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ORIGINAL ARTICLE

The role of corporate governance in management of physical public infrastructures in some selected Sub-Saharan African countries

Serge Messomo Elle

Department of Banking and Finance, University of Buea, Buea, Cameroon

ABSTRACT

This study used the case study research design to achieve its objective. Secondary data were collected from five public infrastructures in five African countries made up of Cameroon, Lesotho, Zimbabwe, Zambia, and Mozambique. The analysis focused on the failures and successes in planning, development, and operation of public infrastructure according to the tenets of corporate governance theories chosen. The findings revealed that the failures in public infrastructure management as observed in three of the five cases studied, namely, the Olembe Stadium in Cameroon, the Matabeleland Zambezi Water Project in Zimbabwe, and the Queen Mamohato Memorial Hospital in Lesotho, originated mostly from the planning and development stages. On the other hand, the success recorded in two cases, which are Mozambique's Maputo Development Corridor and Zambia's Chirundu One-Stop Border Post, are attributable to the fact that they are governed by clear coordination in all stages of the public infrastructure management process with the clear involvement of all the stakeholders.

Keywords*: corporate governance theories; public infrastructure management process; failures and successes; Sub-Saharan African countries*

1. Introduction

Public infrastructures are at the center of many public policies. They enable governments and their agencies to develop economic sectors and urban and rural areas in their respective countries. In Africa, the importance of public infrastructure is more overwhelming than in other parts of the world. This is due to the key role governments play in the development of public infrastructures. Specifically, governments plan, finance, construct, operate, and maintain public infrastructures. They equally ensure the equitable distribution of resources to all regions of their countries without a profit-making objective. They also secure affordability and accessibility on the part of the population as far as public infrastructure is concerned. Despite these advantages, the management of public infrastructures by the public sector in African countries leaves much to be desired. This is partly due to the lack of funds, embezzlement of financial resources, and inadequate planning, design, construction, monitoring, and maintenance, as well as location problems (nonalignment with the needs of the population and economic

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*CORRESPONDING AUTHOR
Serge Messomo Elle, Department of Banking and Finance, University of Buea, P.O Box 179, Buea, Cameroon; messomo2011@yahoo.fr

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exploitation) and financial unsustainability (Marriott, 2014; Kabi, 2020). All the malpractices above can be overcome through the institution of governance mechanisms and the application of viable theories. In this connection, this study was guided by the following principal question: What is the role of corporate governance theories in explaining the nature of failures and successes in the management of public infrastructures in Sub-Saharan African countries?

According to Thorpe (1998), the infrastructure management process is made up of planning, development, and operation phases, and African countries generally witness successes and/or failures in each of these managerial phases (Mbeng Mezui, 2014). This inspired the formulation of two specific research questions in this study:

1. What is the role of corporate governance theories in enlightening the nature of failures in public infrastructure management in Sub-Saharan African countries?

2. What is the contribution of corporate governance theories in determining the nature of successes in public infrastructure management in Sub-Saharan African countries?

Findings from these questions would help to improve the governance of public infrastructures in Sub-Saharan African countries. In line with the above questions, this study set out to examine both the roles of corporate governance theories in defining the nature of failures and successes in the planning, development, and operation of public infrastructures in Sub-Saharan African countries. The study used the case study research design to describe the role of contractual and non-contractual corporate governance theories to explain the failures and successes in the management of public infrastructures in Cameroon, Lesotho, Zimbabwe, Mozambique, and Zambia. The data were secondary and the findings contribute to the existing literature in three ways. First, the study portends to introduce private governance theories and mechanisms in the management of public physical infrastructures in Sub-Saharan African countries. Second, we show that the nature of private governance mechanisms increases good public governance of physical public infrastructure in Sub-Saharan Africa. Such mechanisms provided by corporate governance theories are cost minimization, good planning, inclusive participation, and effective time frame implementation. Third, the findings also reveal that transaction cost, asymmetric information, stakeholders, incomplete contracts, and agency instruments by far explain the failures in the management of public infrastructures in the countries studied, while the stakeholder tool and the regionalization of public infrastructures, more than other variables, account for the managerial successes.

Structurally, this study is divided into many sections, beginning with the introduction in Section 1. Section 2 presents the nature of the management of public infrastructure, while in Section 3, the governance and the management of physical public infrastructures in developing countries are analyzed. In Section 4, the relationship between public infrastructure and corporate governance theories is assessed. The theoretical framework is defined in Section 5. Section 6 features the methodology of the study, while the results are presented and discussed in Section 7. Finally, Section 8 presents the conclusion.

2. Management of public infrastructures

The management of public infrastructures is a process. It implies a series of steps that have to be planned and implemented. Public infrastructures by their characteristics are specific. According to

Grimsey and Lewis (2002) and Inderst (2010), public infrastructures are capital expenditures with long-term benefit streams linked to the services provided by the assets, costs, and revenues of the infrastructures, and are subject to a range of uncertainties and project-specific risks. These elements justify why public infrastructure management is done in a framework made up of planning, design, construction, operation, and maintenance. Planning refers to a set of strategies to develop public infrastructure. It is done according to the constraints and the need of the area where the public infrastructure will be located. This requires identifying why the public infrastructure is set up in a particular region or sector of activity and establishing its relevance and preference by stakeholders. The planning of public infrastructure takes into consideration its budget, its life span, the technical and technological resources needed, and the risks in the public infrastructure investment.

The planning is done in line with priorities so as to ensure that the project being put in place matches the needs of users, is affordable on the part of the government, and is accessible to members of the public. Furthermore, the planning sets functional strategies that enable the public to trust the public infrastructure developed by the government.

The design of public infrastructure on its part is governed by three conditions. They are the satisfaction of the needs of beneficiaries, cost-efficiency, and the protection of the environment. The design must consider the physical, financial, social, and geographical needs of the beneficiaries. The design must also take into consideration all the characteristics above because it is the foundation of the construction. The stages after the design are associated with implementation. A poor design leads to cost inefficiency and an unprotected environment for the users. In other words, a poor public design of infrastructure generates additional costs from its implementation and requires the divestiture of the project. Cost efficiency requires that the government uses the best mix of financing to fund the infrastructure and such funding must match the needs of users throughout the existence of the public infrastructure. All the environmental standards must also feature in the design of the project.

The construction and operation of public infrastructure must fit the planning and the design of such infrastructure. Construction is concerned with transforming and designing drawings and specifications into the physical infrastructure. According to Thorpe (1998), this operates in the following three phases: calling tenders, forming a contract with the successful tenderer, and building. The first activity facilitates the choice of the infrastructure constructor. This choice is guided by the specificities of the project, the time frame allocated to the project, experience, cost efficiency, and commitment defined in the financial planning and design. Once the tenderer is chosen, a contract is formalized, defining the duties and rights of the owner and the constructor of the project (chosen tenderer). Most importantly, the contract names the activities to be carried out by the constructor: site preparation, setting out foundations, building, and backfilling, finishing, and quality assurance. Furthermore, the contract defines the oversight activities to be carried out by the government as the owner of the public infrastructure. These are supervision, inspection, quality control, dispute resolution, negotiation, and design changes. Building, which is the third activity in the construction, is done according to details in the design and construction contract. In addition, building is the physical realization of the project. It requires a strong collaboration of both the owner and the constructor regarding the delivery of the finished infrastructure. In public infrastructure, the construction phase requires more attention. This is because it involves different administrators who have the skills in the construction stages. If this coordination is not properly done, this leads

to ineffective construction, cost inefficiency, delays in the construction program, inequality, and infrastructure not complying with the design norms, standards, and expectations of the population.

The operation of infrastructure refers to the transfer of the infrastructure to the use of beneficiaries. This phase is considered successful when the infrastructure is delivered in line with its planning, design, and construction standards and matches the needs of the beneficiaries. This is very important for public infrastructure because the role of the state and the government is to improve the well-being of its citizens. This is done by satisfying their social and economic needs (Poole et al., 2014). The operation stage in infrastructure management consists in assisting the government in question to achieve these objectives. The operation phase also facilitates the measurement of the social and economic benefits derived by the public from the infrastructure set up vis-à-vis their needs and expectations. One of the ways to guarantee this is to ensure that the public gets the best value at the lowest cost from the infrastructure (Poole et al., 2014). The provisions of quality service to the public and effective performance are guaranteed by the good maintenance of the infrastructure by the operation contractor if the operation is contracted or by the government. Maintenance enables the government to maximize the satisfaction of the beneficiaries for the whole economic life of the infrastructure. Corporate governance theories assist in achieving all these objectives.

3. Governance and management of public physical infrastructures in developing countries

The concept of governance has evolved over time, from private affairs management to public management, and has generated other concepts, such as good public governance (Pierre and Peters, 2000), where transparency, accountability, and inclusive participation are at the center of public resource allocation. These principles have been strengthened by the new public management outcomes of effectiveness, efficiency, flexibility, and evaluation (Puppion and Chappoz, 2015).

Referring to the governance of public infrastructure in developing countries, a question emerges: does public governance of public infrastructure in developing countries follow the principles above? This question can be answered by comparing the level of infrastructure development in developing countries in Africa and Latin America with those of developed countries, such as the United States, England, France, and South Korea. Both sets of countries invest in public infrastructure, but developed countries are far ahead because they are more organized in the planning of the development of their infrastructure and the allocation of resources to their public infrastructure (Frischmann, 2012). It is clear that developing countries in Latin America and Africa are lagging behind in infrastructure development. In Africa for instance, in 2015, approximately 60% of the continent's population did not have access to modern infrastructures. Only 38% of the continent had access to electricity in 2015 and 75% of Africa's road network was unpaved (Office of the Special Adviser on Africa (OSAA), 2015).

In Latin America, the road density index criterion, for instance, showed that this region in 2014 had an average of 22 km of road for every 100 km^2 of land area against 67 km for the United States, 106 km for the Republic of Korea and 102 km for the European members of the Organisation for Economic Co-operation and Development (OECD). The delay in infrastructure in developing countries compared with that in developed countries in Europe, the USA, and South Korea can be explained by governance problems, including low investment infrastructure, poor and obsolete

policies, corruption, lack of financial resources, and inclusive participation in infrastructure governance policies (Sánchez et al., 2015; Perrotti and Sanchez, 2011). The problems above negatively affect the planning, design and analysis, construction, operation, and maintenance of physical public infrastructure in developing countries. According to Jaimurzina and Sánchez (2017), these shortcomings in public infrastructure governance in developing countries of Latin America can be overcome by good planning and strategic vision for infrastructure development, involvement of interested parties, coordination of stakeholders at various levels of government, technical capacities of the public sector, flows and sources of financing, administrative considerations of decisions, and measurement of performance in the provision of infrastructure services. The mechanisms above can be strengthened by corporate governance theories for the effective management of public physical infrastructure in Sub-Saharan countries in Africa.

4. Public infrastructure management and corporate governance theories

Corporate governance is the split of tasks of control and management in an organization. Corporate governance is also the holding of the balance between economic and social goals and between individual and communal goals. The governance framework encourages the efficient use of resources and effective accountability for the stewardship of those resources. From these definitions, we derive three observations in line with public infrastructure management. First, public infrastructure management is a process overseen by a government and its agencies and is usually made up of different components or tasks, which are planning, design, construction, operation, and maintenance. Each of these tasks has specific functions and objectives guided by public and corporate governance rules. The successful implementation of governance rules in each of the public infrastructure management processes leads to a successful realization and quality service delivery as far as public infrastructure is concerned. Second, one of the principles of governance that prevails in the management of public infrastructure is common goal. In other words, public infrastructures are commons and have a societal dimension. They are a community resource and must provide dividends or benefits to all parties associated with them, according to each party's needs, as well as being in line with the protection of the environment. Many corporate governance theories are useful in accounting for the specificities related to the management of public infrastructure. The theories are the agency theory, transaction cost theory, asymmetric information theory, stewardship theory, neo-institutionalist theory, stakeholder theory, and behavioristic theory.

The agency theory contributes to the understanding of public infrastructure management by providing the various agency costs incurred in public infrastructure management, as well as the parties involved and their related duties and obligations. These costs are monitoring, bonding, and residual. These costs explain the successes and failures in the management of public infrastructure. Public infrastructures are public capital expenditure investments requesting heavy amounts of financial resources for construction. In addition, active monitoring from the government helps secure their delivery on time, as well as their operation and maintenance. Bonding costs enable contractors, operation managers, and public infrastructure supervisors to be committed to their respective tasks. Monitoring and bonding costs assist in minimizing opportunistic behaviors and residual costs from constructors and managers of public infrastructures.

Asymmetric information is another theory that explains the importance of information in the

management of public infrastructure. Asymmetric information underlies the gap of information between parties involved in public infrastructure management processes. The gap occurs between governments and developers, operators, and maintenance managers. Asymmetric information must be reduced for public infrastructures to be completed and operate efficiently according to their planning and design. Asymmetric information is more pronounced in public infrastructure because contractors in charge of building public infrastructures are private organizations, whose objectives are different from the government's objectives and goals. Their core objectives are intended to make high profits to the detriment of social values.

The transaction cost theory explains the nature of intermediary costs in public infrastructure management. Examples of such costs are coordination and agency costs. Public infrastructures are dominated by transaction costs related to bureaucracy in government procedures, especially in public infrastructure management. In addition, transaction costs emerge in public infrastructure management with a "long-term nature of partnership contracts with the private sector and the use of private finance means they are often more complex to negotiate" (Poole et al., 2014, p. 115; Araújo and Sutherland, 2010; Royal Institution of Chartered Surveyors, 2013). The stewardship theory is a theory put in place by Donaldson and Davis (1991). It recognizes the role of managers as good stewards who act in the best interest of owners. Thus, this theory shows that public infrastructure managers assist governments in achieving the objectives and goals assigned to public infrastructures. Public infrastructure managers only succeed if they commit to institutional and regulatory frameworks set up for the management of public infrastructures. This is important in public infrastructure management. This is because rules and regulations make it possible to benchmark public projects and facilitate an effective public external auditing and quality control supervision of stakeholders involved in public infrastructure management processes. This is done in order to satisfy the needs of beneficiaries. The existence of such rules is important to measure accountability and transparency in public infrastructure management. These rules can be affected over time by incomplete contracts.

On its part, the theory of incomplete contracts avers that a contract cannot be seen as complete when it does not integrate all dimensions in the contractual agreement between parties. Some necessary elements might be forgotten or emerge in the course of executing the contract that may require contract adjustments or changes. Therefore, clauses are necessary to overcome deadlocks that arise in the course of implementing contracts. This is suitable with public contracts, where difficulties always arise in their implementation either because of delays in the disbursement of funds by financiers (governments and their partners), disruptions by delocalized populations, unethical standards, or because of environmental protection norms that need to be considered. These elements can only be implemented in a contract when the initial contract integrates incomplete contract mechanisms.

The last theory is the stakeholder theory. It was espoused by Freeman in 1984 and it recognizes that organizations are made up of diverse stakeholders with different interests. Applied to public infrastructure, the theory acknowledges that the management of public infrastructure involves many parties from the planning to the operation of public infrastructure. In line with the stakeholder theory, a public infrastructure is well managed when it satisfies the interests of all the parties associated with the infrastructure. Examples are the general population, government, non-governmental organizations, and private investors and operators.

5. Theoretical framework

5.1. Theories and propositions considered

This study used corporate governance theories to explain the failures and successes of infrastructure management in some selected Sub-Saharan countries. Two sets of variables were adopted for this purpose: independent and dependent variables.

Independent variables: These are corporate governance theories made up of asymmetric information theory, transaction cost theory, stakeholder theory, incomplete contracts theory, and behavioristic theory. These theories were chosen because of how much they ease the understanding of hindrances and successes in the managerial process of public infrastructure (Poole et al., 2014).

Dependent variables: These are the components of the management process of public infrastructure. According to Thorpe (1998), they are divided into three phases, which are the planning phase, development phase, and operation phase. In this study, they were measured by failures and successes in the management of physical public infrastructures in each of these phases (Torrisi, 2009).

The variables above were used to develop the three propositions of this study aimed at assessing the case studies of physical public infrastructures in five selected African countries, which are Cameroon, Lesotho, Zambia, Zimbabwe, and Mozambique. These propositions are:

P_1: Corporate governance theories explain the failures or successes in the planning of physical public infrastructure in some selected Sub-Saharan countries.

P_2: Corporate governance theories explicate the failures or successes in the development of physical public infrastructures in some selected Sub-Saharan countries.

P_3: Corporate governance theories enlighten the failures or successes in the operation of physical public infrastructures in some selected Sub-Saharan countries.

6. Methodology

To explain the successes and failures in infrastructure management in Sub-Saharan Africa using corporate governance theories, this study made use of explanatory and case study research designs. The operationalization of variables, the methods, and instruments of data collection are presented in **Table 1**.

6.1. Operationalization of variables

Table 1 presents the variables adopted in this study.

6.2. Sources of data, method, and instruments of data analyses

The sources of data were secondary and the data were collected from government and private reports on public infrastructure management from five countries: Cameroon, Lesotho, Zambia, Zimbabwe, and Mozambique. The infrastructures studied include the Olembe Stadium in

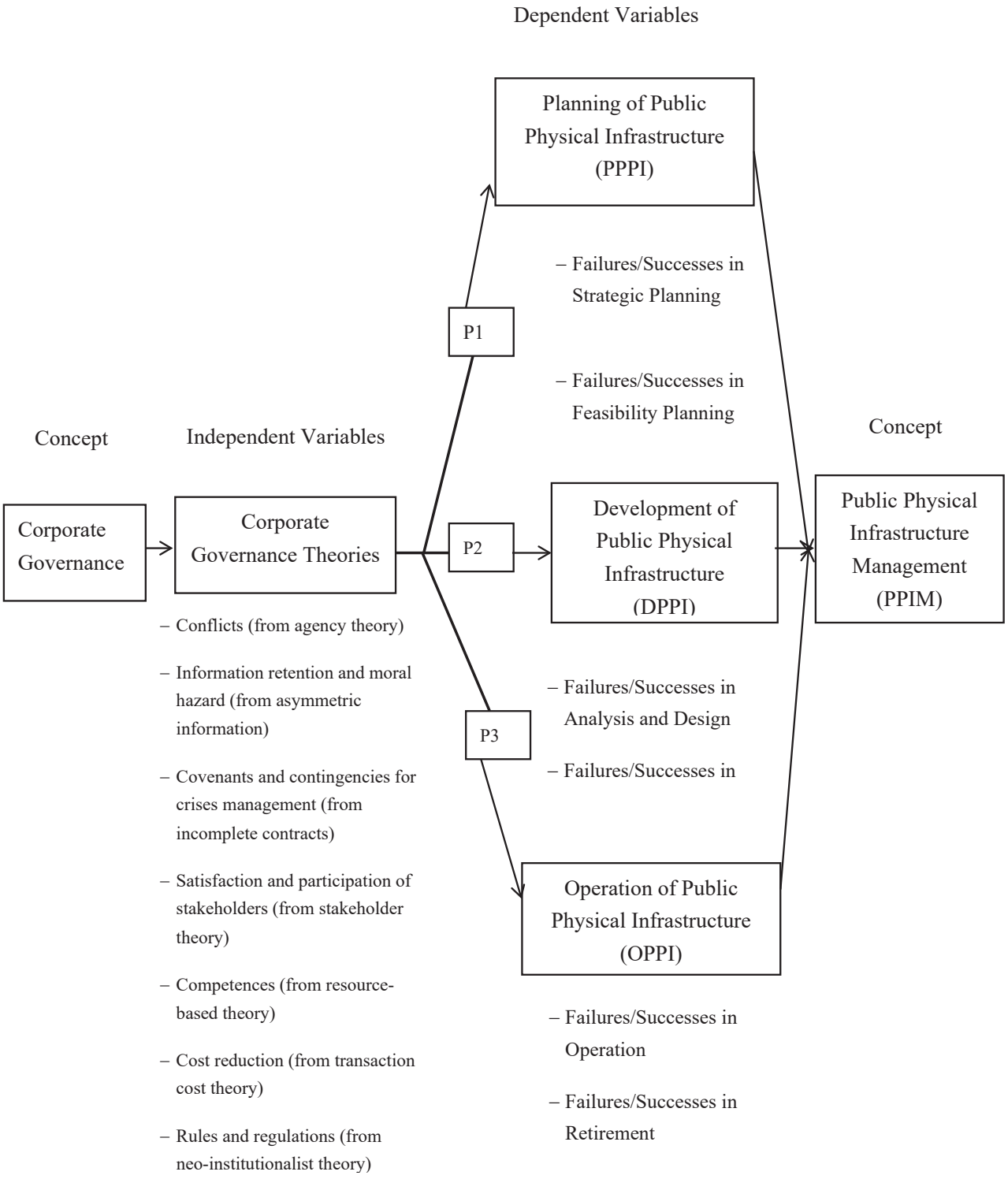

Figure 1. Theoretical design of corporate governance theories and public physical infrastructure management.

Cameroon, the Queen Mamohato Memorial Hospital in Lesotho, the Matabeleland Zambezi Water Project in Zimbabwe, the One-Stop Border Post in Zambia and the Maputo Development Corridor in Mozambique. The analysis of data was done using the case study approach. The analysis was done according to failed and successful public management processes in the various cases studied. The public management processes comprised planning, development, and operation stages.

Table 1. Operationalization of variables

Concepts	Variables	Measures
	Independent variables	
Corporate governance theories	Agency theory	Types and levels of conflicts; delegation of powers
	Transaction cost theory	Transaction cost, cost reduction
	Stakeholder theory	Satisfaction, participation and cooperation of stakeholders
	Asymmetric information theory	Transparency and accountability in the management of infrastructure's resources; disclosure of information
	Incomplete contracts	Restrictive and affirmative covenants for the management of problems and unexpected risks and contingencies in construction of infrastructure
	Neo-institutionalist/ behavioristic theory	Definition of standards and regulations, respect of public laws in public contracts; collective learning and understanding of public infrastructure procedures
	Dependent variables	
Physical public infrastructure management (PPIM)	Planning of PPIM	Failures or successes in strategic planning, feasibility studies, and time frame of PPIM
	Development of PPIM	Failures or successes in analysis and design and in construction of PPIM
	Operation of PPIM	Failures or successes in operation and retirement of PPIM

Corporate governance theories were used to describe the nature of failures and successes in public infrastructure management processes of the case studies chosen. The findings from the data analyzed are presented below.

7. Presentation and discussion of results

7.1. Presentation

The results are presented in terms of failed and successful public infrastructure management. The corporate governance theories that describe the failures and successes in the management of the public infrastructures studied are provided on the tables below.

7.1.1. Nature of failures in public infrastructure management in selected Sub-Saharan countries explained by corporate governance theories

Case study 1: Olembe Stadium in Cameroon

The stadium is located in Cameroon. Its construction was instigated by the expectation that Cameroon would host the 2019 African Cup of Nations. Its construction started in 2016 and its delivery to the Cameroon Government was scheduled for 2018. However, even in early 2020, the stadium could not be delivered to Cameroon because of lack of completion. **Table 2** presents the overview of the Olembe Stadium project and **Table 3** provides reasons of failures in its management process.

Table 2. Overview of Olembe Stadium and failures of commitment to delegation of powers by contractor

Overview of Project: Olembe Stadium	Pre-Factors of Failures
Nature: Complex public infrastructure	**Factor 1:** Failure of the company to deliver the work within the contractual deadlines
Purpose: African Cup of Nation 2019	**Factor 2:** Work stoppage not authorized by the project's owner
Aims: To be used for the opening and the closing ceremony of AFCON 2019	**Factor 3:** Abandonment of site duly acknowledged by the bailiff and by administrative report
Capacity: 60,000 seats all covered, with two training football stadia; construction of gymnasium, Olympic swimming pools, and handball, basketball, volleyball, tennis courts; construction of 5-star hostel with 70 rooms, shopping mall, museum and cinema	**Factor 4:** Undertaking proven contractual services without authorization from the contracting authority
Surface: 34 hectares	**Factor 5:** Failures of the company characterized by the non-respect of the contractual commitments and orders of services from authorities
Location: 13 km from the capital, Yaoundé	
Capital Amount: XAF163 billion[1], where XAF138 billion[2] was borrowed by the State of Cameroon and the balance was provided by the Cameroon government itself	**Factor 6:** Violation of the country's legislation characterized by the accumulation of employees' wages
Initial Project Contractor: PICCINI Group	
Beginning Date of Construction: 07/03/2017	
Expected Ending Date: 09/2018	
Dismissal of Initial Contractor: PICCINI Group Date: 29/11/2020	
Appointment of New Contractor: MAGIL CONSTRUCTION Date: 3/12/2019	

Source: Government compilation reports

[1.] Approximately US$326,000,000

[2.] Approximately US$276,000,000

Table 3. Nature of failures of Olembe Stadium and explanatory governance theories

Infrastructure Management Items	Failures	Explanations from Variables of Governance Theories Adopted (Table 1)
Planning Phase	**Strategic planning:** Mismatch of resources with construction needs; centralization of managerial style and lack of specification of tasks. **Feasibility studies:** Inadequate feasibility studies. **Project planning:** Mismatch of resources with risk tolerance and the project planning (time frame).	Conflicts and lack of participation of all stakeholders in the planning process; differences in information possession.
Development Phase	**Analysis and design:** Inadequate analysis and design of the project. **Construction:** Lack of managerial and technological innovations and high transaction and sunk costs in the construction.	Lack of covenants to enforce actions in the construction stage; lack of covenants to solve conflicts and to favor innovations and cost reduction.
Operation Phase	**Operation:** Not operational. Expected delivery between April–September 2020.	Incompetence and lack of respect of project time frame.

Source: Documentation and compilations

Many corporate governance theories explain the failure of the completion of the Olembe Stadium by 2018 (initial delivery date). These are the agency theory, the stakeholder theory, the asymmetric information theory, the transition cost theory, the incomplete contracts theory, and the behavioristic theory. The incompletion was analyzed at the planning, development, and operation stages of public infrastructure management.

At the planning stage, one of the key causes of the failures of the Olembe Stadium project was the lack of a clear definition of tasks between the governing and leading stakeholders of this public infrastructure, as recommended by Fayol (1917). This lack of transparent distribution of tasks generated high transaction costs in material and equipment intermediary costs in building the Olembe Stadium. This led to additional meetings being held to resolve conflicts between the managerial and government teams and between the government and the construction company in the implementation of the construction process. Such meetings were on project time planning and the schedule of provision of funds by the Cameroon government. Regarding planning, incomplete contracts were not adapted to overcome unexpected situations. If incomplete contract mechanisms were clearly adopted, it may have assisted the Cameroon government and the construction company to more spontaneously resolve conflicts emanating from the building of the Olembe Stadium within the anticipated time frame of the project. Clear examples of these incomplete contracts are affirmative and restrictive contracts. The first would have involved spelling out what needs to be done by the constructor to complete the construction of the Olembe Stadium on time and the second would have required a definition of the actions not to be undertaken by the construction company for the stadium to be completed on time.

During the development phase, the construction was not carried out according to the project planning phase. Besides that, the construction did not adequately match the outcomes from the feasibility studies. The construction stage did not also reconcile the interests of the construction company with the ones of its employees. This was also the case between the government and the local population (external stakeholders). This was explained by the asymmetric information between the stakeholders and the lack of transparency in the construction stage. The latter led to an increase in expenditures beyond the budgeted construction capital. This also led to adverse consequences in the construction time frame. With regard to the behavioristic theory, the failures that led to the incompletion of the Olembe Stadium are also explained by the non-introduction of mutations (changes and innovations) and routines (day-to-day activities) in the construction process in order to meet the project time frame. The mutations would have brought about construction outsourcing,

Table 4. Pre-factors of failures of construction of Queen Mamohato Memorial Hospital

Overview of Project: Queen Mamohato Memorial Hospital	Pre-Factors of Failures
Nature: Public health complex infrastructure	**Factor 1:** Many partners were involved in the financing of the project
Purpose: Reformation of health services	**Factor 2:** Lack of consultations with the main beneficiaries, which are the inhabitants
Aim: Replace the Queen Elizabeth II Hospital, which had been operating for over 100 years	**Factor 3:** Lack of analysis of the state of resources and competences by the Lesotho government
Capacity: **Area of Health Complex: 290,000 m^2** Number of hospital beds: 425, where 390 are directed to be public and 35 are private **Surgical Theatre:** 8 major procedure rooms and 1 procedure room **Affiliated Clinics**: 3 filter clinics offsite and 1 gateway clinic onsite	**Factor 4:** Wrong and poor delegation of powers to project partners by the Lesotho government
Type of Financing: Public-Private Partnership (PPP) **Duration of Contract of PPP: 18 years**	
Total Capital Invested: US$153 Millions **Total Public Contribution: 37.7%** **Total Private Contribution: 62.3%**	
Public Sector Sponsors: Government of Lesotho, Development Bank of South Africa, and Global Partnership for Output-Based Aid	
Private Sector Sponsors: Netcare Ltd., Excel Health, Afrinnai Health, Women Investment Company, and D10 Investment	
Contractors: Netcare, RPP Lesotho, and Bottle Facilities Management	

Source: Lesotho government compilation reports

such as expertise and private investments, in the process to comply with the delivery date of the Olembe Stadium. There was also a need to speed up the routines by increasing the number of employees assigned to operational tasks.

Case study 2: Queen Mamohato Memorial Hospital

The Queen Mamohato Memorial Hospital in Lesotho was built to replace the Queen Elisabeth II Hospital in Maseru. It was financed using public-private partnership (PPP), which was entered into force in 2009. This model of financing was set up with the assistance of the International Financial Corporation (IFC). **Table 4** overviews the pre-factors that led to the failures of the construction of the Queen Mamohato Memorial Hospital.

Table 4 indicates the characteristics of the Queen Mamohato Memorial Hospital construction project in Lesotho and also gives some of the pre-factors that influenced its failure. The partnership between the Lesotho government and the private company, Netcare Ltd., led to many failures, as presented in **Table 5**.

The Queen Mamohato Memorial Hospital is a public infrastructure set up to replace the Queen Elizabeth II Hospital in Maseru. Its amount of capital financing did not meet its operational capacity expectations. At the planning, development, and operation phases, many theories explain this failure. At the planning stage, a wrong special-purpose vehicle was adopted to finance the construction of the Queen Mamohato Memorial Hospital due to asymmetric information between the government of Lesotho and its advisory partner, the International Financial Corporation (IFC). In addition, the feasibility studies carried out failed to effectively assist the government in designing an equitable contract with its private financing partner. Though the government was advised by the IFC, which has international expertise in social development projects, it was supposed to verify the information

Table 5. Nature of failures of Queen Mamohato Memorial Hospital and explanatory theories

Infrastructure Management Items	Failures	Explanations from Variables of Governance Theories Adopted (Table 1)
Planning Phase	**Strategic planning:** Mismatch of the cost of financing for the hospital with the financial resources of the Kingdom of Lesotho; inadequate special-purpose vehicle with its intermediary, the IFC; lack of technical capacity to negotiate funding contracts with funding partners led to unfair terms of contracts, such as payments of US$36.2 million for 18 years and limitations of ceilings of patients treated to 20,000 inpatients and 310,000 outpatients per year (World Bank, 2016). **Feasibility studies:** Inadequate feasibility studies that could not determine the appropriate demand for services in patient care in Maseru; many projection errors were made (Marriott, 2014).	Lack of transparency and sharing of relevant information between stakeholders in the planning phase; lack of building covenants in planning for settlement of disputes in construction and operation phases.

Table 5. (Continued)

Infrastructure Management Items	Failures	Explanations from Variables of Governance Theories Adopted (Table 1)
Development Phase	**Construction:** Over-costing that does not match the capacity and quality of the Queen Mamohato Memorial Hospital. High annual loan repayment construction amounts of about 51% of the health budget of the government.	Construction did not take into consideration the resource capacity of Lesotho due to asymmetric information between parties and lack of establishment of good participatory mechanisms.
Operation Phase	**Operation:** High cost of patient care payment by the government; the operation of the Queen Mamohato Memorial Hospital did not meet its objectives. The Lesotho government continues to transfer patients abroad, namely to South Africa, costing the government US$1.2 million in 2001 (Downs et al., 2013); the number of patients transferred increased to 61% between 2007 and 2014 (Marriott, 2014). There was also the exacerbation of healthcare inequalities across Lesotho, absorption more than 30% of the government's budgetary revenues for the repayment of the loan for the Queen Mamohato Memorial Hospital construction; the running cost of the budget is too high; for instance, in 2012/2013, Marriott (2014) estimated the cost to be 51% of the health budget of the country; increase in interests paid to one of the project's equity partners, Tsepong Ltd., to US$755,000 between 2007 and 2012; dissatisfaction of stakeholders shown by the willingness of Netcare Ltd. to sue the Lesotho government in the High Court (Kabi, 2020). **Retirement:** There is no assurance that the Lesotho government will be able to deliver by the end of the maturity date of the project scheduled for 2026. Finally, there was the retirement of the partner after 18 years under the build-operate-transfer PPP model.	Lack of cost minimization, as advocated by the transaction cost theory, and lack of efficient allocation of resources in the Queen Mamohato Memorial Hospital project; incapacity of the Queen Mamohato Memorial Hospital project to satisfy all its private and social partners as planned and stated by the stakeholder theory. Evidently, the retirement objective of the Lesotho government before 2026 can generate other relational, financial, and contractual problems for the Lesotho government because of the lack of covenants in the main financing contracts, as advocated by the incomplete contracts theory, to empower the government to reinforce its retirement.

Source: Documentation and compilations

provided by the IFC by using alternative mechanisms, such as insourcing or outsourcing, to reduce the scope of asymmetric information with its financing partners. Another element explaining the failures in the management of the Queen Mamohato Memorial Hospital project is the absence of a definition of responsibilities and modalities for compensating the IFC and the private financing company, Netcare Ltd., in case of failures in the PPP contract. They were supposed to be mentioned in the financing contracts using incomplete contracts.

At the development and operation stages, the new hospital was very expensive for the government of Lesotho to afford to repay the funds borrowed for its construction. In addition, it

did not increase the satisfaction of its demand for health services compared with that of the former hospital, despite its high cost. At the operation stage, key stakeholders, namely the public and the government, were not satisfied with the public infrastructure. The sponsoring institution receives more benefits through the repayment of its financing than do the beneficiaries, which are the government and the population.

Case study 3: Matabeleland Zambezi Water Project

The project's aim was the construction of a dam over the Zambezi River. Its duration was five years starting from 2000. Its pre-factors of failures, as presented in **Table 6**, were first, the financing of the project by public funds; second, the shortage in public funds by the Zimbabwean government; third, regular political crises in Zimbabwe; and fourth, delays in the mobilization of funds for the project by the government.

The Matabeleland Zambezi Water Project is an example of failure in public infrastructure financing management. Its failure was analyzed through knowledge-based theories, the incomplete contracts theory, and the agency theory. At the strategic planning stage, the government of Zimbabwe did not do enough to explore the best source(s) of finance to effectively fund the project and to minimize cost. One option could have been to use the build-operate-transfer technique of public-private partnership to finance this project.

Feasibility studies were not appropriately done to assist the Zimbabwe government in choosing the best PPP vehicle. Knowledge-based theories that promote innovation could have enabled the government to effectively overcome difficulties in financing, as well as the restructuring of the project at the planning, design, and construction phases. The incomplete contracts theory relates to the management of unexpected and new situations, which can ease an understanding of the challenges of the financing of the Matabeleland Zambezi Water project and the need to design a new financing contract structure with external stakeholders. The initial contract is a failure when considered from the perspective of the agency theory.

The analysis of the first three projects relevant to the Olembe Stadium in Cameroon, the Queen Mamohato Memorial Hospital in Lesotho, and the Matabeleland Zambezi Water Project in Zimbabwe revealed many failures in physical public infrastructure management. These failures globally result from four core elements: first, the lack of considering public infrastructure management as a process made up of interrelated components. Second, public infrastructures should be guided by new public management principles of efficiency, effectiveness, and economy. Third, public physical infrastructure development needs a heavy amount of financing, which governments have difficulties mobilizing alone, and therefore governments must be innovative towards financing partnerships. Fourth, there is a need for the establishment of formalized mechanisms of mid-term evaluations of public infrastructure projects to improve their efficiency. All these failures are globally justified by the lack of incomplete contracts to prevent the occurrence of failures experienced in the Olembe Stadium and Matabeleland Zambezi Water projects. This is in contrast with Chirundu One-Stop Border Post in Zambia and the Maputo Development Corridor in Mozambique.

7.1.2. Nature of successes in public infrastructure management in selected Sub-Saharan African countries explained by corporate governance theories

Table 6. Nature of failures of Matabeleland Zambezi Water Project and explanatory theories

Infrastructure Management Items	Failures	Explanations from Variables of Governance Theories Adopted (Table 1)
Planning Phase	**Strategic planning:** Wrong long-term source of finance to fund the Zambezi project; the project was not considered as a priority and a national project at the beginning by the Zimbabwean government. **Lack of strong political will to accompany the project** **Feasibility studies:** Inadequate feasibility studies in determining the capacity of the government to finance the project; Matabeleland is one of the semi-arid and drought-prone regions in Zimbabwe; the Zambezi River is shared by many in Southern African Development Countries (SADC), such as Zambia, Namibia, Angola, Botswana, Malawi, and Tanzania, and it was important to get approval from all of them in the project planning; lack of perception of consistent ethnic tension in the Matabeleland area. **Project planning:** Timing was not aligned with the availability of financial resources on the part of the Zimbabwean government.	Lack of skills, knowledge, and competences to conduct adequate planning.
Development Phase	**Construction:** Construction did not align with the financial plan, project planning time frame, and design of the project; delays due to politicization of the project and embezzlement of funds from China for the financing of the project; council officials did not create a project bank account for the US$144.4 million loan facility obtained from China's Eximbank; no covenants were designed in the contract to manage contingencies, which appeared to be many, at the construction phase; legal obstacles emerged with bordered countries at the construction requiring signing and ratifying of Zambezi Watercourse Commission Agreements.	Conflicts and lack of transparency and accountability in financial resources allocation and opportunistic behavior from government officials; lack of contingency plan at the development phase; lack of respect of regional rules.
Operation Phase	**Operation:** The project could not start at its planned date of operations because of lack of funds.	Conflicts and opportunistic behavior of stakeholders hindered the respect of the time frame of the project.

Source: Documentation and compilations from Zambezi Water Project reports and activities

Case study 4: Chirundu One-Stop Border Post (OSBP) in Zambia

The Chirundu OSBP is located between Zambia and Zimbabwe at the Zambezi River along the North-South Corridor in Southern Africa. It was opened on the 5th of December, 2009. It is considered a successful infrastructure for/by both transporters and travelers. It has shortened the clearance time at border crossing points (African Union Development Agency, 2016). The overview of the pre-factors of successes of the OSBP project is provided in **Table 7**.

Table 7 reveals the pre-factors of successes of the Chirundu One-Stop Border Post in Zambia.

Table 7. Chirundu One-Stop Border Post's pre-factors of successes

Overview of Project: Chirundu One-Stop Border Post	Pre-Factors of Successes
Nature: Regional trade border post infrastructure.	**Factor 1:** OSBP is a regional project integrating and facilitating trade in many Eastern and Southern African countries, such as Zambia, Malawi, Kenya, and Zimbabwe.
Purpose: Enhancing regional trade for the Common Market for Eastern and Southern Africa (COMESA).	**Factor 2:** OSBP is a high-transaction and high-transit border post. For instance, in the second quarter of 2011, the number of trucks entering and exiting were 470 units (Nkwemu and Besa Lungu, 2011).
Location: OSBP is located on the banks of Zambezi River bordering Zimbabwe and Zambia, 352 kilometers from Harare (Zimbabwe) and 117 kilometers from Lusaka (Zambia).	**Factor 3:** Chirundu border is the main entry that links Zambia and South Africa.
	Factor 4: OSBP is both a trade program and part of the North South Trade Program involving three regional bodies, which are SADC, East African Community (EAC), and COMESA (Odiki et al., 2009).

Source: Nkwemu and Besa Lungu (2011) and government compilation reports

Table 8. Nature of successes of Chirundu OSBP explained by corporate governance theories

Infrastructure Management Items	Successes	Explanations from Variables of Governance Theories Adopted (Table 1)
Planning Phase	**Strategic planning:** Development of weak ties type of relationships to combine difference experiences and policies (Granovetter, 1973), leading to regular sharing of information for the OSBP initiative through the Common Market for Eastern and Southern Africa (COMESA); regional infrastructure fostering Southern African Development Community (SADC); it falls within the SADC Trade Protocol of Infrastructure Development ratified in 2000; formalization of rules and regulations before the development phase. **Feasibility studies:** The OSBP solves a large number of inland SADC countries' needs of transportation of goods and persons (six countries in total).	Participatory mechanisms were applied at all levels of the planning phase; the formalization of the practices of the OSBP was the decision taken by the promoters of the OSBP project to ensure its sustainability.
Development Phase	**Construction:** The nature of construction of OSPB meets the objectives of the SADC Trade Protocol, which are to increase the efficiency of border operating systems, to increase trade traffic that flows through border posts, and to increase revenues for the governments.	No significant conflicts registered between the stakeholders in the construction phase

Table 8. (Contiuned)

Infrastructure Management Items	Successes	Explanations from Variables of Governance Theories Adopted (Table 1)
Operation Phase	**Operation:** The OSBP reduces the crossing time for commercial vehicles from 2–9 days to hours and made it possible to save US$200–500 per day for the beneficiaries; increases revenues collected by the Zambian government; reduces HIV AIDS infections in Chirundu, as truck drivers are required to spend less time at the border (African Union Development Agency, 2016); adjustments were carried out on the organizational structure in order to re-align the structure with the OSBP concept, mission and vision; the construction of technological facilities, clearing agencies, and business entities was done to improve the effectiveness of the OSBP; the empowerment and building of capacities were also directed to border staff to change their mindsets about the OSBP and to boost their productivity. Reduction in the stoppage time for buses from 2 hours to 1 hour.	Transaction costs were reduced in the operation phase, and participatory mechanisms were implemented in the operation phase; regular review of rules and regulations to ensure their effectiveness.

Source: Documentation and compilations

These are the policy of regional integration, the high level of activities in the OSBP, and the proximity to South Africa. **Table** 8 indicates the nature of successes of the OSBP in Zambia.

The analysis of its management process is assessed in Table 8. Some of the factors are organizational innovations and the efficient flow of information amongst all the parties involved in this project.

Case study 5: Maputo Development Corridor (MDC) in Mozambique

The Maputo Development Corridor (MDC) is a transportation and trade corridor infrastructure linking three South African provinces of Gauteng, Mpumalanga, and Limpopo with Mozambique's capital city Maputo and its port (Kunaka and Carruthers, 2014). The corridor was established in 1996 following a peace agreement in 1995 and the first post-apartheid democratic election in South Africa in 1994 (Schutte, 2005). **Table 9** overviews the pre-factors of successes of the MDC project.

Table 9 features the pre-factors of successes of the MDC project. These are the participation of all stakeholders, the economic integration, and the environmentally sustainable framework to back up the project. The elements of its managerial success are presented in **Table 10**.

The two public infrastructures that registered successes are Mozambique's Maputo Development Corridor (CDC) and Zambia's Chirundu One-Stop Border Post (OSBP). The stakeholder theory and the agency theory explain the success of these two public infrastructure projects. During the planning, development, and operation phases, the distribution of tasks was appropriately done and respected, as recommended in the agency theory. Many parties with interests in either project

Table 9. Pre-factors of successes of MDC project

Overview of Project: Maputo Development Corridor (MDC)	Pre-Factors of Successes of MDC Project
Nature: Transportation corridor	**Factor 1:** Use of participatory and holistic approaches in the project
Purpose: Connect South Africa's Gauteng province and industrial center with Mozambique's Maputo Port	**Factor 2:** Development of an economic integration background for the MDC project
Aims: Rehabilitation of primary infrastructure networks of rail, road, port and dredging; maximization of investments of Mozambique's government and facilitate regional integration and employment opportunities	**Factor 3:** Creation of an environmentally sustainable framework
Beginning Date: August 1995	**Factor 4:** Setting up of common governance facilities by both the governments of Mozambique and South Africa to defend and represent the interests of all the stakeholders in the MDC
Mechanism of Financing: Public-private partnership (PPP)	**Factor 5:** Creation of facilities of participation in management by all stakeholders, such as the Maputo Corridor Logistic Initiative in 2006 operating in South Africa and Mozambique
	Factor 6: The method of financing adopted, namely PPP

Source: Documentation and compilations

were consulted and involved in the planning, development, and operation phases. The parties were consequently very committed to and supportive of the project.

7.2. Discussion of results

The analysis reveals two sets of outcomes: public infrastructure management considered as failed and public infrastructure management seen as successful. The failed projects were initiated and managed by the individual government, while the successful ones are integrated and regional public infrastructures. These results could be attributed to a number of factors.

At the regional level, there are high expertise and financial resources, which are mobilized along with political will. Similarly, regional public infrastructure management tends to grant access to a variety of financial resources obtained using standardized special-purpose vehicles and project finance contracts based on the specificities of each public infrastructure developed. This is not the case with domestic public infrastructures, which often lack this huge expertise, scope, and multinational sources of finance, such as in the case of the Matabeleland Zambezi Water Project in Zimbabwe. These results are in line with the study by Poole, Toohey, and Harris (2014), which showed that PPP and regional approaches are more effective in the management of public infrastructures. Our study is not without some limits. The first relates to the sources of data, which were essentially secondary and documentary, while the second emanates from the limited number of cases analyzed. Studies with primary data and with more case studies are thus needed to fully account for the reasons why the management systems of some public infrastructures in Sub-Saharan

Table 10. Nature of successes of MDC explained by corporate governance theories

Infrastructure Management Items	Successes	Explanations from Variables of Governance Theories Adopted (Table 1)
Planning Phase	**Strategic planning:** Vision, mission, and objectives are clearly defined (Schutte, 2005); the existence of a strong political will and support from the regional integration authorities (SADC). **Feasibility studies:** Areas of operations were properly segmented in the primary and secondary corridor regions, and resource nodes and tertiary roads clearly defined; other logistic needs were also identified, such as the railway linking Guateng to Maputo.	Agency theory and managerial division of tasks (Berle and Means, 1932).
Development Phase	**Analysis and design:** They were done according to the objectives in the strategic planning phase with the involvement of all stakeholders. **Construction:** Enough capital was raised using public-private partnership by the governments of South Africa and Mozambique.	Implementation of participatory mechanisms in the development phase.
Operation Phase	**Operation:** The MDC is under a multilateral joint management by the Mozambique and South African governments and private sector organizations (PSOs). A mix managerial body, namely Maputo Logistics Initiative (MCLI), took over the management of the MDC in 2010 to increase its efficiency.	Inclusion of covenants in initial contracts for the management of potential crises arising in the course of operation of the MDC.

Source: Documentation and compilations

Africa are successful and others are not.

8. Conclusion

Public infrastructure management in Sub-Saharan African countries is a key issue of public governance in African countries when one considers the role that these infrastructures play in the economic development of these countries. This study set out to analyze the nature of failures and successes in the management of public infrastructures in five African countries (Cameroon, Zimbabwe, Lesotho, Mozambique, and Zambia).

Data were collected from documents, and explanatory and case study designs were adopted. Corporate governance theories were used to describe the nature of failures and successes of public infrastructure management in the countries studied. The results indicate, based on the stakeholder's theory, agency theory, transaction cost theory, incomplete contracts theory, asymmetric information theory, and behavioristic theory, that regional public infrastructure management models succeed more than national public infrastructure management ones. We thus advise Sub-Saharan countries to use more regional public infrastructure management models than domestic ones to develop especially public infrastructure projects.

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