

Benefits, Constraints and Risks in Infrastructure Development via Public-Private Partnerships in Zambia

*Sydney Ngoma, Muya Mundia and Chabota Kaliba

Abstract: Zambia, like many other countries, has embraced public-private partnerships (PPPs) as a project delivery method. The country faces budgetary constraints, which has caused the maintenance and provision of new infrastructures to be a challenge. PPPs appear to create opportunities that stimulate investment in infrastructure development and economic growth. The goal of this study was to highlight the benefits, constraints and risks inherent in implementing PPP construction projects in Zambia. Using a questionnaire survey to collect data, the study identified the benefits and confirmed the prevalence of constraints and risks in the implementation of PPP construction projects in Zambia. The major benefits, constraints and risks were identified and ranked. There was agreement among survey respondents regarding the ranking of benefits, constraints and risks regarding construction projects in Zambia. Appropriate improvements to the regulatory framework were recommended for the PPP procurement approach to be successfully utilised and implemented in Zambia.

Keywords: Public-private partnerships, Benefits, Constraints, Risks, Zambia

INTRODUCTION

Zambia, like many other developing countries, is striving to meet its infrastructure development requirements. The country has been facing serious funding constraints in implementing projects backed by public finances (Muleya and Zulu, 2009). Through the implementation of the Public-Private Partnerships (PPP) Act No. 14 of 2009, it was expected that public and private sector players would collaborate in the procurement of public infrastructure projects (Mukela, 2007). The increasing implementation of PPPs in both developed and developing economies suggests that Zambia could benefit from this construction project delivery approach.

In the early 1990s, the Zambian government embarked on economic reforms as part of structural adjustments aimed at achieving development and economic growth (Mukela, 2007). Although there had been projects in the past that were procured via the PPP mode, it was inevitable that there would be an increase in the use of this construction project procurement approach (Muleya and Zulu, 2009).

Infrastructure and Development Reforms in Zambia

From the time Zambia achieved independence in 1964 until the mid-1970s, its government was able to provide infrastructure and related services primarily because of the favourable trends in the global economy. When copper prices declined in the early 1970s, Zambia's export earnings declined. This decline resulted in macroeconomic instability caused by an enormous balance of payment deficits (World Bank, 2002; Muleya and Zulu, 2009).

Department of Civil and Environmental Engineering, University of Zambia, Lusaka, ZAMBIA
*Corresponding author: sydngoma@yahoo.co.uk

In the early 1990s, the Zambian government initiated economic reforms that led to liberalisation and a market driven economy. The privatisation of government owned enterprises was one of the primary actions taken during this period. Despite the reforms, the government remained responsible for providing infrastructure and related services (Mukela, 2007).

Mukela (2007) stated that in 2004, the government of Zambia recognised the need to provide infrastructure and other public services through PPPs. Although various forms of PPPs had been implemented previously, there was no structured legal policy framework at the national level. As such, a number of challenges, primarily relating to contractual obligations, were experienced in the implementation of PPP infrastructure projects. The PPP option provided a more appropriate compromise that allowed the government to maintain statutory and regulatory oversight on the nation's assets while allowing the private sector to provide resources and a more efficient management of the delivery of infrastructural projects. Henceforth, the government of Zambia actively engaged the private sector on issues affecting the nation's economic development (Zambia Development Agency, 2010).

Infrastructure Deficit

The need for initiatives to increase investments in infrastructure to support economic growth in the Common Market for Eastern and Southern Africa and the Southern Africa Development Community (SADC) has been acknowledged by governments in the region. For example, the Zambian government has demanded SADC member countries to re-double their trans-boundary infrastructure investment efforts to support regional economic growth and integration (*Times of Zambia*, 2008).

Table 1 provides the implementation of PPP projects in the SADC region, with South Africa having implemented the largest number of projects between 1990 and 2009; Zambia only had six PPP projects within the same period (Muleya and Zulu, 2009). The table indicates that Zambia did not extensively explore this option of infrastructure development and, hence, had the potential to attract private sector investments. With the enactment of the PPP Act No. 14 of 2009, a gateway was opened for the private sector to consider collaborating with governments in infrastructure development.

Infrastructure provision, including services such as water and sewage treatment, energy, transport, information and communication technology, logistics and financial services, is particularly important to the facilitation of trade and the maintenance of public health (Grimsey and Lewis, 2002). These types of infrastructural services are generally less available in Sub-Saharan countries compared to other regions of the world (Hammami, Ruhashyankiko and Yehoue, 2006). However, they are needed more in this revenue-constrained region (Grimsey and Lewis, 2002). Table 2 identifies priority areas for infrastructure investment in Zambia. The government has been looking at private partners to fund the identified projects (Mashamba, 2009).

Table 1. Comparative Data of PPPs in SADC Countries

Country ¹	GNI	No. of PPP Projects	Total Investment (USD Million) ²
South Africa	5390	32	25341
Tanzania	350	21	2115
Mozambique	340	15	2241
Mauritius	5450	11	549
Madagascar	280	9	216
DRC	130	7	915
Malawi	170	6	133
Zambia	630	6	944
Zimbabwe	–	5	841
Namibia	3230	5	104
Angola	180	5	834
Lesotho	1030	3	114
Seychelles	8650	3	94
Botswana	590	2	247
Swaziland	2430	1	53

¹ Selected countries

² Estimated figures in million dollars

Source: Muleya and Zulu (2009)

Table 2. Priority Areas in PPP Construction Infrastructure Investment in Zambia

Sector	Projects
Roads	Road Sector Investment Plan (Road SIP) with a total investment of USD 1.6 billion over a 10 year period (2004–2013)
Energy	Upgrading of hydro power stations and erection of new ones; Build new thermal power station in Mamba
Sports infrastructure	Rehabilitation of independence stadium and build a new stadium in Ndola, Lusaka and Livingstone
Health	New cancer research center in Lusaka and other district hospitals and clinics; Nursing schools
Housing	Housing project for public and private sector workers
Water and sewage disposal infrastructure	Rehabilitation and construction of water dams and water reticulations systems
Roads	Construction of Kitwe-Chingola (52 km) and Chingola-Solwezi road dual carriage ways (173 km)
Railways	Construction of the Chingola-Solwezi Railway link, rehabilitation of the TAZARA ¹ rail line and revamping of the Njanji Commuter train system in Lusaka, the capital city

(continued on next page)

Table 2. (continued)

Sector	Projects
Border posts	Construction of new border posts at Nakonde, Kasumbalesa and other border posts
International airports	Upgrading of Lusaka and Livingstone International Airports ²
Multi-Facility Economic Zones in Lusaka and Chambeshi	Construction of multi-facility economic zones in Chambeshi and Lusaka South

¹Tanzania-Zambia Railway Authority

²The names of the airports have been changed to Kenneth Kaunda and Harry Mwaanga Nkumbula International Airports respectively

Source: Mashamba (2009)

LITERATURE REVIEW

Because the public sector's capacity to provide necessary development projects is reduced due to funding constraints, most developing countries are looking to the private sector to help deliver the required infrastructure. Fedderke and Bogetić (2006) suggested that the influence of infrastructure is both direct, through capital accumulation and indirect, through total factor productivity gains. Allard and Trabant (2007) cited a number of benefits of PPPs: higher quality, reduced cost and on time delivery, risk transfer, better private sector management experience of otherwise complex projects and private sector innovation in planning for maintenance. Bracey and Moldovan (2006) noted that the use of PPPs allows the public sector to transfer risks to the private sector. However, they also noted that the allocation of risks should be in such a way that both public and private sectors benefit from the project. The risks of PPP projects in developing countries are a major determining factor for private sector participation, especially for the involvement of foreign companies. Although the use of PPPs has been generating interest in developing countries, the use of this approach worldwide appears to have declined as investors discover that the risks associated with this method are often costly (Bracey and Moldovan, 2006).

It has been understood that PPPs are not the panacea for the delivery of all services. There are risks in proceeding with PPPs without critically examining their suitability to specific circumstances. However, the public can realise significant benefits when PPPs are used in an appropriate context.

Constraints and Risks of PPP Construction Projects

Risk is a concept that is understood but not easily defined (Coyle, 2002). It may be associated with the possibility that something harmful or damaging could occur if events go wrong, or it may relate to taking a chance where the outcome could be either favourable or adverse. Risk can also be linked to the fact that the actual outcome of an event may differ from what was expected or planned. Therefore, risk may be associated with the uncertainty of the outcome of prospective actions (Shen, Wu and Ng, 2001).

In the construction context and processes, constraints, however, primarily affect productivity (Chua, Shen and Bok, 2003). A constraint is generally defined as

anything that limits a system from achieving higher performance when measured against its "goal" in respect to continuous improvements in organisations (Goldratt, 1990). Thus, a constraint in construction is regarded as an inhibiting condition, agency, or force that limits a system's performance in a given context or environment (Mayer, Painter and Lingineni, 1995; Whelton, Penneanen and Ballard, 2004).

One of the most important drivers for value-for-money in the implementation of PPP projects is risk transfer. It implies that appropriate risks can be transferred to the private sector, which is better placed to manage them (Hayford, 2006). An optimal allocation of risk is one of the objectives of all PPPs and the value of transferability needs to be rationalised (Grimsey and Lewis, 2002; Li et al., 2005a; Tang, Shen and Cheng, 2010; Zhang, 2005). Unfortunately, risk transfer is often handled poorly in PPP projects (Ng and Loosemore, 2007). Menendez (1998) noted that in the development of PPP construction projects, four primary types of constraints and risks, which are outlined below, often need to be overcome.

Political-bureaucratic constraints and risks

The fragmented decision-making caused by the involvement of multiple public agencies and the prevalent emphasis on administrative procedures rather than on strategies and results that stem from the traditional, lengthy tendering processes pose constraints to the PPP environment. In PPP projects, political risks, such as the discontinuation of concessions, tax increases, inappropriate tariff implementation and increases, and enforcement of new government policies, need to be managed (Demirag, Khadaroo and Stapleton, 2011; Nur, 2005; Abednego and Ogunlana, 2006).

In the Zambian PPP Act, the issues listed above do not appear to have been addressed. While the act stipulates the administrative procurement procedure, it does not provide specific project strategies and expected results from the PPP process. Furthermore, the management and monitoring of PPP projects under a public institution (Ministry of Finance and National Planning) as stipulated in the Zambian PPP Act is likely to be unsuccessful in delivering the intended PPP results. This is a risk to project delivery because it does not protect concessions against changes in political leadership and orientation.

Regulatory constraints and risks

Ambiguous responsibilities among independent agencies and ministerial units, unclear procedures and lack of or deficient framework for the resolution of disputes affect the regulatory environment. These constraints must be overcome to provide transparent procedures for the delineation of market-competition, tariff-setting and any other legal issues related to the regulation of the general framework for project implementation and operation along with any revisions to such procedures (Menendez, 1998).

The Zambian PPP Act of 2009 does not provide a favourable regulatory environment, which can be seen by the absence of adequate technical expertise. Mukela (2007) notes that the study of best practices in the region and, particularly, in a worldwide context revealed several issues that needed to be considered for application in Zambia. The experiences of other countries using

PPPs were worthwhile but did not fully address certain challenges unique to the Zambian environment. One of the major challenges Zambia faces today is the limited technical capacity in both the public and private sectors to administer PPP projects and review policies. The complex and long-term nature of most PPP projects demand skills and understanding beyond that of traditional contract management or administration. Cases in other countries indicate that despite the advancements in PPP implementation, there is a substantial reliance on transaction advisors on most projects due to the range of expertise required in PPP transactions (Enfin Solutions Limited and Vention Africa, 2006).

Financial constraints and risks

Financial constraints and risks stem from public budgetary limits and vague user charge policies, which need to be addressed to achieve sound financial structure for all project phases. There should be an appropriate blend of back-stopping conditions, equity contributions, or other risk-reducing measures, which can help achieve the economic objectives of specific projects for society as a whole (Menendez, 1998).

However, the Zambian PPP Act of 2009 does not provide any financial measures to address such constraints and risks. Although the act provides clauses prescribing the criteria for evaluating financial and commercial proposals, it lacks direction on appropriate PPP finance structures to ensure revenue risk reduction and user affordability of possible charges (Muleya and Zulu, 2009).

Methodological constraints and risks

The methodological constraints and risks stem from frequently limited knowledge of interrelationships between variables, which prevents the clear definition of performance indicators or the estimation of values that are key to the economic and risk evaluation of projects. Overcoming these constraints could refine critical elements of PPP structuring, such as conditions under which a project may be feasible, the likelihood that certain outcomes can actually take place, the value of environmental factors, the ability to adequately define the quality of levels of service, the means of verification of compliance with agreed performance indicators and the specification of remedial actions (Menendez, 1998).

Although the Zambian PPP Act of 2009 empowers the PPP Unit to formulate performance indicators, value for engineering, feasibility conditions, environmental factors and quality levels, it does not define specific methodologies, processes and procedures to help achieve certain goals and objectives.

Risk analysis and management are important parts of the decision making process in a construction company. The construction industry and its clients are widely associated with a high degree of risk due to the nature of construction business activities, processes, environments and organisations (Kartam and Kartam, 2001). In reality, there are many projects that fail to meet deadlines as well as cost and quality targets because of poor risk management (Ng and Loosemore, 2007; Karim, 2011). Furthermore, the PPP experience cannot be simply copied from one country to another because different countries have different practices in terms of culture and policy (Sillars and Kangari, 2004).

According to Muleya and Zulu (2009), the proposed management and monitoring of PPP projects under a public institution as stipulated in the Zambian PPP Act is likely to be unsuccessful in delivering the intended results of the PPP. The unit under the public institution does not have the required capacity to monitor and analyse risks and constraints, including those that are financial and technical and those related to revenue, engineering, politics and innovation. The management of risk and the general procurement process must be addressed further for potential revisions.

Therefore, this report seeks to suggest potential solutions for addressing the deficiency in the PPP statutory and regulatory framework, which would result in maximising benefits while minimising risks and constraints.

Benefits of PPPs

The benefits of PPPs have been widely discussed in the literature (Fedderke and Bogetić, 2006). PPPs are used as a mode for infrastructure delivery so that the public sector can consider funding other projects that otherwise would have been previously unaffordable. The PPP model has been widely seen as a promising avenue for infrastructure development in developing countries (Public Private Partnership Act 2009). According to Harris (2006), the potential PPP benefits are listed below:

1. Cost savings

The close interaction of designers and constructors in a team results in more innovative and less costly designs. The overall costs for professional services, such as those for inspections and contract management activities, can be reduced. Furthermore, the risks of project overruns can be reduced by design-build contracts. Private partners may be able to reduce the cost of operating or maintaining facilities by applying economies of scale, innovative technologies, procurements and compensation arrangements that are more flexible, or by reducing overhead costs.

2. Risk sharing

Public and private sectors can share risks at different stages (Shen, Platten and Deng, 2006). Both parties may bear certain risk outcomes via a risk allocation mechanism (Li et al., 2005b). These transference mechanisms normally leave the public sector with minimal and manageable risks (Merna and Dubble, 1998). Project risks can include cost overruns, inability to meet schedules for service delivery, difficulties in complying with environmental and other regulations, or revenues that may be inadequate for paying operating and capital costs. As the private sector brings commercial discipline into public projects, the risk of cost overruns and project delays can be drastically reduced (Li et al., 2003; Ho, 2006).

3. Improvements or maintenance of existing levels of service

PPPs can introduce innovation in the way service delivery is organised and implemented. They can also introduce new technologies and economies of scale that often reduce the cost or improve the quality and level of the services. PPP projects are more often efficiently managed than those run by government agencies (Klein and Roger, 1995).

4. Enhancement of revenues

Because payback on PPP infrastructure projects depends on user fees, the true cost of delivering a particular service can easily be determined. This information offers the opportunity to introduce more innovative revenue sources that would not be possible under conventional methods of service delivery.

5. More efficient implementation

Efficiency may be achieved by combining various activities, such as design and construction, more flexible contracting and procurement, quicker approvals for capital financing and more efficient decision-making process.

6. Economic benefits

The increased involvement of the public in PPPs can help stimulate the private sector and increase employment and economic growth. Local private firms that become proficient in working on PPP infrastructure projects can "export" their expertise and earn income outside the boundaries of their own countries or regions of origin. The growth estimates presented in the Zambian national budgets indicate that there has been positive growth in the construction industry, e.g., 20.5% in 2004, 19.9% in 2005, 14.4% in 2006 and 13.3% in 2007 (Ministry of Finance and National Planning, 2008).

Thus, in establishing the policy framework for PPPs in Zambia, the government has created a platform for business to be undertaken with broadened options. By being business partners, the public and private sectors become important to each other's success and sustainability (Mukela, 2007).

STUDY METHODS

The methods used in this study included literature review, structured interviews and a questionnaire survey. The literature was reviewed in terms of the content and methods used by investigators. The interviews were conducted prior to the questionnaire survey. The purpose of the interviews was to obtain preliminary

information to incorporate into the questionnaire survey. The questionnaire survey was the primary data collection method and was used to generalise research findings.

The questionnaire method was used because a large coverage of the population being studied was realised within limited costs and time. A letter accompanied the questionnaire that guaranteed anonymity so that honest responses could be obtained. During data analysis, the results were stratified to eliminate any biases that could arise from any specific group of professionals in the construction industry.

The questionnaire consisted of two sections. The first section elicited information about the respondents; in the other section, their perceptions on the relative importance of factors identified from interviews and literature to the development and up-take of PPP construction projects in Zambia were noted. The questions in the second section of the questionnaire were based on a 5-point Likert scale. The Likert scale approach was selected because of its advantage in eliciting the extent of a respondent's agreement or disagreement with a statement and facilitating the generation of hierarchies of preferences for different categories of respondents in the sampled population, which can be compared (Siegel and Castellan, 1988). The target population consisted of respondents from government ministries and departments as well as private companies that included consultants and contractors actively involved in the implementation of PPPs in the construction industry at the time of the survey. The lack of an existing database of participants in PPP infrastructure projects necessitated the use of non-random sampling techniques. The respondents were identified through purposive and snowballing sampling techniques.

To implement this study, interviews were conducted between January and March of 2011 to obtain perspectives on the performance of PPP construction projects. The findings from both literature review and interviews were incorporated into a questionnaire survey that was administered to respondents between March and June of 2011.

The self-administered questionnaires were administered either electronically via email, delivered via post or distributed physically by hand. The responses were collected electronically through return emails, post or by hand. Fifty questionnaires were distributed and 36 were received, which led to a response rate of 72%. The targeted population was small because at the time of the study, few players in the Zambian construction industry had experience in PPP construction projects. The questionnaire sought to confirm, through a triangulation of findings, the constraints and risks to the implementation of PPP construction projects identified from literature and interviews. Furthermore, the questionnaire sought to confirm benefits arising from the implementation of PPP construction projects identified from literature and interviews.

DISCUSSION OF QUESTIONNAIRE RESULTS

Profile of Respondents

The respondents were consultants, contractors and financiers of PPP construction projects in either the public or private sector of the industry or from client

organisations. The data obtained indicated that 55% of the respondents worked for client organisations, 15% worked for consulting firms, 25% worked for contractors and 5% worked for financiers. The respondents' years of experience in PPP construction projects ranged from 0 to 10 years, with over 50% having more than five years of experience. 62% of the respondents had worked on PPP construction projects with values exceeding USD 10 million while 25% had worked on projects that cost less than USD 5 million. The remaining group had worked on projects with values between USD 5 million and USD 10 million. The level of exposure exhibited by the respondents suggested that a high degree of reliability could be derived from the findings.

Statistical Analysis

Twenty-three potential constraints of implementing PPP construction projects identified from the literature and confirmed during interviews were compiled and evaluated in the questionnaire survey. Additionally, 24 potential risk factors for project delivery and benefits grouped in five key areas were identified and evaluated in the questionnaire survey.

The data collected were analysed using statistical methods. The reliability of the five-point Likert scale used in the survey questionnaire was tested for internal consistency using the Cronbach's coefficient, α . Values of $\alpha \geq 0.7$ are an acceptable indication of the reliability of the scale (Siegel and Castellan, 1988). A value of α equal to 0.7458 was obtained, thus confirming the reliability of the scale.

An overall ranking of the constraints, by both public and private sector respondents to the delivery of PPP construction projects, was obtained using the mean score (MS) method (ibid.). To determine the ranking for each factor using the 5-point Likert scale, a 1 was assigned as "least important" and a 5 was assigned as "most important". Then, the factor rankings were arranged in descending order of importance. The MS for each constraint was computed using the following formulae (Siegel and Castellan, 1988):

$$MS = \frac{\sum (f \times s)}{N}$$

where $1 \leq MS \leq 5$

MS = mean score,

f = frequency of response to each rating (1–5) for each constraint,

s = score given to each constraint by the respondents, ranging from 1 (least important) to 5 (most important) and

N = number of responses to that constraint.

In the case of a tie, the criterion for ranking was obtained based on the percentage of respondents strongly agreeing to the identified constraint.

The Mann Whitney U test, which generated p values, was used to determine whether there was a significant difference between the mean ranks for the constraints of implementing PPP construction projects between the public and private sector respondents. A p value lower than 0.05 indicated that there was a difference in perceptions between the two groups of respondents regarding the identified constraint (Siegel and Castellan, 1988).

To complement the Mann Whitney U test, a Spearman rank correlation coefficient (rs) test was performed to measure the level of agreement between the two respondent groups on their ranking of constraints in the implementation of PPP projects in Zambia. The association of the respondents in the rankings was indicated by rs values being significant at levels of 0.05 or less, i.e., for rs values greater than 0.05, there was no significant disagreement between the two respondent groups on the ranking of the constraints in implementing PPP construction projects (Siegel and Castellan, 1988).

Analysis of Constraints in the Implementation of PPP Construction Projects

Twenty-three constraints were ranked by respondents from the public and private sectors and compared. The constraints were evaluated to determine their relative importance as perceived by both public and private sector stakeholders in the Zambian construction industry. Figure 1 presents the identified constraints based on the comparison of MS values.

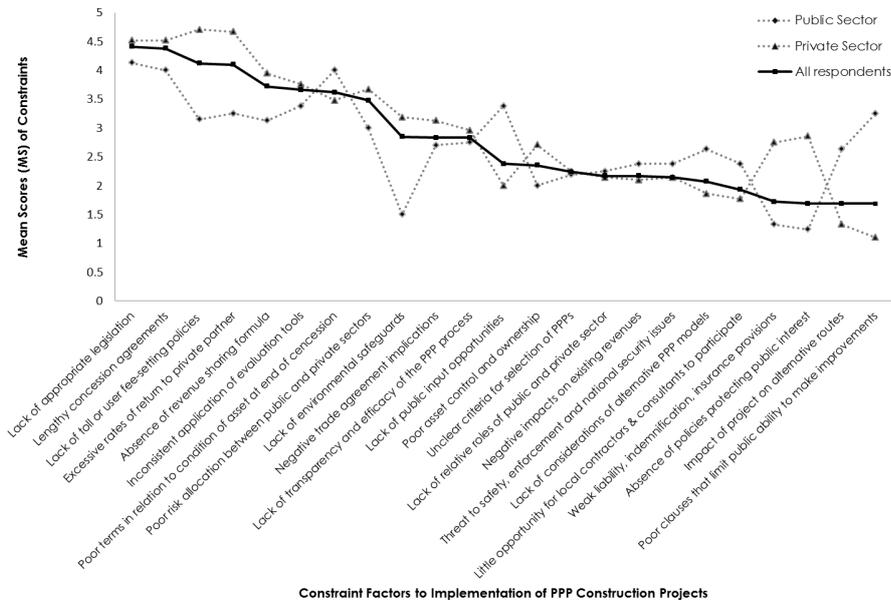


Figure 1. Rating of Constraints to Implementation of PPP Construction Projects Based on Comparison of Mean Scores

Any factors with MS values greater than 3.40 were considered significant, which was based on the interpretation that these factors had over a 75% chance of impeding project delivery. On that basis, factors with MS values less than 3.40 were eliminated; hence, eight constraints remained on the list. As indicated in Figure 1, the top eight constraints of implementing PPP construction projects are given as follows: lack of appropriate legislation, lengthy concession agreements, lack of toll or user fee-setting policies, excessive rates of return to private investors, absence of revenue-sharing formulae, inconsistent application of evaluation tools,

such as value-for-money and benefit-cost analysis, poor terms in relation to the condition of assets at the end of the concession and poor risk allocation between public and private sectors.

Factors relating to fewer opportunities for local contractors and consultants to participate, weak liability, indemnification, insurance provisions, absence of policies to protect public interest, impact of projects on alternative routes and poor clauses that limit public ability to make competing improvements were considered insignificant in constraining the implementation of PPP construction projects. However, it did not mean that these constraints were absent from the Zambian construction industry.

A Spearman's correlation coefficient r_s of 0.451 was obtained. This implied, with 99% confidence, that there was agreement regarding the ranking of constraints in implementing PPP construction projects between the public and private sector respondents.

The Mann Whitney U test generated a p value of 0.054, which confirmed that perceptions regarding constraints between the public and private sector respondents were the same. The results suggested that both public and private sectors were sensitive to shortcomings in the regulatory, risk management, financial and economic environments.

Analysis of Risks in the Implementation of PPP Construction Projects

Twenty-four risk factors were ranked by the respondents from the public and private sectors and compared. The risks were later evaluated to determine their relative importance as perceived by the public and private sector respondents in the Zambian construction industry. Any factors with MS values greater than 3.40 were considered to be significant, which was based on the interpretation that these factors had over a 75% chance of inhibiting project delivery. For this reason, factors with MS values less than 3.40 were eliminated; hence, five major constraints remained on the list.

As shown in Figure 2, the results indicated that the top five risks prevalent in the implementation of PPP construction projects in Zambia were as follows: stakeholder project approval, corruption, inflation, environmental considerations and lack of experience in PPP arrangement. A test on whether there was agreement between the public and private sector respondents regarding the ranking of risks to the implementation of PPP construction projects using Spearman's correlation coefficient produced an r_s value of 0.463. Therefore, there was no significant disagreement between the public and private sector respondents regarding the ranking of the risks in implementing PPP construction projects. This implied that, with 99% confidence, there was significant agreement regarding the ranking of risks in implementing PPP construction projects between public and private sector respondents. The Mann Whitney U test p value of 0.063 confirmed that the perceptions between public and private sector respondents regarding constraints were not significantly different.

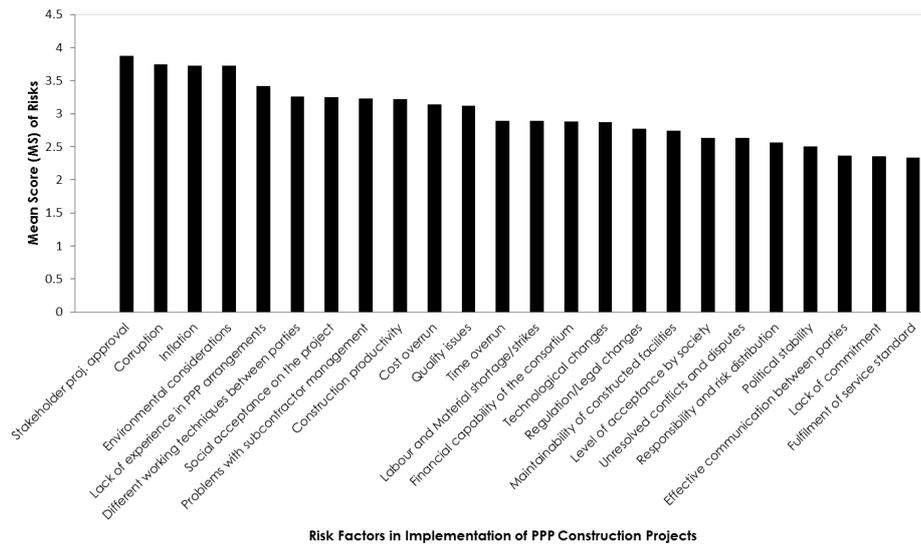


Figure 2. Ranking of Risks to Implementation of PPP Construction Projects

Analysis of Benefits to the Implementation of PPP Construction Projects

Five benefits were ranked by the respondents from the public and private sectors and compared. The benefits were evaluated to determine their relative importance according to public and private sector stakeholders in the Zambian construction industry. The benefits with MS values greater than 3.40 were considered to be significant, which was based on the interpretation that these factors had over a 75% chance of supporting improved project delivery. Figure 3 presents the results of tests on the benefits of implementing PPP construction projects.

The benefits were considered to be significant because the MS values of the reductions in the risk of handling, improvements in the levels of services, provisions of economic benefits, savings in construction related costs and increases in infrastructural provision were greater than 3.40.

These benefits can be termed as success factors. Rockart (1982) defined success factors as "those few areas of activity in which favourable results are absolutely necessary for a manager to reach his or her goal". These benefits are essential to allow project management to be successful (Alinaitwe, Ayesiga and Rugumayo, 2012; Rockart, 1982).

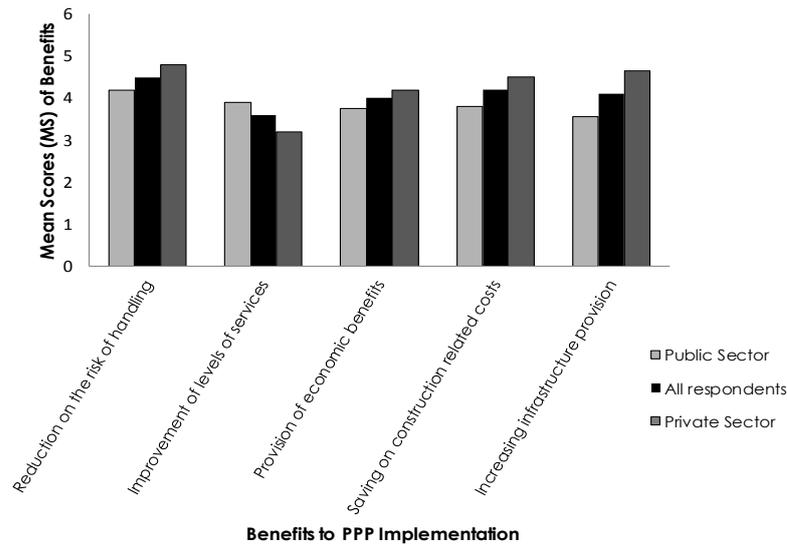


Figure 3. Ranking of the Benefits to Implementation of PPP Construction Projects

CONCLUSIONS

Although the implementation of infrastructure development through PPPs could be beneficial, constraints and risks are always potential obstacles to project success. The goal of this report was to discuss a few of the challenges faced in using PPP as a mode of delivering infrastructure projects in Zambia. The use of PPP has potential benefits in that it provides an opportunity for the public sector to consider projects that would have otherwise been too costly to procure. The Zambian government's initiative to encourage private participation in infrastructure development is in the right direction. However, several issues need to be addressed to create successful and beneficial PPP construction projects. The aspects identified above are based on lessons learnt from international practice and general PPP guidance. These aspects have been compared with the studied scenario in Zambia.

The benefits, constraints and risks of implementing PPP construction projects in Zambia were identified in this report. The study established that a reduction in the risk of handling, improvement in the levels of services, provision of economic benefits, savings in construction related costs and increase in infrastructure provision were the most significant benefits. The lack of appropriate legislation, lengthy concession agreements, lack of toll or user fee-setting policies, excessive rates of return to private investors, absence of revenue-sharing formulae, inconsistent application of evaluation tools, poor terms of conditions of assets at the end of the concession and poor risk allocation between public and private sectors were the eight most significant constraints of implementing PPP construction projects in Zambia. Project approval by stakeholders, corruption, inflation, environmental consideration and lack of experience in PPP

arrangements were the most significant risks of implementing PPP construction projects in Zambia.

RECOMMENDATIONS

To address the issues of constraints and risks of implementing PPP construction projects successfully, the causal factors need to be understood. The results of the study indicated in this report could help PPP project implementers carefully monitor and manage projects by watching for factors with high constraint and risk ratings.

The key areas of legal and regulatory governance, risk management and procurement, and economics and finance should be clearly addressed in PPP construction projects in Zambia. For legal and regulatory governance, the institutional capacity for PPPs needs to be strengthened by establishing an independent "PPP Unit" separate from the existing public procurement agencies. This unit is to provide a platform for advice and best practice guidance on PPPs. The PPP Act of 2009 needs to be revised to include appropriate legislation frameworks related to the length of the concession period, terms on conditions of assets at the end of the concession period, rate of returns, revenue-sharing formulae and user fee-setting policies. This revision will ensure that the country has suitable legal framework.

Furthermore, the operations of the PPP Unit need to be decentralised from the national to provincial level to develop the necessary capacity in the local government. This decentralisation will deal with the lack of project approval by various stakeholders because education programmes will be tailored for specific PPP project environments. This action would further ensure that there is a suitable and supportive authority that would not change regardless of change in political governance. This stability is required because there is a need to consider various options in addressing reforms, especially in view of the different sectors of the economy. Certain reforms may not be applicable or as effective for some sectors; therefore, when designing reforms, governments as well as the private sector should consider the specific reform requirements of each sector. Zambia could learn from other regions that, despite best practices being universally acceptable and adaptable, it is important that these requirements be aligned in accordance with specific objectives, capacity and economic status of a nation. Furthermore, social goals differ from one country to another; thus, reform programmes should be designed to consider existing but varying social needs.

To manage corruption, the Anti-Corruption Act must be strengthened to encourage transparency and improve institutional quality. The PPP Act must be used in conjunction with the Anti-Corruption Act to curb this vice. Furthermore, the legal committee of the PPP Unit must be mandated to reveal specific clauses in the tender and contract documents to reduce bureaucracy.

To curb risks related to inflation, the country's fiscal policies must be strengthened as a way of stabilising the macroeconomic environment. The government must also ensure that the cost of capital is affordable, long-term credit lines with attractive interest rates are available and inflation price are stable. The externalisation of currency and foreign exchange regulations must be well balanced so that investors are not scared away and the local currency is

stabilised. Furthermore, financial institutions must be available to finance PPP construction projects.

When implementing PPP construction projects, the environmental regulations must be considered. Apart from recruiting an environmental expert from the Environmental Council of Zambia in the PPP Unit, all projects must be screened. Only environmental friendly projects must be approved. This restriction would reduce the impact of PPP construction projects on the environment.

Because of the lack of experience in PPP arrangements, more technocrats need to be trained through exchange programmes with other countries dealing in PPPs. Locally, specific programmes should be developed to train individuals in all areas of responsibility in PPP construction projects. Relevant regulatory institutions, such as the Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA), universities and other institutions, should also consider incorporating PPPs in their curricula for construction related academic programs. This addition could help expand the knowledge base and widen opportunities for private investors to engage in public sector projects.

The unit under the public institute does not have the required capacity to monitor and analyse risks, which include financial, technical, revenue, engineering, political and innovation. The management of risk and the general procurement process must be addressed further for possible revision. Therefore, it is imperative that an appropriate risk management structure be devised specifically for the Zambian environment. The use of private finances from the international market will continue to be challenging due to various reasons. However, one of the challenges for private investors will be the guarantee of revenue risks to recoup the investment. Thus, appropriate PPP finance structures need to be devised to ensure that revenue risks are reduced while ensuring user affordability of possible charges.

Although the study described in this report provided valuable insights, the findings were based on the Zambian experience. Further studies are needed to investigate the challenges that plague other countries, especially those in the developing world. Therefore, it is necessary to continuously improve the PPP policy document and research further how the PPP can be best implemented in Zambia to produce the best results.

REFERENCES

- Abednego, M.P. and Ogunlana, S.O. (2006). Good project governance for proper risk allocation in public-private partnerships in Indonesia. *International Journal of Project Management*, 24(7): 622–634.
- Alinaitwe, H., Ayesiga, R. and Rugumayo, A. (2012). Success factors for implementation of private-public partnerships in the construction industry in Uganda. *Proceedings: 4th West Africa Built Environment Research Conference*. Abuja, Nigeria, 24–26 July.
- Allard, G. and Trabant, A. (2007). *Public-Private Partnerships in Spain: Lessons and Opportunities*. Madrid: Instituto de Empresa Business School.

- Bracey, N. and Moldovan, S. (2006). Public-private partnerships: Risks to the public and private sector. Paper presented at *The 6th Global Conference on Business and Economics*. Gutman Conference Center, USA, 15–17 October.
- Chua, D.K.H., Shen L.J. and Bok, S.H. (2003). Constraint-based planning with integrated production schedule over internet. *Journal of Construction Engineering and Management*, 129(3): 293–301.
- Coyle, B. (2002). *Risk Awareness and Corporate Governance*. London: Financial World Publishing.
- Demirag, I., Khadaroo, I. and Stapleton, P. (2011). Risks and the financing of PPP: Perspectives from the financiers. *The British Accounting Review*, 43(4): 294–310.
- Enfin Solutions Limited and Vention Africa. (2006). *Report on the Desk Study to Assess the Capacity of the Private Sector to Engage in Public-Private Partnership Initiatives*. Lusaka, Zambia: Enfin Solutions Limited and Vention Africa.
- Fedderke, J. and Bogetić, Z. (2006). Infrastructure and growth in South Africa: Direct and indirect productivity impacts of 19 infrastructure measures. World Bank Policy Research Working Paper 3989. South Africa: University of Cape Town.
- Grimsey, D. and Lewis, M.K. (2005). Are public-private partnerships value for money? Evaluating alternative approaches and comparing academic and practitioner views. *Accounting Forum*, 29(4): 345–378.
- Grimsey, D. and Lewis, M. (2002). Evaluating the risks of PPP for infrastructure. *International Journal of Project Management*, 20(2): 107–118.
- Goldratt, E.M. (1990). *Theory of Constraints*. Great Barrington, USA: North River Press.
- Hammami, H., Ruhashyankiko, J. and Yehoue, E. (2006). Determinants of public-private partnerships in infrastructure. *IMF Working Paper WP/06/99*. Washington DC: International Monetary Fund.
- Harris, S. (2006). Implementing a PPP programme: Key messages for government. *Proceedings: The International Conference on Public-Private Partnerships*. Manila, Philippines.
- Hayford, O. (2006). Successfully allocating risk and negotiating a PPP Contract. *Proceedings: 6th Annual National Public-Private Partnerships Summit: Which Way Now for Australia's PPP Market?* Rydges Jamison, Sydney, Australia, 16–17 May.
- Ho, S.P. (2006). Model for financial re-negotiation in public-private partnership projects and its policy implications: Game theoretic view. *Journal of Construction Engineering and Management*, 132(7): 678–688.
- Karim, N.A.A. (2011). Risk allocation in public-private partnership (PPP) projects: A review of risk factors. *Journal of Sustainable Construction, Engineering and Technology*, 2(2): 8–16.
- Kartam, S.A. and Kartam, N.A. (2001). Risk and its management in the Kuwaiti construction industry: A contractor perspective. *International Journal of Project Management*, 19(6): 325–335.
- Klein, M. and Roger, A. (1995). Back to the future: The potential in infrastructure privatization. *World Bank Public Policy for the Private Sector, Note No. 30*. Washington DC: World Bank.

- Li, B., Akintoye, A., Beck, M. and Hardcastle, C. (2003). *An Overview of Public-Private Partnership: Managing Risks and Opportunities*. Oxford: Blackwell Science Ltd.
- Li, B., Akintoye, A., Edwards, P.J. and Hardcastle, C. (2005a). The allocation of risk in PPP/PFI construction projects in the UK. *International Journal of Project Management*, 23(1): 25–35.
- . (2005b). Critical success factors for PPP/PFI projects in the UK construction industry. *Construction Management and Economics*, 23(5): 459–471.
- Mashamba, S. (2009). *Developments in the Zambian Construction Industry and the Expected Roles of Our Construction Schools*. Lusaka, Zambia: National Council for Construction.
- Mayer, R.J., Painter, M.K. and Lingineni, M. (1995). Information Integration for Concurrent Engineering (IIICE) towards a Method for Business Constraint Discovery (IDEF9). Texas: Human Resources Directorate Logistics Research Division, Knowledge Based Systems, Inc.
- Menendez, A. (1998). Constraints and opportunities for PPP transport projects. *Proceedings: Seminar on Public Transport: Private Sector Solutions for Investment and Services*. Washington, USA, 5–6 November.
- Merna, T. and Dubley, R. (1998). *Financial Engineering in the Procurement of Projects*. Hong Kong: Asia Law and Practice.
- Ministry of Finance and National Planning. (2008). *Government Republic of Zambia 2008 Budget*. Zambia: Ministry of Finance and National Planning.
- Mukela, M. (2007). *The Significant Other: A Case of Public-Private Partnership in Zambia, Lessons Learned in the Infrastructure Reform Process*. Lusaka, Zambia: Zambia Printers.
- Muleya, F. and Zulu, S. (2009). Delivering infrastructure development using PPP/PFI: A challenge for Zambia. *Proceedings: The 6th Built Environment Conference of the Association of Schools of Construction of Southern Africa (ASOCSA)*. Livingstone, Zambia, 5–7 March.
- Ng, A. and Loosemore, M. (2007). Risk Allocation in the private provision of public infrastructure. *International Journal of Project Management*, 25(1): 66–76.
- Nur, W. (2005). Analisa kelayakan financial proyek jalan tol: Studi kasus jalan tol Cipularang (Feasibility study of toll-road project financing: A case study of the Cipularang-toll-way). PhD diss. Politeknik Negeri Jakarta.
- Rockart, M. (1982). *Factors Affecting Business Growth*. New York: Wiley.
- Shen, L.Y., Platten, A. and Deng, X.P. (2006). Role of public-private partnerships to manage risks in public sector projects in Hong Kong. *International Journal of Project Management*, 24(7): 587–594.
- Shen, L.Y., Wu, G.W.C. and Ng, C.S.K. (2001). Risk assessment for construction joint ventures in China. *Journal of Construction Engineering and Management*, 127(1): 76–81.
- Siegel, S. and Castellan, J. (1988). *Non-Parametric Statistics for the Behavioural Sciences*. New York: McGraw-Hill Book Company.
- Sillars, D.N. and Kangari, R. (2004). Predicting organizational success with a project-based joint venture alliance. *Journal of Construction Engineering and Management*, 130(4): 500–508.
- Tang, L., Shen, Q. and Cheng, E.W.L. (2010). A review of studies on public-private partnership projects in the construction industry. *International Journal of Project Management*, 28(7): 683–694.

- Times of Zambia*. (2008). SADC urged to double infrastructure development, 2 June. Available at: http://www.saidzambia.gov.zm/index.php?option=com_content&task=view&id=53&Itemid=62 [Accessed on 14 April 2009].
- The World Bank. (2002). *Upgrading of Low Income Settlements Country Assessment Report: Zambia*. Available at: <http://web.mit.edu/urbanupgrading/upgrading/case-examples/overview-africa/country-assessments/reports/Zambia-report.html> [Accessed on 14 April 2009].
- Whelton, M., Penneanen, A. and Ballard, G. (2004). Knowledge emergence and adaptive management: An exploration on the co-production of project needs and requirements by client-specialist groups. In A.S. Kazi (ed.), *Knowledge Management in the Construction Industry: A Socio-Technical Perspective*. Hershey, USA: Idea Group Publishing, 251–275.
- World Bank. (2002). *Private Participation in Infrastructure Projects: Country Snapshots*. Available at: http://ppi.worldbank.org/explore/ppi_exploreCountry.aspx?countryID=47 [Accessed on April 2009].
- Zambia Development Agency. (2010). *Public-Private Partnerships*. Available at: <http://www.zda.org.zm/node/211a> [Accessed on 16 June 2010].
- Zhang, X. (2005). Critical success factors for public-private partnerships in infrastructure development. *Journal of Construction Engineering and Management*, 131(1): 3–14.