The Nacala Corridor Railway and Port PPP project Risks identification research

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Abstract. Recently, Public Private Partnerships (PPP) in Mozambique has demonstrated significant advances in the level of private sector involvement in the delivery of infrastructure such as railways and port assets. It is generally considered that PPP is a mechanism to simplify the delivery of transportation projects, transfer the risks of transportation projects, reduce transportation costs and increase transportation revenue. This paper introduces a framework that identifies the risks associated with PPP arrangements for Railway and Port project delivery in Mozambique, with special attention to the Nacala corridor project. The framework divides risks into four categories: political, economic, socio-cultural, and technical (referred to as PEST), which can help project managers launch PPP projects to identify risks, manage risks, and minimize project risks.

1. Introduction
In recent years, the PPP model has entered many fields to solve problems such as project funding and long operating hours. However, it also faces problems such as risk management. Especially unpredictable risks have become new obstacles to the development of PPP.

Risk identification is one of the most important stages of risk management, because the process of identifying risks is very important to accurately analyse risks (Valipour et al. 2018). In order to achieve effective risk management, it is necessary to carry out detailed risk identification, analyze risks in specific departments and stages, provide practitioners with more reliable information, and provide appropriate risk control strategies (Ke et al. 2012). Although numerous studies have been conducted on the subject of risk identification as well as PPP implementations in developing countries, the process of risk identification in the Mozambique PPP construction industry, especially in Railway and Port projects, has hitherto not been well studied. The aims of this paper is to explore the risk identification process and identifies potential risks in transportation PPP projects focusing on the Nacala Corridor Railway and Port project, presenting the PEST method for assessment of these risks.

Risk identification is the process of identifying factors that negatively affect projects success and it is a crucial step in a project risk management process. The objective of risk identification is to identify all potential risks and develop solutions for elimination or minimization of important risks.

PEST is an acronym for four words: political, economic, social, and technical. PEST analysis is a widely used tool for analysing strategic risks. PEST can be used to identify changes in the external macro environment and its impact on the competitive position of enterprises (Sammut-Bonnici, T., & Galea, David).
2. Development of relative research

2.1. Risk identification methods in PPP projects

Cause-effect diagram, brainstorming, breakdown structure, project analogy, checklists and Crawford slip are some of the widely used risk identification methods. Regarding the literature, developing a risk checklist by using a hierarchical structure is the mostly recommended technique in order to classify risks according to their sources and it facilitates dealing with risks logically by provide a clear risks visualization (Bing et al. 2005, Li et al. 2002). Different projects have different risks, and there is no standard procedure to identify risks in construction. Therefore, risk identification is a complex task. (Hlaing et al. 2008). It relies strongly on the skills and judgment of the key project personnel. Ezeldin and Orabi (2006) pointed out that risk identification is mainly based on historical data, past experience and judgment, personal preferences and information held.

2.2. Risk identification in transport PPP projects

Although PPP seems to be more suitable for transportation projects, there are always disputes between the partners, causing the transportation project to fail (Engel, Fischer and Galetovic, 2010). Among the challenges met with PPP implementation in transportation projects is the increased cost of the transaction, prolonged procurement process, lack of suitable skills, unappealing financial market, incomplete risk transfer and increased end-user charges (Grimsey and Lewis, 2007). The major risks for transport projects in the operation stages are relate to technology, traffic/revenue risk, regulatory and legal changes, interest rate and foreign exchange risks, force majeure risk, and political risk that the project may be exposed to (Trujillo, Estache and Quine, 2002).

2.3. Risk identification in Railway and Port PPP projects

2.3.1. Categorization of risks under PEST framework. As a result of a comprehensive literature survey, this paper identified a number of potential risk and their factors in the Nacala Corridor railway and port PPP project, and categorized these risks by using the PEST framework by organizing the broad range of risks, encompassing Political, Economic, Socio-Cultural and Technical risks.

Political risks (P): Political risk has been defined as the risk resulting from the adverse risk of Government intervention, discrimination, seizure, expropriation of the project or as a result of political decisions associated with the industry and governing laws that could result in reduced returns, major losses or managerial control. It includes political stability, employment laws and competition regulations.

Economic risk (E): Comprises pre-investment, tools revenues, financial, costs overrun risks resulting in a drop in revenues or project financiers suddenly pulling out. Economic risks are due to the uncertainty of costs and revenue generation.

Socio-cultural risk (S): Can direct or indirect effect on the society or the user of the facility. It also includes the relationship risk between the parties involved in the contract, moral hazard, and the equal participation of different groups of the society.

Technical risk (T): Includes risk related to differing site conditions, traffic control, public access, weather issues, etc. Technical risks arise from lack of new technology, defect in design, manufacturing and engineering.

2.3.2. The Nacala corridor railway and port PPP project risk identification. The Nacala Corridor PPP project is a new railway linking Moatiz’s coal mining area to the port of Nacala in the city of Nacala, Mozambique. The 912- mile railway runs from Nacala to the border between Enter Lagos and Malawi. The project provides convenient transportation for the less developed and remote northern regions of Mozambique and inland Malawi, enabling the export of rich mineral resources including coal, iron ore and other minerals in the Tete region of Mozambique. The Project also includes the construction of a
deep-sea port and associated terminal infrastructure at Nacala city (Synergia socioambiental report, 2016). The risks involved in this project are categorized in the PEST framework as follows:

**POLITICA (P):**

*Political Decision-making and Change in law:* The Nacala port and railway project has a concession period of 20 years. The PPP concession period was granted in 2000, and within a very broad scope provided by the previous decree, the PPP was handled on a case-by-case basis, with judicial certainty lower than PPP law. Due to the lack of regulatory agencies, the concession has given concessionaires too much decision-making power, but has not provided a channel for corridor users to file formal complaints or rule on possible disputes between users and operators. Disputes on matters such as terminal handling charges, rail freight tariffs, and service levels were affected by this concession and this led to risks of low productivity. On August 10th, 2011 the Republic Bulletin published the Degree N° 15/2011, the Law establishes that each government department shall be responsible for the PPPs in their respective departments, and shall supervise their PPPs while taking care of the interests of users to ensure that the project is sustainable and that the contracting parties have economic and financial balance. Thus some problems with the previous degree was addressed by the recently degree. But the law still suffers from other weakness, for example restrictions on open transparency (only certain clauses of the contract are published), coupled with the institutional fragility of the bureaucracy, may lead to the possibility of system corruption.

**ECONOMICAL (E):**

*Financial performance, Costs Overruns, Revenue:* Despite the positive financial performance of the CDN-managed Nacala port, which has achieved increased throughput over the past five years, the port still needs to address financial performance issues. Compared with other regions in Asia, Europe, and North America, the port of Nacala has higher terminal loading and unloading fees, but is in line with other ports in sub-Saharan Africa. In fact, the terminal loading and unloading charges at Nacala Port are lower than those of more efficient South African ports such as Cape Town, Durban and Port Elizabeth. Nacala Port seems to reduce port productivity and increase logistics costs due to factors affecting container costs, such as auxiliary costs for weighing, scanning containers, inefficient operations such as container outages, and prolonged storage time, rather than issues such as storage, the unit cost of the terminal, container movement.

Another concern is trade facilitation. Traders report that import procedures at the port are inefficient. Moreover document requirements are excessive, and official fees are high. Another issue brought up by traders and freight forwarders at the Nacala Port is during the customs clearing process of imports and exports, traders originally had 90 days to register in the contra marker system. Customs Authority reduced this to 25 days and did not communicate the change publicly. Customs charged late penalties to traders, amounting to 5% of the value of shipment. This adds additional and unexpected costs to value chains using the Nacala Corridor.

*Demand:* Overcoming the many challenges, CDN will face a number of near- to medium-term challenges to improve the performance. The demand for additional storage in or near the port will require a huge investment, and the demand of railways and port high maintenance costs.

**SOCIO-CULTURAL (S):**

*Public opinion, Environmental and Social and Moral hazard:* Socio-cultural negatives impacts from the development of the project Nacala corridor railway and port project comprise construction phase and operational phase. Impacts related to the construction phase comprise inadequate expectations for the project and formation of contrary public opinion resulting from the dissemination of information and Conflict of Interest, losses and compensation, due to the indemnification for the possible loss of structures and other assets and removal of sacred elements. Operational phase comprise human health or the environment such as, air quality, noise emissions and safety due to the passage of the train.

*Environmental justice:* A few people affected by the project have taken legal action against the concessionaire or its contractors. Some cases have been resolved through negotiations. Some have been fired for non-prosecution, while others remain pending. As of November 2015, a total of nine
court cases have been initiated. One of these is a group case initiated by 89 people. Most of the people with pending court cases claim dissatisfaction with the compensation amount paid.

**Partnership:** As the FMC’s equity partner and agent of the Mozambican government’s concessions for the Port of Nacala and the northern CDN railway, CFM has been in an inevitable conflict of interest and policy decision to try to regulate the CDN but also to participate in commercial operations. Potential conflicts of interest have also emerged in several other concession arrangements, in which CFM plays a dual role as a technology supervisor and equity partner.

**THEchnOLOGICAL (T):**

*Project Management and Force majeure:* The concession to operate the Nacala Port and Railway for a period of 20 years was awarded in 2000 to CDN-CEAR with shareholding split between SDCN (51%) and CFM North (49%). However, due to the poor performance of the initial investors, the concession did not perform well and began to get traction only in 2007, this resulted in the first significant shareholder change in 2009.

*Design and Construction:* The Nacala port is not congested at the moment, both in terms of the marine and the land (road/rail) access to the port. However, the total port area between 25 ha and 40 ha, is considered small, with limited space for expansion, storage and logistics activities, for example to length the rail sidings to accommodate full train lengths, provision of a truck holding area or construction of a chipping plant and export facility.

In the case of the rail line, the poor conditions of some sections of the network are constraining the rail freight logistics. Because of the harsh condition of the Cuamba-Lichinga section, which is some 267km and the Cuamba-Entre Lagos section 77km, the speed of this section of the railway was reduced to below 25 kilometers per hour on average. When conditions are good, the maximum average design speed for this section is 60 kilometers per hour.

*Technology:* A major concern is the modernization. The Port of Nacala and the corridor railway sector logistics are constrained by a numerous problem, among which include physical infrastructure, lack of equipment’s and lack of skilled labor. The cargo-handling system at the container terminal, the Nacala Port lacks lifting equipment to improve its operational efficiency. In addition, the port has been relying on the equipment on board, which has severely limited the port’s capacity and has been unable to increase productivity. In the other hand, a continuing problem affecting the efficiency of Nacala's railway logistics is the lack of rolling stock and equipment, as well as train operation technology. These restrictions result in low service levels, insufficient services, slow speeds, long transit times, low productivity, poor availability and utilization of locomotives and trucks, and ultimately low traffic and traffic diversions.
Table 1. The Nacala corridor railway and port PPP project risks categorization and descriptions under PEST framework

| PEST       | Risks factors          | Descriptions                                                                 |
|------------|------------------------|-------------------------------------------------------------------------------|
| **Political** | Change in Law          | Unfavourable changes of policy, Legislation changes.                         |
|            | Protectionism          | Poor legislation.                                                             |
|            | Political Decision making | Host-country's interference in choosing subcontractors, Lack of political stability, Prejudiced and unfair process of awarding the project. |
| **Economical** | Demand                | Fall to Demand (high bidding cost, High design and construction costs; High maintenance cost). |
|            | Financial              | Resource or Input; Insurance; Inflation.                                     |
|            | Costs overruns         | Exchange and interest rate; Currency.                                        |
|            | Revenue                | Insufficient performance during Operation.                                   |
|            | Public opinion         | Public opposition of environmental or social Impacts are questionable.        |
| **Socio Cultural** | Moral hazard          | Good faith in the contract.                                                  |
|            | Environmental and Social | Effects on human health or the environment like noise, air quality; Public interest incorporation. |
|            | Environmental Justice  | Legal action against the Concessionaire.                                     |
|            | Partnership            | Lack in performance of an individual and/or organizations, Lack of a Regulatory Structure, Early termination (including any compensation). |
| **Technological** | Project Management      | Poor operation performance, Maintenance.                                    |
|            | Design & Construction  | Construction schedule overrun; Design latent defect; inaccurate geological and geotechnical exploration. |
|            | Technology             | Application of innovative and unfamiliar processes; Application of innovative and unfamiliar technology; Lack of skilled workforce and personnel. |
|            | Force majeure          | Natural hazards.                                                             |

3. Summary
This paper through the analysis of many researchers works, projects documentation, case studies, and literature related to transportation infrastructures PPP projects (completed/on-going) of some developing and developed countries, mainly put forward the corresponding risk identification process and identified potential risks associated with transportation PPP projects focusing on the Nacala corridor railway and port project. The study proposed the PEST framework for risk identification, which in terms of its objective measurement make it suitable for assessing systematically the risks in transport infrastructures PPP projects, and better promote the further development of Mozambique economy.
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