135	Shanghai Construction Company/PRC government	Unspecified Chinese Government Institution	2006	Completed	Low	No
<i>Ghana</i>	Bui Dam Complex	562	Sinohydro/PRC government	Eximbank	2007	Completed	Low	No
<i>Guinea</i>	Souapiti Dam	850	Sinohydro/PRC government	Eximbank	2006	Suspended	Low	Yes
<i>Guinea</i>	Keleta dam	335	China International Water & Electric Corp. /PRC government	Eximbank	2011	Completed	Low	No
<i>Ivory Coast</i>	Expansion of Abidjan Port	875	China Harbour Engineering Company /PRC government	Eximbank	2013	Completed	Low	No
<i>Ivory Coast</i>	National Stadium of Ebimpe	Varying from 103 to 133	Beijing Construction Engineering Group /PRC government	Eximbank	2015	In progress	Low	No
<i>Kenya</i>	Railway between the Port of Mombasa and Nairobi	3233	China Road & Bridge Corporation/PRC government	Eximbank	2014	Completed	Low	No

<i>Malawi</i>	National Stadium	Varying from 65 to 70	Anhui Foreign Economic Construction Group/PRC government	Eximbank (ODA)	2009	Completed	Low	No
	Mozambique National Stadium	80	Anhui Foreign Economic Construction Group/PRC government	Preferential Loan: most likely Eximbank	2006	Completed	Low	No
<i>Mozambique</i>	Beira Fishing Port	120	China Harbour Engineering Company/PRC government	Concessional loan: ODA	2014	Completed	Low	No
	Maputo Ring Road	300	China Road and Bridge Corporation/PRC government	Eximbank	2012	Completed	Low	No
<i>Mauritania</i>	Nouakchott to Bofal Railway	Varying from 330 to 620	Transtech Engineering Company/PRC government	Eximbank	2007	Canceled	Low	Yes
<i>Mauritania</i>	Port of Friendship expansion project	282	China Communications Construction Company/PRC government	Eximbank	2008	Completed	Low	No
<i>Nigeria</i>	Abuja to Kaduna rail line	Varying from 500 to 1000	Guangdong Xinguang International Group -China Civil Engineering Construction	Eximbank	2006	Completed	Low	No

		Corporation/PRC government						
<i>Nigeria</i>	Mambilla Power project	300	China Gezhouba Group Company and Sinohydro/PRC government	Eximbank	2007	Cancelled	Low	Yes
<i>Nigeria</i>	Papalanto power gas turbine Phase II	297.8	Shandong Electric Power Construction Company/PRC government	Eximbank	2005	Completed	Low	No
<i>São Tomé e Príncipe</i>	Deep Sea Trans-Shipments Port	800	China Harbour Engineering Company/PRC government	China Harbour Engineering Company	2013	In progress	Low	No
<i>Senegal</i>	Power plants 250mW coal power	350	China Metallurgical Group/PRC government	Unspecified Chinese Government Institution, Government Agency	2006	No evidence of completion and possible change of plan (Korean company funded the same project)	Low	Yes
<i>Sierra Leone</i>	Mamamah International Airport	315	China Railway International Group/PRC government	Eximbank	2011	Cancelled	Low	Yes
<i>Sudan</i>	El-Gaili combined-cycle power plant, phase 1	128	Harbin Power Equipment Company Limited (HPEC) /PRC government	Eximbank	2001	Completed	Low	No

<i>Sudan</i>	National Electricity Corporation transition line	81	China Machinery Engineering Corporation/PRC government	Eximbank	2006	Completed	Low	No
<i>Sudan</i>	Two power plants (one in Rabak and one in port Sudan)	512	Shandong Electric Power Construction Company/PRC government	Eximbank	2005	Completed	Low	No
<i>Sudan</i>	Power plant in Al-Fulah	Varying from 518 to 680	Shandong Electric Power Construction Company/PRC government	Eximbank	2009	In progress	Low	No
<i>Sudan</i>	Merowe Dam	519	China International Water Electric Corp. and SinoHydro/PRC government	Eximbank	2003	Completed	Low	No
<i>Tanzania</i>	Mahurubi port	200	China Harbour Engineering Company /PRC government	Eximbank	2013	In progress	Low	No
<i>Tanzania</i>	Expansion of Dar es Salaam Port	524	China Communications Construction Company/PRC government	Eximbank	2012	Suspended	Low	Yes
<i>Zambia</i>	Kafue Gorge Lower Hydro Power Project	1000	Sinohydro/PRC government	China Development Bank	2010	Suspended	Low	Yes

Zambia	Ndola National Stadium	65	Anhui Foreign Economic Construction Group/PRC government	Concessional loan: ODA	2006	Completed	Low	No
Zambia	Heroes National Stadium in Lusaka	94	Shanghai Construction Group China/PRC government	Eximbank	2011	Completed	Low	No
Zimbabwe	Two electricity generations unit at Hwange Power Station	500	China National Aero-Technology Import & Export Corporation (CATIC) /PRC government	CATIC	2004	Completed	Low	No
Zimbabwe	Parliament building	140	China's Shanghai Construction Group/PRC government	Unspecified Chinese Government Institution (ODA)	2017	In progress	Low	No
Zimbabwe	Kariba South Hydro Power	325	Sinohydro /PRC government	Eximbank	2013	Completed	Low	No
Zimbabwe	Robert Gabriel Mugabe International Airport expansion and renovation	153	China Jiangsu International/PRC government	Eximbank	2017	In progress	Low	No

<i>Angola</i>	Caio Deep Water Port	600	China Communications Construction Company	Eximbank	2017	In progress	Medium	No
<i>Djibouti</i>	Multifunctional terminal of Doraleh	590	China Civil Engineering Construction Corporation Ltd and China State Construction Engineering Corporation	China Merchants Port Holdings	2014	Completed	Medium	No
<i>Djibouti</i>	Ghoubet Salt-export	64	First Harbor Engineering Company	Eximbank	2016	Completed	Medium	No
<i>Ghana</i>	Takoradi Harbor Infrastructure Development project	150	China Harbour Engineering Company Limited	Chinese Development Bank	2012	In progress	Medium	No
<i>Guinea</i>	Souapiti hydropower plant	1175	China International Water & Electric Corp. Sinohydro	Eximbank	2015	In progress	Medium	No
<i>Kenya</i>	Lamu Coal Power Station	1200	PowerChina Group	Industrial and Commercial Bank of China	2014	Delayed/suspended	Medium	Yes
<i>Nigeria</i>	Mambilla Power project	4930 (85% of the 5800)	China Gezhouba Corporation, Sinohydro Corporation	Eximbank	2017	Stalled// Attempt to restart the work in 2020	Medium	Yes

		Limited and CGOC Group Limited.						
<i>Nigeria</i>	Lekki Deep Sea Port	629	China Harbour	Chinese Development Bank	2019	In progress	Medium	No
<i>Nigeria</i>	Zungeru Hydropower Project	927	CNEEC-Sinohydro	Eximbank	2012	In progress	Medium	No
<i>Zimbabwe</i>	Hwange power station expansion (7th and 8th unit plant)	1200	Sinohydro	Eximbank	2015	In progress	Medium	No
<i>Gabon</i>	Port Mole	120	China Harbor Engineering Company	l'Agence Nationale des Grands Travaux	2013	Completed	High	No
<i>Ghana</i>	Free Port in Atuabo	600	China Harbor Engineering Company	Joint Venture including a 10 percent free carry shareholding for the government of Ghana and a 35 percent shares to be owned by state owned enterprises	2015	Cancelled//Suspended indefinitely	High	Yes

<i>Ethiopia</i>	Grand Ethiopian Renaissance Dam : turbines	1800	China Electric Power Equipment and Technology Corp.	Funded entirely by the Federal Democratic Government of Ethiopia; Possibility that Chinese banks are apparently underwriting the cost of turbines and other electrical equipment	2011	In progress	High	No
<i>Ethiopia</i>	Tekeze Dam	365	Chinese National Water Resources and Hydropower Engineering Corp	Funded entirely by the Federal Democratic Government of Ethiopia	2002	Completed	High	No
<i>Eritrea</i>	Massawa Port Project	400	China Harbour Engineering Company Limited	Eritrean Ministry of Public work	2014	In progress	High	No
<i>Ivory Coast</i>	San Pédro Stadium	118	China Civil Engineering Construction Corporation	Local Government funded (probably funded with China's money due to previous loan agreement)	2017	In progress	High	No

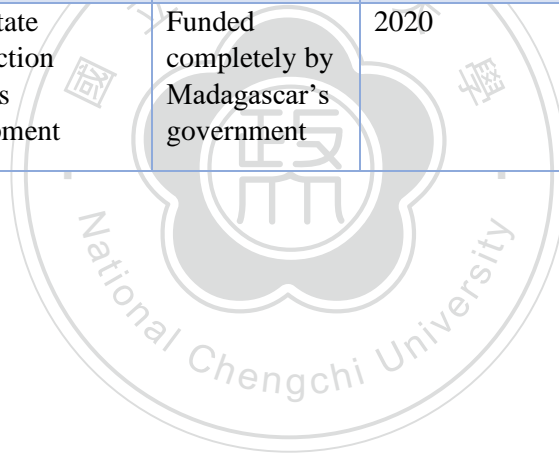


*Ivory Coast*

Korhogo Stadium	82.8	China National Building Material	Funded completely by Ivory Coast's government (chances that its funded with China's money due to previous loan agreement)	2017	In progress	High	No
Lamu Port: First-three Berth	Varying from 480 to 689	China Communication Construction Company	The Government of Kenya	2017	In progress	High	No
Mahamasina stadium	77	China State Construction Overseas Development	Funded completely by Madagascar's government	2020	In progress	High	No

*Kenya*

*Madagascar*



As Table 3 shows, many Chinese-involved infrastructure projects started after 2006. Specifically, there are only 18 projects initiated before 2006. Second, half of the low-risk projects are government building or stadium, and, in comparison with the other categories of projects, the low-risk projects are generally less expensive.<sup>5</sup> Third, 46 projects belong to the low-risk category, where the main Chinese investor is the PRC government and the main financing source is Chinese state-owned banks. Moreover, 12 projects belong to the medium-risk category, where the main Chinese investor is the Chinese companies and the main financing source is Chinese state-owned banks. There are only 9 projects that belong to the high-risk category, where the main Chinese investor is Chinese companies and the main financing source is non-Chinese state-owned banks. Last, among the 67 projects, 11 of them were suspended, postponed, or canceled.

Our dataset shows interesting information about China's investment of infrastructure projects in Sub-Saharan Africa. For instance, some projects are listed as a group of projects while others are not. Those projects shown as a group, were either signed as a group projects by the recipient country or as part of an agreement with China's government. For instance, it can be seen with the Angolan government agreement for the four stadiums loaned and paid in form of foreign aid for the Africa Cup (Will 2012). Another example is the Ghanaian government agreement for the construction of two stadiums and renovations of two others (Will 2012). In other cases, China offers those deals as a recognition gift. For instance, since World War II, China and Taiwan are involved in a war of influence over their own recognition as a country around the globe (Rich 2009). The dollar diplomacy used by both countries is favorable for the PRC which by offering more money and gifts such as Stadium or governmental buildings especially in developed countries lead to countless loss of support for Taiwan recognition as a country over the years (Taylor 2002). An interesting example which explains that kind of turnover is Malawi. The country stopped recognizing Taiwan in 2008 and which shortly after recognized the PRC. Therefore, in exchange of that support, China financed and offered the 2009 Malawi National Stadium (Will 2012).

Furthermore, as shown in Table 3, some projects have been entirely funded with the local government, such as Massawa Port Project in Eritrea (Tesfanews 2015) and the Tekeze Dam in

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<sup>5</sup> Many other stadium or building were not included in the dataset because they did not follow our selection criteria of minimum 50 million USD money invested for example the 30 million USD invested by China for the construction of Cape Coast Stadium in Ghana (Dreher et al 2017).

Ethiopia (Debebe and Stevenson 2009). The reason is that these countries have directly expressed that they do not want any external investor/loan in order to not be pressured by those investors or other countries because of a possible conflict. The Grand Ethiopian Renaissance Dam has been such a case where Ethiopia wants to build a dam on the Nile which brought Sudan and Egypt on a possible conflict of interest since Ethiopia will control the water upstream. Therefore, having an external loan or a partner could be challenging because the investor (the country or company) could be pressure or even be forced by Sudan or Egypt to cancel the agreement (Tawfik 2015).

### 3.2 Statistical Results

Regarding estimation methods, we employed an Analysis of Variance (ANOVA) for testing our first hypothesis and a two-sample t-test for testing our second hypothesis. ANOVA is a statistical method that separates observed variance data into different components, and it allows a comparison of more than two groups at the same time to determine whether a relationship exists between them. If no true variance exists between the groups, the ANOVA's F-ratio should equal close to 1.

Table 4 shows whether the group of low-risk, the group of medium-risk, and the group of high-risk are different in terms of the average amount of investment. The results suggest that there is at least one group that is different from the other groups. The pairwise comparisons of means with equal variances over expected risks suggest that the average investment for medium-risk projects is higher than for low-risk projects, and the difference is statistically significant at  $p < 0.1$  level. However, the difference between low-risk projects and high-risk projects and the difference between medium-risk projects and high-risk projects are not statistically significant.

**Table 4: ANOVA for the relationship between the average amount of investment and the levels of expected risk**

Expected risk	Summary of average amount: mean	Summary of average amount: Standard Deviation	Frequency
0	476.25652	725.43787	46
1	1083.5833	1400.8118	12
2	460.81111	543.69709	9
<b>Total</b>	582.95672	881.60558	67

Source	Analysis of Variance: sum-of-squares (SS)	Analysis of Variance: Degree of Freedom (DF)	Analysis of Variance: mean square (MS)	Analysis of Variance: F ratio	Analysis of Variance: Prob > F = P value
<b>Between groups</b>	3665506.91	2	1832753.45	2.46	0.0933
<b>Within groups</b>	47631567.8	64	744243.247		
<b>Total</b>	51297074.7	66	777.228.405		

We conducted a Bartlett's test for equal variances: Chi square (2) = 11.8776 Prob> Chi square = 0.003

Average amount (Expected risk)	Contrast	Standard Error	Tuckey: value	Tuckey: value >T	P	Tuckey: 95% confidence interval
<b>1 vs 0</b>	607.3268	279.6417	2.17	0.084		-63.65201 1278.306
<b>2 vs 0</b>	-15.44541	314.4406	-0.05	0.999		-769.9216 739.0308
<b>2 vs 1</b>	-622.7722	380.4129	-1.64	0.268		-1535.544 289.9994

**Table 5: T-test for the Relationship between the Average Amount of Investment and the Likelihood of Suspension**

<i>Suspension</i>	Summary of average amount: mean	Summary of average amount: Standard Deviation	Frequency
<b>0</b>	495.04643	701.91348	56
<b>1</b>	1030.5	1468.4519	11
<b>Total</b>	582.95672	881.60558	67

Group	Observation	Mean	Standard Error	Standard Deviation	Tuckey: 95% confidence interval	
<b>0</b>	56	495.0464	93.79713	701.9135	307.0728	683.0201
<b>1</b>	11	1030.5	442.7549	1468.452	43.98057	2017
<b>Combined</b>	67	582.9567	107.7053	881.6056	367.9162	797.9972
<b>Differences</b>		-535.4536	285.3521		-1105.341	34.43396

Differences = Mean (0) – Mean (1)

t = -1.8765

Ho Null hypothesis: The single sample t-test evaluates the null hypothesis that the population mean is equal to 0.

The degrees of freedom for the single sample t-test is simply the number of valid observations =65

Alternative hypotheses: There exists a difference between the two samples.

Ha<sub>1</sub>: one -tailed p-values evaluating the null against the alternatives that the mean is less than zero. The result obtained is 0.0325

Ha<sub>2</sub>: two-tailed p-value evaluating the null against an alternative that the mean is not equal to zero. The result obtained is 0.0651

Ha<sub>3</sub>: one-tailed p-values evaluating the null against the alternatives that the mean is greater than zero. The result obtained is 0.9675

For the purpose of this research, the t-test allows us to examine whether the group of suspended cases and the group of non-suspended cases are different in terms of the average amount of investment. As Table 5 shows, the difference between these two groups is statistically significant at  $p < 0.1$  level. This finding suggests suspended infrastructure projects are more

expensive than the non-suspended projects, and the difference between the two groups are statistically significant. Therefore, the results in Table 5 provide strong supports for H2, which suggests that China's infrastructure projects have more chance to be suspended when the amount of investment is high.

As mentioned above, the results in Table 4 provide partial support for H1. Specifically, we find that medium-risk infrastructure projects are more expensive than lower-risk projects, but high-risk projects are not necessarily more expensive than medium-risk projects. There might be two possible reasons for this surprising finding that high-risk projects have a lower average amount of investment. The first possible reason suggests that some of the high-risk projects might actually have been subsidized by China through previous loans. However, because Chinese investment details are often opaque, we can only use the observable data for classifying projects into different level of risks of non-completion. The second possible reason pertains to the nature of loan source. Because the funds of the projects in the high risk category are mostly coming from the local Sub-Saharan countries' governments, the lack of funds and the corruption in the countries might make these countries less likely to complete the payment for these high-risk infrastructure projects. Therefore, when the loan source is the local government, the projects tend to be more "realistic," which means that they are generally cheaper.

## **Chapter 4: Case Studies**

In addition to the statistical analyses, I conducted a qualitative analysis with two case studies. The purpose of the qualitative analysis is to further examine the causal mechanism of my two hypotheses. I select two cases for the qualitative studies: Mpanda Nkua Dam project in Mozambique and the Kafue Lower Hydroelectric Gorge project in Zambia. These two cases are selected for two reasons. The first reason is about their similarities. Specifically, both projects are megaprojects of dam. Both projects are located in the same region/river, and Mozambique and Zambia have similar problems and have similar issues concerning electricity production and needs of infrastructure. As mentioned before, it is clear that China has strong intention to be a dominant investor in dams and power plants in Sub-Saharan Africa. Since the building of the Three Gorges, China has effortlessly promoted its state-owned company, Sinohydro, as the leader of the global hydropower sector (Nordensvad and Urban 2014). During the last decade, China has been massively investing in dam building in in Africa or Latin America (Bosshard et al. 2009). China's investing strategy in dams is drastically different from other dam builders due to the major help from the PRC government and the way they are handling social and environmental risks. The two case studies in the following sections display the way the PRC government and Sinohydro handle major infrastructure projects.

The second reason for choosing these two cases is about their differences. Kafue project is expensive, and it is suspended. Therefore, this case illustrates the mechanism of H2. However, Kafue project is an expensive project with low expected risk of non-completion. According to H1, low-risk projects should be less expensive, but this is not the case for the Kafue project. The following case study indicates that a low risk project might not be necessarily less expensive. It could become more and more expensive as time goes by. In contrast, the Mpanda Nkua Hydroelectric Dam is an unusual case that does not fit in Su and Varga's (2017) analytical framework. Specifically, the main actor involved in the project is not the PRC government nor any Chinese company, but local companies. And the main source of loan for this project is from Eximbank. It is interesting to study this case as the analysis could shed light to Su and Varga's (2017) framework and contribute to the studies regarding the risk of China-related infrastructure project investments.

#### 4.1 Kafue Hydropower project

The Republic of Zambia is located also in southern Africa and is a landlocked country. It is bordered by Democratic republic of Congo to the north, Tanzania to the northwest, Mozambique to the south east, Zimbabwe and Botswana to the South and Namibia to the southwest, Angola to the West and Malawi to the East. Zambia was named Northern Rhodesia (1911-1964) under the rule of the British empire and mostly one company, British South Africa Company. After its independence in 1964, Zambia elected the first president, Kenneth Kaunda, who stayed in power until 1994. His party, United National Independence Party (UNIP) remained a majority until 1991. The one party-regime, was at first, satisfied the people's agenda of being independent, earlier than their neighbors. After, when the grip of power was being hold entirely by UNIP, the government quickly showed repression toward possible opposition parties and suppress some civil liberties (Macola 2008). At the end of UNIP grip of power, more and more protests were launched against the government and Kaunda. It led to a change of power to a social democrat leader, Frederick Chiluba. Chiluba's leadership established a steady social economic growth and started the government decentralization. Chiluba's successor, Levy Mwanawasa, took power in 2002 and remained famous for his anti-corruption program and the improvement of the standard of living. After Mwanawasa death in 2008, Rupiah Banda acted as acting president and was elected shortly after as president. Three years later, he stepped down, letting Michael Sata leading the country who died in office three years later in 2014. Elected in 2015, Edgar Lungu is the current president of Zambia. (Macola 2008)

The economic growth and the way the country was led made huge impression on the world scene, as Zambia was showing over 6% economic growth from 2007-2010 and was on the top 10 of the global reformers list made by World Bank (Ngoma 2010). Although, it shows great prospect for the future, Zambia ranked 143 on the Human Development index 2018 (UNDP 2018) which shows only low-medium human development. In addition, Zambia scored as an low country in the world as ranked 111 out of the 160 countries in the database according to the Logistics Performance Index (LPI) data (2018) of the World Bank which measure of performance of trade logistics and infrastructure (World Bank 2018).

After its independence, the country was meddled in surrounding countries fights for their own independence an played a key role as middleman between countries (Chongo 2016). As UNIP



took control of the country, the government chose to close the border for avoiding external influence to pressure the government of Kaunda (Macola 2008). The entire country as it was lockdown was powered by one dam: Hydroelectric dam of Kariba (White 1973). Zambia, like Mozambique, always planned to use the power of the Zambezi to offer electricity access to its citizens (White 1973). So, in addition of the Kariba Dam, Zambia built two other dams in the seventies, the Kafue upper gorge dam and Itezhi-Tezhi Dam, to be able to sustain its economy and its electric needs. The three dams, all impacted their environment or habitations of locals (Godet and Pfister 2007). For instance, the Kariba Dam forced an estimation of 60000 people to be relocate due to the construction (Paehlke 1995). A second example is the Itezhi-Tezhi dam's impact on environment, its construction reduced the fish reproduction and by so their population (Godet and Pfister 2007). Moreover, it also led to a reduction of wildlife animals and finally it led to irregular floods (Godet and Pfister 2007).

In comparison with our other study case, Zambia built much more hydroelectric dam in total comparing with its neighbors Zimbabwe, Malawi, Tanzania and even Mozambique. The fundamental difference between Mozambique and Zambia is related to the production capacity, the production per dam in Mozambique is much larger than in Zambia. Overall, Zambia and Mozambique have proactive competition toward building hydroelectric dams (World Bank 2010).

The Kafue Lower Gorge Hydroelectric dam is therefore taking a major part in the recent policy led by Zambia where only 22% of the population as access to electricity (Kesselring 2017). The origin of the project started in 2005, the Chinese government through Eximbank pledged to provide 85 % of the supposed 600 million dollars Kafue Lower Gorge project (Dreher et al. 2013). The project in 2005 was awarded to Sinohydro in collaboration with Zesco-state power utility (Dreher et al. 2013). However, nothing was organized until the President Banda signed a Memorandum of Understanding for 1 billion dollars in 2008. Brautigam (2011b) declares that after the MOU, no agreement was arranged between the two governments which shortly after, led to Zambia's government to reopen the competitive bidding by the World Bank International Finance corporation. However, Ofstad and Tjønneland (2019) and Dreher et al. (2013) never mentioned the reopening of the bidding as mentioned by Brautigam (2011b). Moreover, Ofstad and Tjønneland (2019) argues that in 2011 after Banda's presidency, the new minister of Finance in charge of the project was wondering if the deal made with China was as beneficial as it seemed.

Therefore, he wanted to include an external party to verify if the transparency and the agreement were sufficient to continue to conduct the project. Norway was asked to participate but firmly rejected to be involved (Ofstad and Tjønneland 2019).

Ofstad and Tjønneland (2019) declared that during the same year, Zambia decided to withdraw from the agreement with China and looked for another type of funding and contractor. China then engaged Zambia's in discussions to solve the problems mentioned therebefore and they finally agreed to settle the funding as follow: The China Development Bank (more specifically China-Africa Development Fund) will provide the funding in co-partnership with Zambia's own source, China will fund 85% while Zambia the 15% left. The second bidding was won once again by Sinohydro, nevertheless the price of the project raised and was evaluated between 1.374 billion and 2 billion dollars (Bhattarai, Saporiti and Trouille 2010; Lusakatimes 2015). However, since Sinohydro is working in partnership with Zesco, the company ensured itself to follow international norms and rules by engaging a Norway company: Norconsult (Ofstad and Tjønneland 2019).

Initially, the project was supposedly starting in 2011 and the completion was planned for 2017. However, due to feasibility reports and environmental studies, the project's construction was deferred until it officially started in November 2015 (Lusakatimes 2015). After 4 years of work and a year before completion, the China's state company Sinohydro stated that they suspended work due to lack of finance and "difficulties beyond their controls" (Takouleu 2019). The case was never fully explained, and the work supposedly restarted before being halt again due to coronavirus in February and was supposed to be completed in April this year but was never completed.

The feasibility report made by Bhattarai, Saporiti and Trouille (2010) declares that the Kafue Lower Gorge Project project is feasible. In addition, they argue that it fits electricity demands and supply for the following years. Moreover, the report shows that there are material available for construction at reasonable distance and that the localization is suitable for the building due to presence of quality rocks. Their approach only suggested that flood might deferred the project by two or three months. A general environmental report has been made in 2010 by the World Bank (World Bank 2010). The report shows the same results as in the Mphanda Nkua case, the rising number of floods and drought in the region, the reducing number of fish and animals in the area. The Dam will also damage the local national parks in the regions (Ameshi et al. 2018).

As such, World Bank (2010) declares that Zambia is one of the countries at higher risk regarding climate change impacts on its environment and by so its dependent economy. In addition to that, the World Bank raised another main issue that the construction of other hydropower dam accentuate the risk on dependency in the region as all the other dam are geographically close to each other and increase the national electricity system to a small area that might collapse. Moreover, World Bank (2010) concludes by advising the Zambia's government to switch to alternative energies which would diminish the damage for the environment and its dependency on the Zambezi. Bosshard, Brewer and Mc Donald (2009) declares that China made available resources that are inaccessible, accessible. The Kafue Lower Dam is the perfect example since it is located in a conservation zone (Bosshard et al. 2009; Ameshi et al.). It explains one of the main reasons why China is funding and constructing those projects and not Western countries.

Another recent study from Kalumba and Nyirenda (2017) argues, comparable to the World Bank (2010) report that the Hydroelectric dam “negatively affect environmental services of a river which in-turn impacts the social wellbeing of downstream communities who depend on these environmental services”(Kalumba and Nyirenda 2017, 3). Moreover, similarities were found with another environmental report made by James Morrissey (2006) about the Mpanda Nkua Dam. They argue that the construction of the dam will lead to less sediment deposition which impact the local agriculture and fisheries. However, not data were found about possible impact on local communities which raise an issue. Moreover, The World Commission on Dam (WCD) guidelines advice to take contact with the local communities and integrate them in the plan of the construction and share the possible benefit with them (Isaacman and Isaacman 2013). However, some sources stated that up to 5000 local workers got involved in the construction process for the Dam (Takouleu 2019).

Ngoma-Leslie (2016) demonstrated in her paper the rising tension between local workers and Chinese companies in Zambia. She illustrated that multiple incidents happened since the early 2000s and China growing presence in the region. Moreover, the following example, showed that workers arise because of poor wages or poor condition of work. One example is the Collum Coal mine where in 2010, Chinese managers shot 11 people for protesting against the company for poor wages. The case attracted the whole country attention and China complied to help the wounded workers and the others with better benefits. Nevertheless, it remained insufficient and in 2012,

once again the workers protest for their right of minimum wage which lead to the assassination of one Chinese manager (Ngoma-Leslie 2016). In 2007, all over Zambia, multiple national protests were organized against the presence of Hu Jintao (Ngoma-Leslie 2016). The impact created by all those protests raised the tension on government level and even international level and forced the Chinese government to work more hand to hand with Zambia's government to find solution for the workers under Chinese supervision.

In conclusion, the project is categorized in our dataset as a low risk of non-completion project due to the involvement of China's government and financing through first Eximbank, after by the National Development Bank. However, the development of the project aforementioned enhances that the amount of investment made by China is positively associated with the likelihood of being suspended. Nonetheless, this case study does not support our first hypothesis as the sum of money invested is much higher than the average amount invested in low risk of non-completion infrastructure projects. In this case, the case was suspended for diverse reasons, but problem of funds was the latest reason in 2019 for the project suspension. Suspension of projects seems therefore closely related to the amount of investment/money. In addition, China might face other internal issue to the projects such as NGO's trying to boycott the project or as other Chinese companies, workers riot and complains about salary and work condition as enunciated previously.

#### 4.2 Mpanda Nkua Hydroelectric Dam

The Republic of Mozambique is located in southern Africa and is the third largest country of the region. It is bordered by Tanzania to the north, Malawi and Zambia to the northwest, South Africa and Eswatini to the southwest, Zimbabwe to the west, Indian Ocean to the east. Historically, Mozambique has been plagued with the Portuguese occupation for almost five centuries (1498-1975), an atrocious war of independence (1964-1974), followed by a civil war from 1977-1992 opposing anticommunist forces (RENAMO) to the Mozambique Liberation Front (FRELIMO). Even though Mozambique suffered from huge political turmoil, its economy growth was almost reaching double digits (8%) after the first democratic election in 1994 until 2006 (Hanlon 2007). Nonetheless, Mozambique has been classified by the IMF since 2007 as a heavily indebted poor country and remains one nowadays (IMF 2020). Moreover, a study conducted by Hanlon (2007) argues that poverty is so severe and continue increasing with people that cannot feed their family

sufficiently. Moreover, Hanlon (2007) continues by demonstrating that the past economic growth is only benefiting the richest group which are between 7% and 15% of the population. In contrast, Mozambique ranked as an average country in the world as ranked 84 out of the 160 countries in the database according to the Logistics Performance Index (LPI) data of the World Bank which measure of performance of trade logistics and infrastructure (World Bank 2016).

An important factor is that, as mention previously, Mozambique is really poor and ranked 180 out of 189 countries on the Human Development index 2018 (UNDP 2018). In addition, 80% of the working population are farmers working for their subsistence (USAID 2019). Moreover, another research shows that Mozambique is only using 16% of its arable ground which means that the efficiency regarding the economy and the help for the ordinary citizen is lacking (USAID 2019). During the past three decades, the government mostly focused on investing in infrastructure programs such as the Mpanda Nkua (Isaacman and Isaacman 2013).

The question that could be asked is why Mozambique focus on infrastructure program as it remained beneficial for the elites and detrimental for the local population? The economic policy of the government was driven the creation of multiple infrastructure such as the hydroelectric dam of the Cahora Bassa. In comparison with the Mpanda Nkua dam, the Cahora Bassa was finished into 5 years while the Mpanda Nkua dam construction is still not complete after almost twenty years. Moreover, the Cahora Bassa dam was the largest hydroelectric dam in Sub-Saharan Africa. The Cahora Bassa dam was built from 1969-1974 during the independence war and belonged in majority of shares to the previous colonial power until 2007 (Isaacman and Isaacman 2013). The historic fight for the control of the Cahora Bassa dam offers another perspective on the construction of the Mpanda Nkua dam and the risk of construction for a tier party and the legacy at stake. Isaacman and Isaacman (2013) explains the case of the Cahora Bassa dam has a tri-power race for the possession of the dam.

At first, after the end of completion and the independence from Mozambique, a hidden war started for its possession. The first president of the country, Samora Machel previously described the project as a “racist-colonial dam”, while taking power he changed it in a positive discourse describing the dam as a symbol of modernization which could help the country achieve economic growth, bringing investment, etc (Isaacman and Isaacman 2013). During his mandate, his party, FRELIMO, created and followed a Marxist-Leninist program (Poppe 2009). One of their keys of

the program was to socialize the countryside, declaring that they wanted to change the system used by the colonial power (Carbone 2003). In that aspect, the government wanted to establish new communal village and relocated population, as Buur and Kyied (2006) argue that they are very similar to what the previous colonial power plan. Moreover, at first, they did not use any violence, as citizens from some regions peacefully agreed to move while in other regions, more and more reluctance was shown by the local population and they slowly started to coerce and force them to move into larger communities (Buur and Kyied 2006). Furthermore, they never did consult the local leaders or considered the quality of the ground for the relocation or even the cultural and ethnical differences between people (Isaacman and Isaacman 2013).

Concerning the possession of the Cahora Bassa Dam, after the 1974 peace treaty of Lusaka, the 550-million-dollar dam was allocated to the HCB (Hidroelectrica De Cahora Bassa) jointly owned by 82% to Portugal and 18% to the new Mozambique government (Isaacman and Isaacman 2013). As part of the agreement, Isaacman and Isaacman (2013) stipulated that the ownership of the dam will remain Portuguese until repayment of the dam. A major agreement was signed between Eskom (South African electricity company) and the colonial power in the late 1960s allowing the South African company to buy all the electricity produced by the future dam below the market price (Isaacman and Chris 2003). That agreement shattered FRELIMO's dream to provide electricity to the Mozambique citizens.

That agreement of South-Africa during apartheid regime sook ought to destroy the young independent country infrastructure projects by supporting the RENAMO opposition forces (Isaacman and Isaacman 2013). For instance, Isaacman and Isaacman (2013) reported that they sabotaged roads, burned villages, destroy pipelines supposed to export the electric power to South Africa on purpose. At the time, Isaacman and Isaacman (2013) argued that South-Africa did not really needed the electricity from Mozambique and sabotaging it was part of its plan. The plan was mainly to sabotage the money made by the Mozambique government for the exportation of the electricity was used to rebuy the shares of the HCB Isaacman and Isaacman 2013. As South-Africa wanted to keep the agreement with Eskom and the Portuguese valid, they did everything in their power to prevent the buying from the Portuguese share by the Mozambique's government. The Cahora Bassa was the only available grid for the FRELIMO government and because of its

sabotage, the rural economic development remains stuck for more than a decade (Isaacman and Isaacman 2013).

The late 80s and early 90s offered a complete change in terms of political and economic development of Mozambique. First, the switch of Mozambique regime political vision from Marxism program to a capitalist system (Carbone 2003). Second, the peace treaty between RENAMO and FRELIMO which allowed to rebuild the pipelines and roads to export the electricity. The third factor is the end of South-African apartheid regime in 1994 (Isaacman and Isaacman 2013). After all those events, Eskom added 1.75 million homes to the electric grid in South-Africa in 4 years (Davidson and Mwakasonda 2004). In the 90s, the Mozambique government wished to build another dam, the Mpanda Nkua dam for exporting additional electricity, increase its autonomy from the HCB and South Africa, while continuing its effort to offer electricity for its own people (Isaacman and Isaacman 2013).

The Cahora Bassa case was a competition between powers which tried to benefit the most out of it. As Mozambique was a weak independent power at the time, it could not face the Portugal and South African ambitions. Moreover, Cahora Bassa was still a symbol of colonial time, the Portuguese workers were only high ranked in the HCB hierarchy while the local workers received minimum-wage and lived in closest town (Isaacman and Isaacman 2013). Furthermore, as mentioned earlier, the agreement for the electricity price by Eskon was another legacy of the colonial past. In 2003, a new agreement was signed, Eskon agreed to pay double the price which is a small victory for Mozambique but benefited mostly the Portuguese company since they remain the major holder (Isaacman and Isaacman 2013). The major reason for the sudden acceptance from Eskon to the change of tariff was the prevision of the end of the South African electricity surplus in 2007 (Cuvilas et al. 2010). The possibility and desire of building of the Mpanda Nkua dam is a way to regain the upper hand over the ownership of the Cahora Bassa dam (Cuvilas et al. 2010). In 2006, after 32 years under Portuguese hands, the Mozambique government had the option to buy 67% shares of Portugal for a total of 950 million dollars (Bayano 2006). Today, the HCB is owned by 92.5% by the Mozambique government while the 7.5% left remain under Portugal's hands (HCB 2020).

The Cahora Bossa dam showed the importance of Mozambique attachment on infrastructure project and especially on hydroelectric dam projects. As seen above, The Mpanda

Nkua appeared as a new infrastructure capable to respond to the government desire for growth and exportation of its electricity to neighbor countries. The Mpanda Nkua dam can clearly be called a “megaproject” following the definition of the Oxford Dictionary (Flyvbjerg 2017). As the project of Mpanda Nkua is being built in a developing country and was planned for an approximative cost of 2.3 billion dollars, the project is deserving to be called a megaproject.

As mentioned previously, the government will benefit from the Mpanda Nkua hydropower as it previsions display an impressive possibility to double the production of the country (Cuvilas et al. 2010). The country, in 2010, produced 2352 MW of which 365 is exported mostly to South-Africa as seen hereabove. In addition, the electricity is not distributed equitably, as the Mozambican Aluminium (Mozal) producer absorb more than a third of the country electricity (850MW) (Cuvilas et al. 2010). The estimation of production for the Mpanda Nkua dam is between 1300 and 2400 MW which could fill the gap and help the local citizens, since only 10.5 % of the population have access to electricity in 2008 (see Table 6) (Cuvilas et al. 2010). As any other Sub-Saharan country, Mozambique relies on its natural resources for gathering some funds, coal, gas etc. In 2000, the government announce for the first time, the possibility for foreign investor to create a consortium of enterprises to produce aluminium only for exportation. The Mozal is now the biggest private-sector project in the country, however, the Mozambique’s government only own 3.9 percent of it (Pretorius 2005). Another interesting fact, which display the concrete influence of South Africa in the region, is that the Industrial Development Corp. of South Africa owns 24% share of Mozal (Pretorius 2005).

**Table 6: Population with access to electricity by province (%), 2005–March 2008**

Total by Regions	Year			
	2005	2006	2007	March 2008
<b>South</b>	15.8	18.3	24.4	25.5
<b>Centre</b>	3.9	4.7	5.6	5.7



<b>North</b>	3.5	4.7	5.9	6.0
<b>Country</b>	6.8	8.2	10.1	10.5

Source: Ministerio da Energia. Realizaçoes do sector de Energia 2005 – 2008. Maputo, Mozambique, 2009. Available on the internet <http://www.me.gov.mz/prt/downloads/estats/realizacoes>. Accessed with Cuvilas et al. 2010 : <https://www.sciencedirect.com/science/article/abs/pii/S1364032110000341>

The Cahora Bassa introduced and conceptualized the environment where the of the Mpanda Nkua Dam was created. As showed previously, the resurgence of the colonial power in some period of its recent history and the major influence of South Africa economy has always exerted pressure on Mozambique and its ambition to give electricity access to its people. Therefore, the recent history and turns of events from the Cahora Bassa created patterns and legacies for the Mpanda Nkua dam.

The Mpanda Nkua Dam plan is located in the Tete region in the North-West of Mozambique, just over 60 km south of Cahora Bassa on the Zambezi river. The plan of building more dam on the Zambezi river originated from the colonial time to master the Zambezi power (Isaacman and Isaacman 2013). As aforementioned, the idea of building another dam surge in the late 1990s, while the Mozambique government fought to retake the share of the HCB. We can summarize the government ambition as: to have more to be able to give and export more. The objective is also to attract more foreign investment in a country lacking foreign investment in the infrastructure.

Therefore, as the government ambition to build the Mpanda Nkua project, a feasibility report is conducted for the government by the Technical Unit for Implementation of Hydropower projects (UTIP) in 2000. The result from the report using the WCD guidelines (Acreman et al. 2001) from UTIP were substantial as they claimed that the environmental cost was minimum (Isaacman and Isaacman 2013). Shortly after, the government started to open the bidding for the project and hoped to attract foreign investor in order to start the project in the following years. In

addition to that, the project was included in the PIDA programme as a major infrastructure to develop (NSENERGY 2020). In the following years, different reports and critiques were made about the UTIP report by multiple organizations (NGO, researchers) that work conjointly against the Mpanda Nkua dam project (Isaacman and Isaacman 2013). The pressure exerted by those diverse reports and critics pressured international organizations and Western government to not invest in a chaotic infrastructure projects that could destroy the environment and lives of locals (Alvarenga 2008). Therefore, not a single Western country bid for the project until China did in 2006 (Alvarenga 2008).

During that year, Eximbank and the Mozambique government signed a Memorandum of Understanding (MOU) which pledged to secure a 2.3-billion-dollar soft loan from the bank for the construction of the megaproject (Conrad et al. 2010). The success of the founding for the project shows the ability of Mozambique to attract foreign investors even though their project draw criticism. The success or failure of the project would impact the future investments in Mozambique.

At the time of the signature of the MOU, the planification for the construction would have taken place in 2009 and expected to finish in 2014 (Conrad et al. 2010). Out of the 2.3-billion-dollar investment half is used for the construction of the dam itself while the other half is used for the transmission line for other regions. However, Brautigam and Ekman (2012) declares that Mozambique was unable to secure the financing from China. Brautigam (2011b) argues that even if the MOU has been signed in 2006, Eximbank and the Mozambique government still have not reached an agreement during the three following years. The case of the Mpanda Nkua is special as it does not fit in our dataset as in generally China state-supported project are being constructed by Chinese firms. Since the contract for the construction of the project has not been awarded to a Chinese group but to the Mozambique group Insitec and the Brazilian Camargo Corrêa (Jansson and Kiala 2009).

In 2010, the Electricidade de Moçambique (EDM) is added as constructor with the two previous group Insitec and Camargo Corrêa which all together created the Mpanda Nkuwa Hydroelectric Facility (HMNK) (NSENERGY 2020). The new HMNK signed a 35-year concession agreement for the project the same year with the Mozambique government (NSENERGY 2020). In 2013, the government decided to bypass the previous agreements with

HMNK in order to work with new parties, as for the investment part, Mozambique continues to look for other investors (World Bank 2015).

In 2015, China State Grid showed interest in the financing of the megaproject, as financier, the plan will make the state-owned company owner between 30 to 40% while the Eskom will hold 20%. In addition, Électricité de France (EDF) and Brazil Eletrobras will both hold between 10 and 15 percent and the rest will be under the Mozambique company EDM or private investor (Macauhub 2015). As it continued to be delayed due to lack of finance, the government decide to revoke completely in 2018 the involvement of Insitec and Camargo Corrêa while announcing the participation of the Hidroeléctrica de Cahora Bassa (HCB) (NSENERGY 2020). In February 2019, the government decided to create a Mphanda Nkuwa Hydroelectric Project Implementation Office which would coordinate and with the advice of a consortium of four companies selected in September of the same year to find an investor for the project (Africa Energy Portal 2019). The latest information project the start of the project late 2021 and complete it in 2028 (NSENERGY 2020).

#### 4.2.1 Anti-Dam Campaign

As stated earlier, the Mpanda Nkuwa Dam always draw criticism from NGOs and researchers since its earliest stage of planification. In 2001, the Ecosystem Impacts of Large Dam came out (Acreman et al. 2001), the UTIP used it for measuring the impacts of the possible new dam and stated that the risk was not major. Isaacman and Isaacman (2013) argues that the UTIP report is mostly based on the comparison of the possible new dam with the Cahora Bassa which created an enormous environment disaster. Therefore, it seems that the UTIP report is biased and diminished the real damage that could create the new Dam (Isaacman and Isaacman 2013). First example, the UTIP report that the Cahora Bassa created an 2700 square kilometer reservoir while the Mpanda Nkuwa would create an 96 square kilometer reservoir which would represent a low “risk of significant adverse impact on biodiversity from construction activities and inundation” (Isaacman and Isaacman 2013). Second example, the construction of the dam would only affect 1600 person which correspond to 260 houses, which is a reduce economic and social risk. In comparison, the Cahora Bassa, with the creation of the reservoir destroyed much more housing and forced local people to move (Isaacman and Isaacman 2013) . In other hand, the UTIP report explains that some villages would willingly relocate in another location with water supply and

receive a compensation from the state. Finally, the report concluded that, the project is vital for Mozambique lack of access to electricity for its own citizens, as showed previously that only a small portion of the population has a daily access to electricity.

Multiple NGOS and associate researchers, like International Rivers or WWF or Justiça Ambiental responded to the lack of objectivity from the report and produced their own assessment of the possible impacts of the Dam. The first major anti-dam paper is produced by Justiça Ambiental on International Rivers website. The paper written by Daniel Ribiero (2004) defend the position that the seven strategic priorities created by the WCD are not followed in the Mpanda Nkua dam plan.

The first priority is the “needs for assessments”. Does the dam help the region locally, regionally, or nationally? Their response is negative as they take that the Cahora Bossa Dam is producing a lot of electricity, but on the other hand, the authorities keep exporting it instead of using for their citizen or as seen before, the local electricity is used for the industry by Mozal (Ribiero 2004). The second priority is gaining public acceptance with stakeholders participating actively in the project and negotiate their outcome with the government. Ribiero (2004) argues once more that the government never engaged any resolution with the local population. Third is the evaluation of the dam, if there was any alternative possibility or possible problem that they should have considered. One more time, the UTIP stipulated that they only prepare six different hydroelectric alternatives. There is no mention of the possible improvement of the Cahora Bassa or using other sources like wind or solar instead (Ribiero 2004).

The fourth priority is to “address existing dam”, as seen earlier, the Cahora Bassa was extremely destructive and that the new project will not improve or correct the damage but will only increase the risk on the Zambezi. The Fifth one represents the risk that must be addressed and analyzed. In addition of other risks mention in this section, is the location of the Mpanda Nkua as it would be located in a seismic region which could damage the dam and the entire local environment (Ribiero 2004). The sixth priority is sharing benefits for the construction, Ribiero (2004) argues that mainly the business and industrial sector would benefit from it. The last priority is securing compliance, which means “Institutional capacity to monitor and enforce commitments for social and environmental components of the project was analyzed and measures to strengthen capacity identified” (Acreman et al. 2001). Moreover, not a single plan or mechanism has been

installed to help the locals to express their unhappiness with the program or simply being able to ask information about the project (Ribiero 2004). He continues to argue that none of the seven is followed in the feasibility report conducted by UTIP. In addition, the Mpanda Nkua dam do not comply with the WCD guidelines, even though they address some issues caused by the Cahora Bassa, they planned no solution for the construction of Mpanda Nkua in case of facing similar issues. (Ribiero 2004)

Two years after, another more detailed study was produced by James Morrisey (2006) who went directly investigated about the locals' perception of the project and the real impact for them or the nature. He argues that people living alongside the river are dependent on the state of their environment to be able to survive (Morrisey 2006). He explains that people that have been forced to move from village to other village due to war, floods or other environmental issues and are facing new social issues. In villages, some citizens have more power and more land than others and use the newcomers or poor villagers for farming their land (Morrisey 2006). Therefore, if you do not own anything, the risk of being used or become poorer increases (Morrisey 2006). Besides, that one factor could explain the reluctance of some citizen to move out of their land. He points out that the Cahora Bassa impacted their lands in various way (Morrisey 2006). First, it reduced the fertility of the land for agriculture purposes (Morrisey 2006). Second, due to erosion of the ground, some farmer practices onto the river which increase the risk of being attacked by crocodiles or hippopotamus and being infected by malaria (Morrisey 2006). Another factor are floods which prevented and destroyed some access to drinking water. Finally, many citizens fish to survive but the number of fish and prawn have exponentially decreased over the last decades. (Morrisey 2006)

Morrisey (2006) argues and reiterated the problem explained by Ribiero (2004) with the capacity of the Mpanda Nkua to deal only with exceedingly small earthquake. The risk during the construction for the local populations are the followings. New migrants could disrupt the local authorities by not respecting villages' rules (Morrisey 2006). Another possible issue is a new afflux of cash could increase the number of people under influence, prostitution, and drugs in the area (Morrisey 2006). Another major problem antecedently mentioned, is that a possible resettlement would create political and community disruption in the new communities (Morrisey 2006). As the dam operate, there will be resurgence of other risks: mini-flood, disruption of the river flow regime

which will remove the sediments from the river and therefore affects the fishes and agriculture (Rotblat 2001). Those issues pointed by Morrissey (2006) concerned communities that will not receive compensation since they are supposedly too far downstream.

Morrissey (2006) concludes by mentioning the lack of governance from the central government and issues that the dam represents for it in the region. That villages are all independent from each other, establishing their own order (lack of order), lack of physical infrastructure, current dams issues, lack of compensation for the downstream communities, lack of resettlement plan, not following the WCD guidelines, corruption, etc (Morrissey 2006). Morrissey (2006) argues that the government forgot to assess almost everything for the local people and not providing any solution for their safety or help.

In 2008, another article published by Fox and Sneddon (2008), focused on the anti-dam campaign in Mozambique and Thailand and most especially the movement of Justica Ambiental (JA). The Justica Ambiental is part of another NGO (Livaningo) based in Mozambique itself. As stated before, the project of the NGO is to prevent the construction of the Mpanda Nkua dam based on its probable impacts and risks in the Zambezi region (Alverenga 2008). Fox and Sneddon (2008) argues that the efficiency of the NGO movement is mostly trying to influence state agencies instead of trying to politized the citizens that might be affected by the construction of the dam. JA objective is to stress out the government to take an exhaustive study of all the possible alternatives and if the result of that study imply that the dam is their best option, then, they should put in practices the international work of WCD guidelines (Mediafax 2002). As mentioned therebefore, JA tries to influence the system within the system. Moreover, in 2002, the NGO visited all the states agencies to raise questions if Mozambique will follow international standard mentioned by the WCD guidelines (Fox and Sneddon 2008). Furthermore, the government agreed to proceed the collection of sources form stakeholders and citizens in order to create a proper response. In addition, the DNA (National Water Directorate) agreed to hold a symposium during the year about the WCD guidelines but canceled it within less than two weeks before the event (Fox and Sneddon 2008).

After the UTIP report and as the government started to look for investors for the project, the government never gave the details about the scope and the impacts of the Mpanda Nkua dam project but only about the benefits (Fox and Sneddon 2008). As a response, the NGO started a project to inform the local communities along the river that might be affected by the project. A

major survey was conducted in 2005 in the different communities about the positive and negative aspects of the construction of the dam (Fox and Sneddon 2008). The younger generation were mainly responding positively as the dam offers them another source of revenue, while the older generation responded the contrary as they believe that they are excluded from the decision-making process (Morrisey 2006). JA tries to make people aware that they have rights and that they can claim those rights even against the government (Fox and Sneddon 2008).

As a matter of fact, the lack of real protest by locals in general is due to the stress of confronting the government which used repressions as used under the colonial rule. In addition, the people of the Tete region were directly impacted during the civil war and still today violence and tensions between the FRELIMO and RENAMO remains in the region (Morrisey 2006). As James Morrisey (2006) stated that villages have vastly different opinion on which political group to support because of the previous conflict that still can be felt in nowadays Mozambique's political decisions. As seen in Morrisey (2006) report, the structure of the village is built around men and in a hierarchical way that if the traditional leader of the village do not want to cooperate with the NGO it remains impossible to access and possibly affect their view on the construction of the project. Another major survey has been conducted in 2010 by the World Bank to analyze the Zambezi river Bassin (World Bank 2010).

In conclusion, the anti-dam campaigns remain mostly a bureaucratic fight between NGOs and officials in the capital. The government failed to follow the international standard of the WCD and address its local population on the matter while focusing only on the marge of benefit that it could inherit if the project is completed. Its direct consequence was the withdrawing of all Western interest for the projects. On the other hand, the government do not fear any real contestation as the local fear for the possible consequences of their acts. The various reports and survey conducted throughout the years enlighten the limitation of NGO's pressure on the government.

#### 4.2.2 China and the Mpanda Nkua Dam

As noted in the previous section, international banks and institutions adopted security policies or consider external surveys and reports regarding the possible risk and impacts on the environment and civilians' lives. In 2001, Organization for Economic Co-operation and Development countries (OECD) decided to establish a Common Approaches to the Environment

and Officially Supported Export Credits which will be officially adopted two years later by the members (Bosshard 2007). In the “Approaches”, the agencies are supposed to

“...benchmark projects against host country standards, against one or more relevant environmental standards and guidelines published by the World Bank Group, the European Bank for Reconstruction and Development, the Asian Development Bank, the African Development Bank and the Inter-American Development Bank” (Bosshard 2007, 13).

First, we observed that since the environmental impact and conclusion of the reports about the Mpanda Nuka Dam did not show sufficient data and did not address correctly the WCD guidelines which are often taken into consideration by international institutions, lead at the time to withdraw possible investors members of OECD. Second, as China is not member of OECD and that Eximbank did not sign the Common Approaches in 2003, they are not required to follow or to regulate themselves to international standard. Therefore, in the first decade of the twenty-first century, China involvement in large hydroelectric dam have received number of critics due to their lack of analyzing reports showing the possible destruction and violation of other people’s right during and after completion of the project (Mohan et al. 2012). As James Morrissey (2006) stated that China have disregarded these impact assessments for their investment. An example is the Merowe Dam case, were China and the Sudanese government did not have appropriate resettlements plans which increased the risks of the Dam in the region (Askouri 2007, Bosshard 2010). As such, China in that period is under criticism but do not refrain itself to invest or sign agreements, as Hu Jintao visited 18 African countries in 2006-2007 which lead to numerous investments (Masyuki 2009). Moreover, The Mpanda Nkua dam MOU was signed during the visit of the Chinese president in Mozambique (Isaacman and Isaacman 2013).

Although China did not seem to care for the environmental or social impacts, it soon realized that its reputation to disregard international norms might cost more than it would benefit (Bosshard 2007). However, China in the early 2000s has always been disinterested in international institutions, so they choose to counterbalance the international guidelines by creating their own guidelines (Bosshard 2007). The first important guideline was: Guidelines for Environmental and Social Impact Assessments of the China Export and Import Bank’s Loan Projects (Eximbank 2008). Soon after the Ministry of Commerce and the Ministry of Environmental Protection conjointly created overseas investment guidelines for Chinese companies (Bosshard 2007).



The Eximbank guidelines (2008) set several principles to implement social and environmental studies as an important part of the planification of the project. Eximbank's guidelines (2008) equalize and refer to the World Bank study of assessment of the risks. Oppositely to the World Bank, Eximbank declares that the recipient country will be the one conducting the assessments and that the company will follow the country's regulation (Eximbank 2008). If the country does not have any regulation, then China will conduct the assessment and follow China's regulation (Eximbank 2008). With this principle, Eximbank hopes that it shows willingness of China to respect the country's national standard (Bosshard 2007). Another major principle is that the Eximbank will respect the right of the land and resources and create mechanism of public consultation in case of serious negative impacts on the local environment. Therefore, it shows China acceptance of taking a role in environmental and social protection at the same level as the international institutions or banks against risks that might occur during planification or construction of environment (Eximbank 2008). Finally, the Eximbank bank adhere to all those principles for its investment (loan) before and during the contract. In addition, if those principles are not followed during the construction, the bank reserves the right to withdraw or suspend the funding based on those principles. (Eximbank 2008)

Those guidelines represent a new model of Chinese investment in infrastructure in the world. Nevertheless, even after its implementation, Conrad et al. (2011) argues that the implementation remains insufficient because there is no real enforcing body to force a company to comply to it. However, the new priority which stipulated that China must follow the country's regulation, led African leaders to increase pressure on the company. Conrad et al. (2011) gave the example of the Belinga project in Gabon funded by Eximbank which violates the guidelines since it threatened the biodiversity of a National Park. However, the construction still started to take place, but the non-respect of its guideline gave grounds to the locals which complained to the bank. Shortly after, the bank suspended the funding and wait for another impact assessment report (Conrad et al. 2011).

To summarize the Mpanda case in relation with the possible Chinese change of model of investment in infrastructure. After the signature of the MOU in 2006 and the reasons why the three following years where the Mozambique government and the Eximbank bank could not find any agreement for the construction of the dam remains unclear (Brautigam and Ekman 2012).

However, signing a MOU does not abide the Eximbank to invest directly in the project (Brautigam and Ekman 2012). Shortly after the MOU, the new model for protection of the environmental and social issues was enacted (Eximbank 2008). As the assessments of impacts after the UTIP report remains negative or raised concerns(Alvarenga 2008, Conrad et al 2011, Morrisey 2006, Ribiero 2004), Conrad et al. (2011) said that the Mozambique government will have to hold the Eximbank responsible for ensuring its adherence to its own guidelines which will minimize the impact of the undesirable effect.

Even if the project starts, as stated previously, first, NGOs as Livaningo or International Rivers are fighting for preventing it to happen. Secondly, they could as it happened in the Belinga case, complain about the non-respect of Eximbank own guidelines which would compromise the project indefinitely. All those factors could have influenced the Eximbank to not get involved in the project which stalled the project. Even with the resurgence of the project in the last few years as a priority for the government (OECD 2013), the project is still being postponed every year due to the lack of investor (NSENERGY 2020). Moreover, as some studies shows (Cuvilas et al. 2010, Morrisey 2006), that the Zambezi river has been changing due to climate change and is already producing less than expected. Furthermore, it will continue to decrease over the years and the profitability of the project will continue to fade more and more. Another possible factor could have been the financial crisis of 2008, which slowed down investment and economy in general (Han et al. 2019). Therefore, China and other countries will not invest in the project for the following reasons, the cost of the project, feasibility, risks, and the profitability are not worth the investment.

Lastly, the interesting case of the Mpanda Nkua Dam, as mentioned earlier, is that for the first time China funded a project where the contract is not awarded to a Chinese company. Alvarenga (2008) declares that the Mozambique government and the Brazilian company pressed the China to change their modus operandi to finance the project. He continues to argue that the new model of investment is not surprising as first, “China has an unremitting tendency to be pragmatic in its foreign affairs and economic diplomacy” (Alvarenga 2008, 9) and secondly, that the practice of state owned company will start to have their own interest which can be different from the Chinese State Council (Alvarenga 2008). However, the project never started and not a single other project was financed or planned by Eximbank the same way.

The failure of the project might have been one of the factors to not conduct another project based on the new model. Another possible hypothesis of the failure of the project might be: did the Eximbank really wants to be involved in the project as it might have been pressured by the local government to involve an external constructor (Mozambique). Moreover, when a project is funded by a Chinese bank, usually there are condition about to whom the contract of the project is awarded (van de Looy 2006). In addition, Eximbank stated in 2009 that if the funding comes from a Chinese loan, then Chinese companies have to be selected as contractor (Mawdsley 2012). Furthermore, the agreement signed in 2007 with Portuguese government for the shares in HCB, included another condition which is to involve Portuguese firms in major hydroelectric infrastructure projects (Isaacman and Isaacman 2013). All the factors introduced previously, could have impacted the MOU between Mozambique and China and resulted to a non-agreement and a failure of the new model of investment.

After the MOU signed for the construction of the dam, governments signed in 2007 another MOU for the installation of 3000 Chinese settlers on the Zambezi River (Horta 2008). Loro Horta (2008) declares that China is planning to transform the region into the China's main rice supplier. In addition to the financing of the Mpanda Nkua Dam, China will finance three other dams and build new roads and renovate two harbors (Horta 2008). Those investments in the infrastructure shows the interest of China for numerous projects. Horta (2008) continued to demonstrate that China pledged 800 million dollars for the modernization of the Mozambiquan agriculture in order to quintuple the rice production within 5 years. He declares that civilian in Mozambique rarely consumes rice, it will remain a stock for export to China. Like the Mpanda Nkua dam scenario, the idea of migration of people and especially foreigner that might settle in the Zambezi valley encounter a huge resistance from the local which suffered the most from the colonial power and the civil war due to the richness of their land (Morrisey 2006). Moreover, as the dissatisfaction grows, the probability of 3000 Chinese settlers remains unlikely to happen (Brautigam 2012; Horta 2008).

In conclusion, the case of the Mphanda Nkua Hydroelectric dam illustrates our second hypothesis as the amount of money invested is high and that the project was suspended before even the start of the construction. Like the Kafue Lower Gorge project, the Mphanda faced internal issues in addition of funding problems. NGO's such as International Rivers and JA are criticizing

the project due to environmental issues and societal possible disruptions if the projects goes through. Therefore, trying to involve the local population and scholars to fight against the project which might directly affects the plan for the construction of the project. As Ansar et al. (2014) argues that Dams are one of the most difficult projects, as they take years to be constructed and the rentability of the projects are low, and the project need to be 100% completed before utilization which makes them one of the most risky investment in infrastructure.



## **Chapter 5: Conclusion**

In this thesis, we examined the relationship between the amount of investment and the risk of non-completion for an infrastructure project by focusing on cases of China-related infrastructure projects in Sub-Saharan countries from 2001 to 2019. We tested two hypotheses: 1) The amount of investment is positively associated with a higher level of risk of non-completion and 2) The amount of investment is positively associated with the likelihood of the project being suspended.

To test these two hypotheses, we used an analytical framework developed by Su and Vargas (2017) to classify infrastructure projects into three categories of different levels of non-completion risk. We thus created a dataset of 67 infrastructure projects. We found that most of these projects are in the category of low risk of non-completion. After conducting ANOVA and T-test analyses, we observed that there is a significant difference between the low and medium risk category in terms of average investment amount in infrastructure projects. Moreover, the results of the T-test showed that more expensive China-related infrastructure projects are more likely to be suspended.

Our qualitative analyses showed interesting dynamics about China's investment features and the infrastructure project's risk of non-completion. The case study of Kafue project clearly substantiated the mechanism of our second hypothesis since this project is expensive and indeed has a higher probability of being suspended. However, it also suggested that it is necessary to use a more dynamic view for considering our first hypothesis as the Kafue dam demonstrates that projects with lower risks of non-completion might not necessarily be less expensive. In fact, the low-risk projects might become more expensive over time due to various problems in different construction phases. Specifically, the Kafue hydropower project faced the problem of insufficient funds, which prevented from being completed on time.

The Mphanda Nkua project illustrated our second hypothesis as it shows that projects with large sums of investment from China are more likely to face suspension. However, this project represents a new model of investment made by China because it does not fit the analytical framework proposed by Su and Vargas (2017). In particular, it was the first and only China-related project being initially built with Chinese money but ended up not being awarded to Chinese contractors to complete. The Mphanda Nkua dam was canceled by Chinese investors as the local government, the contractor and the Chinese bank failed to agree on how to proceed for the

construction. One important question from this case study is how do we evaluate the expected level of non-completion risk for a project where the main actor involved is not from China, but the loan source is from Chinese state-owned bank? In our view, it is difficult to evaluate because the project was backed up first by Eximbank and signed by Chinese officials during an official visit of the president, but later, there were no further actions from those officials or the Eximbank after the signature of the Memorandum of Understanding.

Taking all of this into account, it makes sense to rank this project as high risk of non-completion. The reason being that although the project is under Chinese supervision due to the funding by the state-supported bank, it may encounter miscommunication and external factors (diplomatic issues for example), which are much more likely to happen in comparison to working with another Chinese company as contractor. Therefore, the risk of non-completion for Mphanda Nkua could be estimated as a high-risk infrastructure project. Moreover, after analyzing two dam projects, a more comprehensive analytical approach could be adopted to investigate the differences in risk of non-completion and to discover a plausible explanation for why certain types of infrastructure projects (such as stadiums versus dams) have a greater tendency to be suspended.

This thesis functions to fill the gap in the literature of international political economy of developing countries and their relationship with China. It displays that China's growing presence in Sub-Saharan Africa does not mean that the success of any China-related infrastructure project will be guaranteed. Moreover, this study shows that even if China is an influential investor, it faces many issues that cannot be controlled. For future studies, we believe that a comparison with another region could help test how well our proposed hypotheses could "travel" to other countries. Furthermore, future studies could examine the correlations between China's involvement in larger projects and their results in terms of success of implementing and constructing new projects; these results could then be compared to other major investors such as the U.S. or European countries. China tries to impose itself as a new infrastructure leader in the world, but this country is facing increasing backlash from local communities that could affect the modality of China's infrastructure investment in developing countries in the future.

Furthermore, another possible direction for future studies suggests that it would be interesting to analyze Sub-Saharan citizens' perception of China as an alternative power that could help revitalize the local economy through infrastructure building. The analysis of locals'

perceptions toward China remains practically under-researched due to the lack of fieldwork. Rebol (2010) was one of the first to conduct a survey in Africa and analyze the image and perception of China in the region, and he concluded that it was mostly positive. In recent years, Afrobarometer released, for the first time, a report surveying 32 countries on their perception of China, and it shows that infrastructure is one of the major issues their countries is facing (Bentley et al. 2015, 5).

Another report from Chingwete et al. (2016) shows that China's involvement in infrastructure projects is most effective at creating a benevolent image in the eyes of Sub-Saharan countries. The region that has the most positive perception of Chinese investment in infrastructure projects is Central Africa, following East and West Africa and finally Southern and North Africa (Chingwete et al. 2016, 20). One reason for China's positive image is that building infrastructure directly helps the local population and the government while other types of investments could be perceived as business which do not influence a large portion of the population (Agénor 2010). I believe further studies should be carried out to analyze the projects' impacts on local perception of China. These studies could, for example, explore the local's reaction in function of the success or failure of an infrastructure project in a given country as well as whether larger projects exert greater influence than smaller projects on China's image.

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