Public Infrastructure Financing Using EPC (Engineer – Procure – Construct)/Turnkey Contracts

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Abstract:

The majority of public infrastructure developments in most developing countries are financed by donor aid, grants and international bank loans which have created a backlog of debt in the long term. The foregoing system of public financing dubbed the traditional financing system is currently impractical due to the withdrawal of aid assistance by donors as a result of high levels of debt, corruption and mismanagement of funds. The introduced alternative financing models of the "*Build – Operate – Transfer*" (BOT) and the "*Public Private Partnerships*" (PPP) have managed to bridge the realization gap of public infrastructure but to a moderate level due to their exposure to risks. This has therefore result into an investigation of a probable substitute for mega public infrastructure financing that are currently in high demand by the general public to meet their basic needs.

The paper therefore provides an insight on the use of the Engineer-Procure-Construct(EPC)/Turnkey contract financing system as a substitute in delivering vital infrastructural projects. Emphasis is made on the importance of adopting the system, its merits, demerits and its ability of bridging the gaps created by traditional financing method, the BOT and PPP.

The possibility of applying the EPC/Turnkey contract financing system in Malawi construction industry is explored.

Keywords: Project financing, *build – operate – transfer, public private partnerships*, EPC/Turnkey contracts, traditional project financing, mega infrastructure projects, risk management, project management, procurement and sustainability.

1. Introduction and Background

The demand of public infrastructure in developing countries like Malawi is currently on the rise due to urbanization and population growth. Malawi's infrastructure contributes a total of 1.2 percent to the annual per capita growth of its gross domestic product (GDP) (Shkaratan, 2010). The major public infrastructural constituents of the country include the power, water and housing sector, the transportation networks, the information communication and technology (ICT) sector and waste water systems. The demand-supply ratio of public infrastructure since 1964 has drastically increased and reached a state of equilibrium in 1994 when Malawi attained its democracy with a population of 9,725,612 against an infrastructure supply value of \$14.18 Million (NSO, 2008). The demand-supply curve started to decrease with a high demand of public infrastructure with respect to the current population pegged at 17,215,000 as recorded in 2015 against a current infrastructure supply value of \$78.78 Million (NSO, 2015). The foregoing illustrates a population growth of 56.5 percent with respect to an infrastructure growth of 18 percent within a period of 21 years which is low as compared to other developing countries in the world (NSO, 2014). Further to the same, the latter has also been justified further by the World Bank with Malawi being ranked as the 64th fastest population growing country yet it still ranks low on the gross domestic product log currently listed at position number 148 out of 194 countries (WorldBank, 2016).

The traditional trend of financing public infrastructure in Malawi has involved the use of local revenue collected from taxes, donor aid, financial grants and international bank loans. The foregoing trends have been in existence ever since with an extremism on donor aid, grants and loans in the democratic era for financing mega public infrastructures in all sectors as a means of meeting the growing demand. In 2009, a turn around to the public infrastructure financing began when alternatives such as the Build – Operate – Transfer (BOT) contracts and the Public Private Partnership (PPP) were introduced (*Mwanakatwe, 2014*). These current substitutes have proved effective but with risks in project management of public infrastructural projects specifically in areas of feasibility studies, planning, contractual agreements, liabilities and cost benefit returns. The efficiency of the same in terms of development of the country has been questioned that has led to the need to identifying a sustainable substitute for financing public infrastructures in an effective and efficient manner to eradicate the bottlenecks generated by the BOT and PPP.

The Engineer-Procure-Construct (EPC)/Turnkey contract also referred to as the Turnkey contract are general contracts that involve the use of the contractor's in-house resources to plan, design, implement and deliver works to a full functional/operational state upon agreement with the client and its related contractor's financier (*FIDIC, 1999; Huse, 2013*). Unlike the BOT financing agreement that involves the client agreeing on the operational period with the investing contractor, the EPC/Turnkey financing agreement allows the client to fully own the public infrastructure upon final completion and commissioning. In addition, the same agreement allows the investing company (contractor and its financier) to adopt all the liabilities until handover unlike in the PPP financing agreements where risks are shared and all dealings are advantageous to the private partner.

2. Problem Statement and Justification

The realization of major public developmental projects in developing countries like Malawi is highly dependent on the availability of finances in order to bridge the poverty gap. The presence of poor financial management, low turnout of the gross domestic product (GDP), lack of technical expertise(specialization), corruption and political maladministration have created a fundamental breach in the implementation of public infrastructure projects that would have reversed the current poor economy of Malawi (*ASANRA, 2011; Bowen, 2012; Chiocha, 2011; Rwelamila, 1995*). The introduction of Engineer – Procure – Construct/ Turnkey Contracts breaches the financing gap and covers the shortfalls of the current financing substitutes (BOT and PPP) of public infrastructure project by providing both financial aid, specialized human, equipment resources and minimal risks in cost overruns and time delivery.

3. Objectives

The following constituted the main and specific objectives of the research as follows:

3.1 Main objective

The main objective of the research focused on investigating the proposed method of financing public infrastructure as follows:

• To analyze the performance of financing public infrastructure through the effective use of EPC/Turnkey contracts.

3.2 Specific Objectives

In order to strategically achieve the main objective, the following objectives were developed as follows:

- To compare and contrast the current traditional approach to public infrastructure financing from the EPC/Turnkey contract approach.
- To identify the benefits and challenges of using the EPC/Turnkey contract approach in public infrastructure financing.
- To investigate the importance of implementing public infrastructure projects in Malawi using EPC/Turnkey contracts.

4. Research Questions

The following research questions were developed to address the objectives of the research as follows:

- What key strategies have developed countries used in financing public infrastructure?
- What are the current problems being experienced in public infrastructure financing in Malawi?
- What are the characteristics of EPC/Turnkey contracts in relation to effective public infrastructure financing?

5. Literature Review

Public infrastructure financing in developing countries has evolved over the past years due to the presence of poor economic environments. The absence of adequate funds to venture into mega infrastructure projects has become a milestone to social and economic development such that foreign aid has been the only relief point for the same. The debt levels currently for developing countries are very high regardless of the cancellation of same in 2006 by the World Bank and International Monetary Fund (IMF) which has crippled most of the development areas in infrastructure (*IMF*, 2006). The pressure currently exerted by international monetary bodies on the self-development of developing countries and the reduction of their credit facility has resulted into developing countries like Malawi looking for alternative financial means. This has led to alternative measures for financing public infrastructure using either direct private investments, public private partnerships or build-operate-transfer agreements (*Estache, 2015*). For instance, Malawi has developed the Malawi industry and trade center (MITC) and public private partnership

commission (PPPC) as a means of lobbying in private investors to invest in public infrastructure in Malawi. Nonetheless, the presence of unstable economies in Malawi has resulted into most private investors pulling out of their investments and agreements. In addition, elements of high levels of corruption, poor political will, policies, security and mismanagement of funds have created an unconducive environment for investors to trade their businesses (*Elshakour, 2013*).

The Build-Operate–Transfer (BOT) contract is a form of project financing whereby the private entity receives a franchise from the public sector organization to finance, design, construct and operate a facility for a specified period of time after which the ownership is transferred back to the public sector upon recovery of the project costs (*Brady, 2005*). During the time that the project contractor operates the facility, it is allowed to charge facility users appropriate fees and revenue returns all stated in their contract to enable the project contractor to recover its investment together with the operating and maintenance costs (*Kumaraswamy, 2001*). The BOT has therefore become one of the most common project financing techniques in developed countries as its key elements which include the lender's ability on revenue returns and project collateral have minimal involvement with the public sector. Thus, the lenders to the project looks primarily at the earnings of the project as the source from which loan repayments will be made. Their credit assessment is based on the project, not the credit worthiness of the borrowing entity. Furthermore, the lenders look at the security obtained that is largely confined to the project assets. As such, this project financing is often referred to as a "limited recourse" financing due to the fact that lenders are given only limited recourse against the borrower (*Delmon, 2005*).

The BOT project financing structure has therefore proved to be complex to the extent that the risks that are built by the project are usually shared between the various parties with each party anticipating its own risks (*Tiong, 1990*). A preamble risk assessment exercise is usually undertaken before the commencement of the project whereby the sponsor identifies the possible risks, the occurrence and impact on the project and shares them to relevant parties. The sponsor risk management plan is either to bare the whole risks, avert the risks with insurers or share the same among the project parties (contractor and lenders). In addition, in scenarios of project risk sharing and allocation by the sponsor, each project participant must be satisfied with risk allocated, the creditworthiness of the risk taker and the reward received by each party. In this circumstance, BOT

project financing contracts allows for each party to have a quasi – equity risk which proves to be complex to parties that have limited experience and knowledge on the project to be undertaken.

Public private partnership (PPP) work more like BOT contracts whereby large scale public infrastructure are generally financed by the private sector with the investor receiving returns on their investment within a specific legal framework. In principle, PPP involves the private firm or consortium establishing a specific project company (SPC) that signs the agreement with the public entity to build, own and operate the public infrastructure for an agreed time period (*Zhang, 2005*). The presence of funding gaps and poor public sector accounting practices have encouraged the uptake of PPP as their liabilities are "off-balance sheets" and risks are shared with the public (*Akintoye, 2003*). The current trend noticed in most of the PPP agreements usually provide a raw deal to the public as they realize the investment at a late stage with minimum knowledge of sustainability. The PPP framework allows the private sector to raise funds for projects by taking out commercial loans or drawing up equities from bond markets with the aim of repaying interest and principal for the loans plus dividends for its shareholders (*Akintoye, 2003*).

The ideality of sourcing funds suitable for financing new, long-term public infrastructure through the use of PPP has developed a particular form of debt financing referred to as "project financing" (Richard, 1996). The character of this type of financing involves the assessment of the "cash flow risk" that the project is envisage to generate in the agreed operational timeline (*Cartlidge, 2006*). It should be noted that it is this cash flow that enables the SPC to service its debt obligations to its lenders and generate revenue for its investors/shareholders. PPP have also been associated with elements of credit risks which have resulted into most mega projects failing to materialize. The level of risk has a direct correlation to the cost of financing the project such that a direct proportionality relation has been obtained with respect to the level of risk against the cost of financing a project (*Chan, 2014*). As such, the presence of unstable economies in developing countries provides a breeding ground for credit risk in PPP agreements with traits of delays in project completion, currency depreciations and other delay repayment conditions. Furthermore, research has also illustrated the exposure of PPP to commercial risks such as operational costs and political risks (Akintoye, 2003). Legislative changes in the political administration of developing countries are inevitable and have resulted into failure of public project even in their implementation phase due to change in development ideologies.

The EPC/Turnkey contract is a modern contracting system which is at its helm in the Asian continent whereby a single company agrees to provide a finished project meeting all agreed specifications at a fixed time and price (O'reilly, 1999). The sole contracting company further is entitled to take responsibilities of risks of planning, design, procurement, implementation and commissioning with limited variations in time and costs. This type of contract has been amended over time since its development by federation of consulting Engineers (FIDIC) in 1999 with respect to the current global economic trends whereby elements of project financing and sourcing have been incorporated (FIDIC, 1999). The EPC/Turnkey project financing involve the contracting company providing a cost-benefit proposal for a developmental project to the client(beneficiary) which upon approval assists the same beneficiary to obtain funds from international banks with the contracting company acting as collateral on the project. Different literature has argued that this new established contract has been disadvantageous to most contracting companies as the risk to the implementing company and the financing institution is usually unmanageable (Smith, 1990). Nonetheless, further authors have contradicted on the same illustrating that the use of this type of contracting system as a project financing tool ensures the full incorporation of all monetary fund either privately or publicly sourced into the works with no mismanagement of funds, limited corruption and certainty of project deliverables (*Huse, 2013*).

The client who is the beneficiary suffers no risks and is assured of obtaining the public infrastructure within the agreed time and cost allowing a huge cost saving to the national development budget. The EPC/Turnkey contract financing system provides for an efficient and effective output of the project as the lender is assured of the project delivery taking into consideration the robust risk management analysis involved in mitigate all risks to be bared before implementation (*Marsh, 2000*). The foregoing project financing further provides for contingency planning referred to as "Plan B" as it deploys standby mechanism to deal with issues of financing, quality, time and scope adjustments (*Enfiedjian, 1997*).

6. Methodology

Through the analysis of the current financing trend of public infrastructure using the traditional approach of conventional contracts in developing countries such as Malawi, a pragmatism research philosophy was developed. Using the Gaussian constants of 95% confidence level for a population of 1,846 registered construction firms (contractors, consultants, public institutions and

development partners in construction) for the year 2014 – 2015 a sample size of 141 was obtained for the purposive collection of data. As such, a procedure of cross sectional survey was done using questionnaires that were sent to all major players in the Malawi construction sector (contractors, consultants, government institutions and implementing agencies) to obtain deductive data for the justification of the need to change the financing approach for realization of vital infrastructure projects in Malawi. The deductive data was further triangulated and validated using the inductive data approach which was obtained from desk research and online interviews conducted with specialist in the EPC/Turnkey contract financing systems in developed countries of the republic of South Africa and China.

In addition to the same, a validation exercise using focus groups was also conducted as a means of further triangulating the deductive data from the survey. The foregoing data collection technique acted as complementary method to the key interviews so as to obtained adequate qualitative data for the study. Data obtained from the techniques highlighted was analyzed using statistical tabulations, graphs, central of measures of tendency to obtain justifiable results. Demographical data was obtained for the sample size to provide a basis of the research participants capacity and knowledge in providing significant responses to the key questions setup in the quantitative and qualitative data collection techniques. Correlation, regressions, variations and deviations from the mean benchmark were used to measure the data obtained for compressive results and discussions.

7. Results and Discussions

Reference being made to the research objectives and the research methodology used, analyzed data and results were obtained from the study and discussed as follows:

7.1 Comparison analysis of traditional financing systems to the EPC/Turnkey contract financing system:

The traditional system of financing public infrastructure in developing countries like Malawi using public funds from tax revenue has currently declined with respect to the size of the infrastructures under demand. Investigation have shown that projects which have an implementation cost of one billion Malawi Kwacha or less are easily financed by the government with respect to their tax return cash flow within their reserves. Projects of this nature usually involve works of rehabilitation or maintenance of existing public infrastructure as a short term solution to meet the

current demand. Nonetheless delays in payment still exists even in such project due to political and market risks (price fluctuation, forex and country risks). The effects of these risks especially political risks have led to mega infrastructure project in Malawi either stalling or failing to be completed due to external factor such as willingness, mismanagement of funds and corruption. The introduction of the EPC/Turnkey contract in the Malawi infrastructure industry breaches the financing and project management gaps currently in existence and as created by the traditional contracting systems, the BOT and the PPP. Studies indicated that the majority of players in the infrastructure sector of Malawi up to 86% are aware of the EPC/Turnkey contract financing system and recognize its merits with respect to other financing systems as illustrated below:

S/N	Comparative analysis variable	Traditional Financing	EPC/Turnkey
		Systems, PPP & BOT	Contract Financing
			system
1	Time delivery	21% of projects are	79% of projects are
		delivered on time	delivered on time
2	Risk Management	Risk sharing and	Investing contractor
		allocation among parties	bares all risks
3	Robust Frameworks &	Amendments inevitable	Rigid frameworks with
	Agreements	due to unforeseen risks	fixed prices and
			delivery timelines
4	Accessibility to Information	Open and two way	Strictly confidential to
		communication systems	mitigate cooperate risks
		between all parties	
5	Procurement Processes	National or International	International
		Competitive Bidding	Competitive Bidding
		with selection and	with biasness to mutual
		evaluation criterion.	selection after rigorous
			due diligence.

6	Quality Management - Control	Moderate to low. Private	Moderate to high.
	and Assurance	investor is the ultimate	Public beneficiaries set
		decision maker.	standards and EPC
			contractor provides
			warranty of the project.
7	Sustainable Management –	Highly sustainable as the	Sustainability is
	Liabilities and Warranties	public is one of the	minimal. Warranties
		shareholders expect from	are provided as
		BOT contracts.	compensations.
8	Cost Benefit Returns (CBR) and	Public beneficiaries are	CBR and ROR is
	Rate of Returns (ROR)	liaised after the agreed	instant upon
		project time period.	completion of the
			project.

Table 1: Comparison and contrast analysis of the EPC/Turnkey Financing System and TheTraditional Financing Systems inclusive of BOTs and PPPs

In addition, the Public Private Partnership (PPP) system in developing countries has been faced with problems of delays in land acquisition and compensations by the government (public partner). Delays in implementation and raising of equities caused by poor loan agreement process between the private investor and their financiers have also affected the implementation of public infrastructure under the PPP. These setbacks usually overstretch the balance sheet of the implementer which in turn results into them withdrawing from the project. As a result, a contrast analysis between EPC/Turnkey financing system and current Public Private Partnership (PPP) system illustrated the ability of EPC system bearing the entire financial burden for the project with capital returnable plans (CBR and ROR) being set in the preamble. For instance, countries like India that have adopted the EPC financing in road infrastructure projects have allowed for road toll gates as a revenue system in the post construction phase of the project. Furthermore, the EPC outstands the PPP and the traditional financing system in time delivery, risk levels, capacity, and fulfillment of obligations to the public entity as all responsibilities are bared by the implementing contractor. For instance, while the government takes the responsibility of developing repayment mechanism for the project, the procurement, clearance, engineering and construction obligations

are handled by the private contractor that allows for a significantly surge in the pace of implementation.

7.2 Benefits and challenges of the EPC/Turnkey contract financing system:

EPC/Turnkey contract financing systems have overtime provided benefits to developed countries which have acted as a benchmark for application in developing countries. Desk research has yielded results in respect to the ability of this type of contract financing system applying a single point source of liability for all risks to be encountered in the project (*Lam, 2005*). This is one the major merits that upholds the use of the EPC/Turnkey contract in developing countries which are associated with vast market risks such being price, forex, country, liquidity and technological risks. The distinction of the EPC/Turnkey financing system in time delivery allows for a high rate of return for the public infrastructure which once commissioned the client is able to obtain returns to offset the debt with contractor's financier (*Cudney, 2006*). In depth research also illustrated that the EPC/Turnkey contract system being a "fixed cost financing agreement" with no overruns mitigates the cash-flow risks and allows for strategic planning in public budgets and repayment modular (*Sidwell, 1995*). Being a developmental credit facility that the EPC contractor sources from its financier, the percentage interest applied to financing facility is very low with a maximum rate of up to 10% for high risk projects. Consider the analyzed data obtained on the main benefits of EPC/Turnkey financing system as illustrated in Figure 1 below:



Figure 1: Frequency Bar Graph - Benefits of the EPC/Turnkey Contract Financing System

Furthermore, the research identified major challenges to the EPC/Turnkey contract financing which included lack of knowledge, high capital investments suitable for mega projects only and requires stable economies. Developing countries usually have small corporate firms whose risks are calculated and limited to small public investments and not mega infrastructural projects. The study also identified elements of political interference as the major setback in the implementation of the EPC/Turnkey financing system. The fact that the EPC contractor bears all risks, the beneficiaries usually the government provides an unconducive environment of corruption, theft, procurement interference and delay tactics that affect the commencement of project. The existence of unstable economies usually affects the post – contract era where the beneficiary is entitled to repay the credit facility to the contractor's financier. Since the risks are bared by the EPC contractor during the project cycle only, unstable economies in the host country does not provide a challenge as the contractor uses external and in-house resources to achieve the project deliverables within the agreed time, cost and specifications. Mega projects such as power production facilities, oil and gas infrastructure, telecommunication and modern rail systems require high capital investments and risk taking. The EPC financing system provides a solution to the same by dealing with their complexity, technological requirements and knowledge capacity. As such, convincing financiers to invest in such mega projects is not easy as the financing institutions are mostly focused on the business operation criterion. Consider the hierarchy of major challenges of EPC/Turnkey contract financing system:



Figure 2: Flow diagram of Challenges of the EPC/Turnkey contract financing system

7.3 Significance of using EPC/Turnkey contract financing system in public infrastructure in Malawi:

In order the evaluated the importance of applying the EPC/Turnkey contract financing system in Malawi for the development of public infrastructure, the research focused on identifying the major bottlenecks that are currently trending by the other systems of public infrastructure financing. The findings illustrated that the majority of public infrastructure projects failed under the traditional financing approach due to lack or mismanagement of funds, poor project management skills, inadequate designs, lack of capacity of the project team, corruption and political interference. A majority percentage of up to 54.9% of the sample supported strongly on political interference and willingness factors as being the major setback of traditional approach of public infrastructure financing. These benchmarks created a basis for measurement of significance of EPC/Turnkey contracts in financing public infrastructure in Malawi.

The research therefore determined major importance of using the EPC/Turnkey contract financing system in developing countries like Malawi as illustrated in the figure 3 below:



Figure 3: Pyramid illustrating the level of Importance of using the EPC/Turnkey Contract Financing System

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Reference being made to the above figure, the level of significance of applying EPC/Turnkey contracts in public infrastructure financing was determined by measuring the variance of responses for each parameter provided. This EPC/Turnkey financing system allows for the practicability for implementation of complex projects mostly in manufacturing and processing investments. Thus, since the method allows for the investing contractor to ascertain all responsibilities and risks to deliver a full operational investment, the complexity of design, construction procedures and procurement of materials is made easy using in-house expertise. Furthermore, the financing system contract falls mostly under the design- build (DB) system as such the investing contractor is efficient on the type and cost of materials to be incorporated into works to prevent cost overruns, re-works, snags and time loss. In addition, the study also identified that EPC/Turnkey projects allows for the timely delivery of the project deliverables as the investing contractor has more of an open budget with a fixed cost sum. Thus, the investing contractor is able to maximize their input using unlimited resources so as to complete the project within time to reduce overheads, risks and optimize their profit.

Being a single source operation system, the EPC/turnkey financing system provides minimal disputes as compared to the traditional system or the PPP. Thus, once contracts are agreed on the design and planning stage of the project between the beneficiary, the contractors financier and the investing contractor, the remaining project life cycle is managed by the contractor only with minimal interference from the other project members. This prevents conflicts between the project parties in circumstance of change in government, review of policies and the effect of market risks to the development of the public infrastructure under implementation. Furthermore, the ability of financing system having one-point source of operation prevents elements of corruption and mismanagement of funds as the contract has an obligation to fulfill to its financier and the beneficiaries of the public infrastructure.

In addition to the same, it was also noted that the EPC/Turnkey contract financing system also allows for a rapport in the procurement process both at the planning stage and during implementation of the project. Thus, since implementation of new public infrastructures in Malawi falls under mega construction projects (project with a cost of more than \$30 Million in third world countries) (*Huse, 2013*), technical and financial capacity of the investing contractor is a priority

during procurement. As such, only eligible contractor that have vast experience and capacity usually tender for such works due to their complexity and scope such that only few contractors mostly in developed countries prequalify for the same. This allows for a rapport in the due diligence process of the client as bidders are few and over-qualified such that the financial proposal evaluation criteria usually supersede the technical proposal. This therefore allows for the client to select the best bidder with respect to value for money as affordability and technical capacity factors are critically analyzed during evaluation.

Nonetheless, the study revealed that EPC/Turnkey contract financing has a minimal significance on stakeholder involvement as usually the investing contractor uses his own resources during the implementation of the project. Dependent stakeholders which are usually the general public are only involved in the planning and design stage as they provide the nature of the infrastructure that is in high demand to bridge the poverty gap of the country.

8. Conclusion

In a nutshell, the practicability of implementing public infrastructure using the EPC/Turnkey financing system has provided a leeway in the realization of major developmental projects that can improve the economic output and gross domestic products of developing countries. The analysis of the research objectives which focused on determining the benefits and challenges of the financing system, the importance of its use and its difference with the conventional methods provided a basis of evaluation of the EPC practicability to the Malawian environment. Pragmatic research techniques and methodologies were used to obtain deductive and inductive data for the project. The effectiveness of the EPC/Turnkey contract financing system as a bridge in public financing has been proved to be feasible with respect to its merits and ability to manage risks which the other conventional methods have failed to suffice. The significance of such a financing system provides a relief point to the government and allows for the instantaneous output in revenue and benefits to the public utilizing the infrastructure. All in all, the application of EPC/Turnkey contract to developing countries is focused on the nature and size of the project with megaconstruction projects that provides basic needs to the public being priorities for development of the country's economy. The presence of poor stakeholder involvement in EPC/Turnkey contract financing model in public infrastructure usually affects the sustainability of the project due to absence of skill transfer and capacity building during operations.

9. Recommendations

Nonetheless, reference being made to the analyzed data and the research discussions, the following recommendation can be drawn out for the effective implementation of the EPC/Turnkey contract financing system in developing countries as follows:

- Improving the stakeholder involvement in the EPC/Turnkey contract financing system by using localized human resource to allow for sustainability through capacity building and knowledge transfer to the public.
- Enhance transparency and accountability on the procurement process of EPC contractor during the tendering process with in-depth due diligence to iron out the presence of shell corporations.
- Develop local construction standards that are adequate and robust to ensure that all modes of quality control and assurance are covered during the implementation process of the public infrastructure.
- Regularizing the EPC/Turnkey contract financing agreements by either negotiating or imposing policies for local firms' involvement as subcontractors or sub-consultants to ensure an efficient skills transfers for operation purposes after handover.
- Introducing the e-procurement system as a mitigation measure to prevent political and corruption interference in the selection criteria of the EPC contractor. The use of such a system allows for credible selection of most capable contractors and eliminates any conflict of interest.
- Enhancing scientific and engineering research in public infrastructures that are economically viable to the country and have high rates of return prior to the engagement of the EPC/Turnkey contractor.
- Promoting change management in the public sector to adopt new innovations and problem solving techniques using the new EPC/Turnkey BOT contract financing system.

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