Public–Private Partnership Risk Factors in Emerging Countries: BOOT Illustrative Case Study

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Abstract: A public–private partnership (PPP) is an agreement between a host government and a private entity in which the private sector supplies infrastructure assets and services that are traditionally provided by the government. The popularity of PPP projects has been steadily on the rise over the past few years. This upward trend is in large part driven by governmental fiscal austerity, particularly in the aftermath of a prolonged global economic recession. The perceived attractiveness of PPP projects is particularly acute in emerging countries because of population growth and increased urbanization. PPP projects are usually highly complex in nature. They require large capital expenditure, they have long durations, and they usually utilize sophisticated technology. For a construction firm willing to expand its services internationally, a PPP project represents a unique opportunity to leverage its core competency and achieve competitive advantage in both domestic and foreign markets. Risk, however, increases with foreign penetration because of unfamiliarity with the geography, the supply chain, the local codes, and the business practices. Using an illustrative case study of a build-own-operate-transfer (BOOT) thermal power plant project, this paper addresses the salient risk factors facing the construction firm undertaking a PPP in an emerging country. **DOI: 10.1061/(ASCE)ME.1943-5479.0000079.**

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Author keywords: Public–private partnership; Build-own-operate-transfer (BOOT); Infrastructure; Risk; Power plant; Emerging market; International construction.

Introduction

During the past decade, the financial market has endured prolonged periods of recession (Reinhart and Rogoff 2009). The repercussions of the recession have reverberated worldwide because of the globalization of businesses and the integration of financial markets. The emerging countries have experienced decreased gross domestic product (GDP) growth as a result of the deteriorated economic situation (Griffith-Jones and Ocampo 2009). A widely used strategy to reinvigorate the economy and boost aggregate demand is to invest in core infrastructure projects that include thermal power plants, toll roads, airports, waste water treatment plants, pipelines, and mines (Elwell 2010). The development of the infrastructure has been given more importance in emerging counties because of population growth and increased urbanization of the society (Iimi 2005). In addition, a well-functioning infrastructure has a positive effect on public safety and the quality of life. It also promotes the efficient and cost-effective flow of resources within and across geographical borders (Munnell 1992; Aschauer 1989a).

In effect, economic research has shown that infrastructure development contributes to the productivity and economic expansion of the private sector, even after accounting for a possible crowding-out effect (Aschauer 1989b). In other words, the public investment would eventually generate a higher return of investment for the private sector. Another stream of research has indicated that public investments would reduce the cost of production in the manufacturing industry (Nadiri and Mamuneas 1994; Morrison and Schwartz 1996; Moreno et al. 2002).

Historically, the financing of energy infrastructure projects (primarily power generation plants and energy transmission systems) has been the sole responsibility of the government. The government secures financing either directly from fiscal budgets or by issuing revenue bonds. The government then bids the project, supervises the construction activities, operates the project, and collects the cash flow resulting from the operational activities through revenues and/or taxes. One part of the cash flow is used to reimburse the debt (such as coupon payments), whereas the remaining fund is used to balance the budget. The government retains control and ownership of the project from its inception to its completion. The government financing scheme is illustrated in Fig. 1.

In the aftermath of a global recession, many government agencies in emerging countries may lack the resources and expertise to undertake development projects requiring significant capital outlay. An astute solution for infrastructure development projects is for the government to form a partnership with the private sector. Such an initiative is referred to as public–private partnership (PPP). There are different forms of PPP depending on the extent of private involvement in public projects. The private-sector participation in public projects varies in a continuum from limited control to full control of the assets and services. The various PPP models for infrastructure projects are shown in Fig. 2:

- Procurement agreement: The government outsources procurement activities to the private sector. However, the overall management control of the infrastructure remains under the jurisdiction of the government.
- Management agreement: This arrangement is similar to the previously discussed procurement arrangement. The difference is

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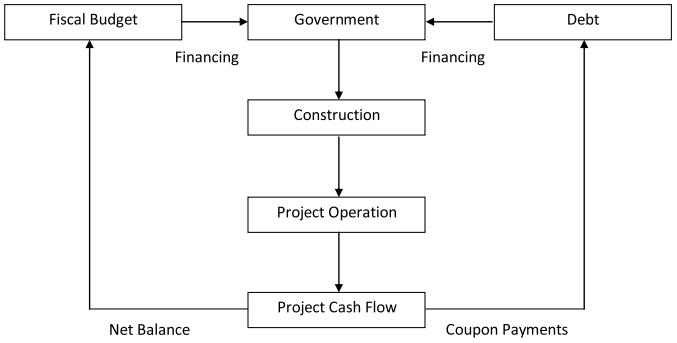

Fig. 1. Traditional government financing scheme of public infrastructure projects

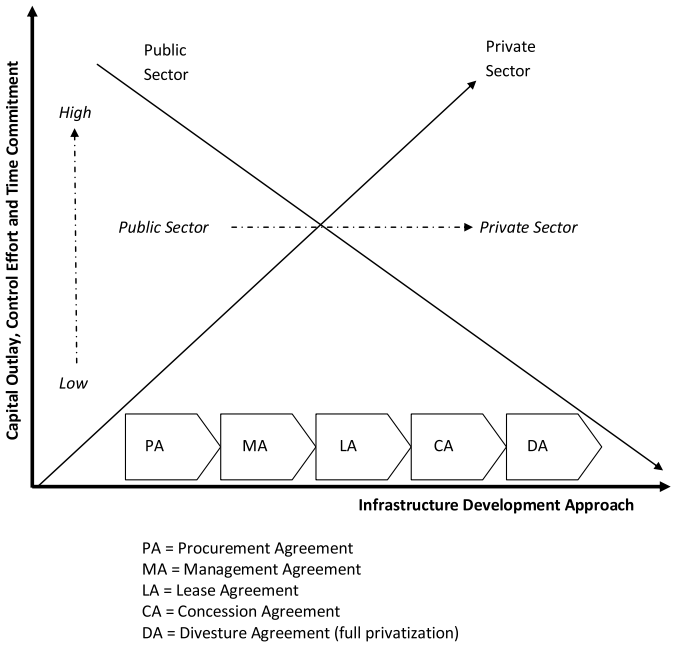

Fig. 2. PPP models for public infrastructure projects

that the government relinquishes some aspect of control and operation of the asset to the private sector.

- Lease agreement: The private sponsor leases or rents the infrastructure from the government for a specified time period. The private sector has the right to cash flow, resulting from the operation of the infrastructure.
- Concession agreement: The government gives the private sector the right to finance, build, and operate an infrastructure project. The private sector has the right to cash flow for operating the infrastructure over the concession period. At the expiration of the concession period, the private sponsor transfers the control and assets' ownership back to the government. At that point, the government could either decide to operate the plant itself or put the operation up for another round of bidding. Popular forms of concession agreements include build-own-operate-transfer (BOOT) and build-lease-transfer (BLT).
- Divesture: The government fully transfers the ownership and control of the assets to the private sector. A build-own-operate (BOO) falls under this category as it permits the private sponsor to retain ownership of the project indefinitely with no obligations to return it to the government.

The capital expenditures for PPP energy projects in India, Russian Federation, Brazil, and China are available in the Global Market Information Database (GMID) from the Euromonitor Database. The four aforementioned countries have been at the forefront of promoting PPP energy projects. In particular, India and the Russian Federation are emerging as leaders of PPP energy projects in terms of absolute expenditure and growth.

Nature of BOOT Construction Projects

A construction project could be viewed as a temporary and dynamic network made of many independent groups, including multiple layers of consultants, contractors, and suppliers. The work is initiated by the owner/promoter who develops the project scope, defines the project parameters, and devises a plan to secure key resources. The work is then allocated through contractual agreements to the key production players who, in turn, subcontract parts of the work to other parties. The contractual agreements delimitate the rights and obligations for performance of the various parties to the project. The network eventually disintegrates and ceases to exist at the completion of the construction project.

The product development process in construction is typically characterized by fragmentation of resources and discontinuation of expertise. The output of a typical construction endeavor is a unique project, using a customized design and produced in situ under highly variable and uncontrollable environmental conditions (such as uncooperative weather). As a way of comparison, the output in a manufacturing environment is often in the form of mass or continuous production of a large number of similar products (i.e., standardized products). The production is performed under steady state and under controlled conditions. As such, the risk factors in construction are often higher than in other production environments. As noted in some studies, the key success factors in construction greatly depend on the ability to proactively and efficiently manage the risk factors (Chapman and Ward 2004; Loosemore and Teo 2000).

Specifically, the initiation process of a BOOT project in the context of a PPP is typically as follows: The host government identifies a need for the infrastructure project. An expression of interests is requested by the host government to interested private parties. The private parties submit their credentials that encompass both financial capacity and technical expertise. A short list of 10 to 15 firms is typically retained for further consideration. Eventually, the concession agreement is awarded to one private sponsor. The private sponsor manages the PPP project from its inception to its completion.

The BOOT concession agreement is the one binding the private sponsor to the host government. It stipulates the important terms for constructing and operating the infrastructure energy project. It specifies the concession period, the rights and responsibilities of each party during the concession period, and the tariff that will be collected by the private sponsor during the operation phase. The quality of assets and the performance standards at the end of the concession period are also important stipulations in the concession agreement.

The private sponsor is either a private organization (such as a construction/engineering firm) or a consortium of private firms (such as construction/engineering firms, equipment manufacturers, investors, and venture capitalists) that coalesce for the specific purpose of financing, constructing, and operating the project. The reason why various private firms may join forces is to combine resources and expertise. This joint effort also allows the achievement of economies of scale and the diversification of risks.

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The organizational type of the private sector could take the form of a corporation, a joint venture, a partnership, a limited partnership. or other organizational forms.

The private sponsor forms a project company (PC) to construct and operate the project. The PC is in charge of the engineering, procurement, construction, and operation phase. It secures the key resources and it selects the consultants, the prime contractors, and the operators of the project. The PC has the right to cash flow for operating the infrastructure over the concession period. The host government reviews and approves the design. It also takes part in the approval of the performance tests to ensure proper compliance with the specifications of the concession specifications. In addition, it facilitates the necessary approvals and other authorizations for constructing and operating the facility. The government plays an active role in quality control and assurance in its capacity as the steward of public interest. The public is the final user of the project. The government also has a claim on the ownership of the infrastructure assets at the term of the concession period.

The success of the BOOT depends on the extent by which the goals of the private sponsor are congruent with those of the host government. As shown in Fig. 3, each party has its own set of motives. The private sponsor needs to earn profit, control the activities under its jurisdiction with minimal political interference, and collect its tariff (payment processing) during the operation phase. The host government needs to minimize the life cycle cost of the project, ensure quality standards, and ensure minimum performance standards. The incentive scheme of the concession agreement should address all the previously discussed aspects, and should emphasize the common interests between the public and private sectors, namely the timely completion of the project, the performance of the project, the coordination and integration of various operating activities, and transparent transactions.

Risk Factors of BOOT Projects

A BOOT project is recognized as one of the riskiest project delivery schemes (Dey and Ogunlana 2004). The risk management of BOOT projects starts with the identification of the risk factors resulting from the inherent characteristics of the project itself and the risk factors resulting from exogenous factors in the external environment. An implementation plan is then put in place to avoid the risk, mitigate the risk, diversify the risk, or allocate the risk to the party best able to assume it.

The inherent risk factors of BOOT projects are those that are related to the characteristics of the project itself. One risk is related to the cost magnitude of the project: Projects that require relatively large capital expenditure and large number of participants are riskier than projects with relatively little investment outlay and fewer participants to the construction process. There are more uncertain variables in high magnitude projects that could adversely affect the cost, quality, and duration of the project than in low magnitude projects. A second risk factor is related to the duration of the project: Projects with long durations are inherently riskier than projects with short durations. The variables occurring in the long-term horizon are less defined and more uncertain than variables occurring in the short-term horizon. A third risk is related to the financial structure of the project: Projects with high debt-to-equity ratio are financially riskier than projects with low debt-to-equity ratio. The earnings of projects with high leverage are more volatile than those with low debt-to-equity ratio. Highly leveraged projects/firms are less able to meet their obligations to the creditors than low leveraged ones, thus pushing the project closer to potential bankruptcy. The financial risk increases with the debt-to-equity ratio, the intensity and schedule of the debt, and the duration of the project. A fourth risk is related to the type of construction: Complex and highly customized projects using untested technologies are riskier than standardized projects with well-established technical and regulatory precedents.

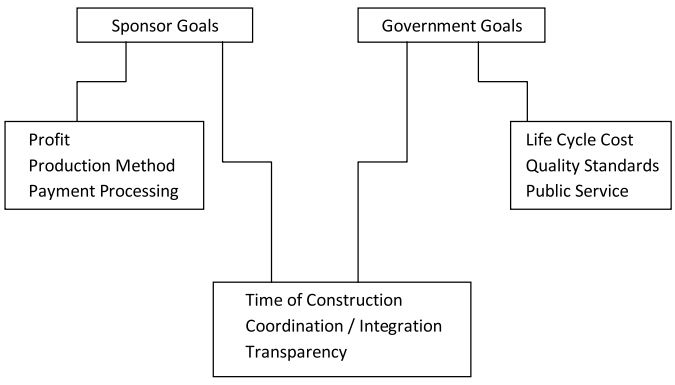

Fig. 3. Public and private sector motives in a BOOT project

The exogenous risk factors are those related to the external variables belonging to the macro-environment in which the project operates, including the political and geographical environment. For example, projects located in areas in which the macro-environmental is rapidly changing (e.g., price increases, social trends, demographics, technological innovations, regulatory changes) are facing more uncertainties than projects located in relatively stable macro-environments with slow-moving changes. The risk of construction projects further increases with foreign penetration (Gunhan and Arditi 2005). The country (sovereign) risk factor is substantial, notwithstanding the unfamiliarity of the sponsors with the geography, the local codes, the business practices, and other idiosyncratic cultural and operational issues.

Illustrative Case Study

The demand for electricity has been on the rise in an emerging country. In an effort to sustain the projected demand, the government has decided to initiate a PPP for the construction of a state-of-the-art 850 MW combined-cycle thermal power plant using natural gas as its fuel source. The cost of the project is estimated to be $900 mils. The government has decided to commission the project to the private sector using a BOOT approach. The concession period is 25 years.

A private sponsor has been awarded the BOOT concession. The sponsor is a consortium of international engineering and construction firms. The consortium also includes the manufacturers that supply boilers, turbines, generators, and other heavy equipment. The private sponsor, represented by PC, has the right to cash flow for operating the infrastructure over the concession period. At the expiration of the concession period, the PC transfers the control and asset ownership back to the government according to the terms of the concession agreement. At that point, the government could either decide to operate the plant itself or put the operation for another round of bidding.

Before starting a bidding process, the sponsors have to develop a risk management strategy. One important endeavor in this regard is the categorization of the project risk into different groups depending on the level of control and anticipation of the uncertainties:

- Uncontrollable risks: Such risks belong to the macro-environment, like *force majeure*, politics, geology, economical issues, restrictive laws and regulations, and other external

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variables. The uncontrollable risk could be shared, diversified, or avoided through some sort of an insurance mechanism. For example, commodity prices and foreign currencies could be hedged against price increases through the use of financial derivative instruments.

- Controllable but undefined risks: Such risks are controllable, yet the extent of their occurrences is not known in advance. An example is a potential labor problem or the use of new technologies.
- Assumed risks: Such risks are assumed because of the actions of a third-party. Examples include poor design, poor workmanship, poor coordination, right-of-way problems, or other assumed responsibilities for third-party inadequate actions. This risk is mitigated through a vigilant screening process of production players.
- Controllable inherent risks: Such risks are inherent to the project, yet controllable in advance. Examples include supply shortage, poor material delivery, and productivity problems. The controllable risks are allocated to the parties that are best able to handle them because of their unique expertise or resources.

The project would be subdivided into separate major work packages that are awarded to different prime contractors (assuming the PC has in-house construction management expertise). The prime contractors might be responsible for one or more of the following activities: the engineering, procurement, construction, installation, and testing of their assigned work packages. The selection and coordination of the prime contractors is the responsibility of the PC. The prime contractors would have to provide the bid, payment, and performance bonds (or other equivalent forms of guarantees such as letters of credit) to ensure the proper execution of the project. Such bonds indicate that the contractor has undergone a rigorous prequalification by the surety company and is capable of fulfilling the obligations of the contract. The reputation and stature of the surety company is a valuable piece of information in assessing the adequacy of the bonds and the pre-screening process.

The next step for the PC is to share the risk with the various prime contractors. Some important issues to consider in this regard are as follows:

- Which party is best able to conduct a feasibility study?
- Which party is best able to plan, organize, lead, and control the preconstruction work, including the bidding process and contract administration?
- Which party is best able to secure financing for the project?
- Which party is best able to design the project?
- Which party is best able to provide post-design constructability reviews and value engineering?
- Which party is best able to secure procurements and key resources?
- Which party is best able to utilize efficient and effective construction methods and techniques?
- Which party is best able to control the project in terms of productivity, safety, and quality?
- Which party is best able to coordinate the field work, handle administration procedures, and provide overall customer service?
- Which party is best able to operate and manage the completed project?
- Which party is best able to handle jurisdictional disputes and local problems?
- Which party is best able to handle labor relations, including subcontractors' claims?
- Which parties are best able to streamline their activities and achieve project synergy?

The previously noted strategy requires a thorough identification of the risk factors during the construction phase and during the operation phase. As shown in Fig. 4, the ability to influence the final project cost and to ensure its final success is very effective at the beginning of the process and it diminishes significantly as the project progresses through time. Once the design is completed and the project is awarded for construction, than the ability to influence the final project cost is greatly reduced.

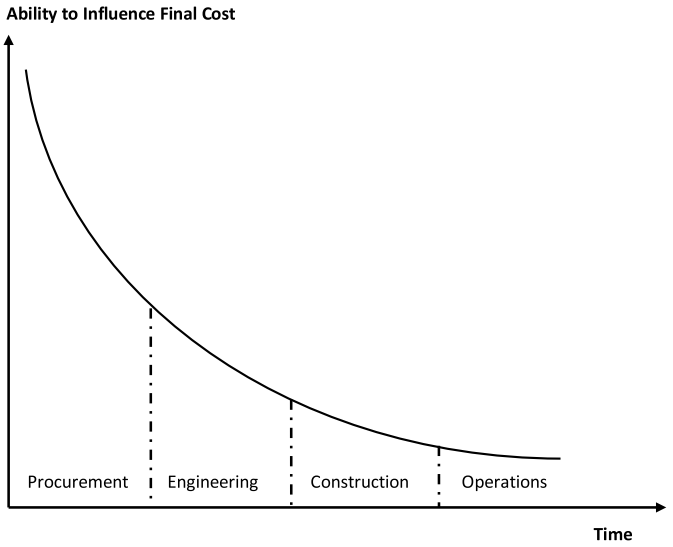

Fig. 4. Cost–influence curve of a typical BOOT project

Inherent Project Risks

Cost Escalation Risk

There are many controllable or uncontrollable variables that could increase construction costs such as poor productivity, *force majeure*, and high supply cost. The risk related to cost is addressed through the type of pricing contract agreed between the PC and the prime contractors and/or the subcontractors hereafter referred to as contractor for simplicity). Each work package contracted to a prime contractor would have a different pricing strategy. The two broad contract pricing mechanisms, namely fixed price and cost-plus pricing arrangements, depend on a number of factors, most notably information at contract award, project control expertise, and risk allocation (Fig. 5).

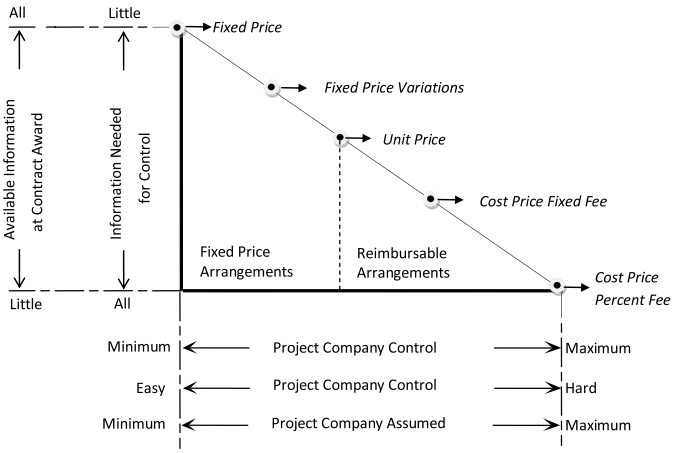

Fig. 5. Contract pricing strategies

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Fixed Price: Under a pure fixed-price (or lump sum) agreement, the contractor agrees to carry out all aspects of the work, including risk of construction, in exchange for a fixed sum of money. Under this scheme, it is particularly important for the PC to provide the contractor with a complete set of instructions, including desired scope and overall schedule, to minimize subsequent expensive change orders. Once the fixed-price contract is awarded, the PC relinquishes project management control to the contractor. Nonetheless, it is in the interest of the PC to oversee the operations without infringing on the ability of the contractor to perform day-to-day operations. A unit-price contract is an example of a flexible fixed-price contract as it accommodates variations in the quantity of work during construction. Other flexibility features are typically utilized by incorporating standard change condition clauses in the contract.

Cost-Plus: A cost-plus contract is used in case the scope of the project is poorly defined, or in case significant changes to the work are anticipated during construction, or in case concurrent design and engineering needs to be undertaken to shorten project duration. Under this scheme, the contractor is reimbursed for the cost of construction plus a fee (either fixed or variable). The determination of the appropriate fee is a matter of negotiation between the PC and the contractor depending on the size of the work package, its nature, duration, complexity, sophistication, and other risk factors. A guaranteed maximum price could also be specified to minimize cost uncertainty. By assuming the cost responsibility, the PC becomes de facto the project manager. The PC also assumes a risk manager role as the cost-plus contract transfers all economic risk from the contractor to the PC.

Special Provisions: A combination of different pricing approaches could be devised to meet the specific needs of the work package. For instance, a convertible contract could be used in some special cases. It starts as a reimbursable cost and progressively converts to a fixed-price contract as engineering proceeds and the scope becomes more defined in nature. However, the PC relinquishes bargaining power in such a case because of the absence of market competition.

Construction Delay

Construction delay is another major risk that could affect project success because time is of the essence in a power plant project, notwithstanding possible penalty clauses in the concession agreement. The causes of the delay include unfamiliarity with the technology, labor unrest, design implementation problems, change order disputes, and inability to receive supply on time. There are two categories of clauses that could be used to manage the risk of delay, namely the no-damage clauses and the liquidated damage clauses.

The no-damage clause stipulates that the contractor is entitled to time extension but no monetary damages in the event of delay. Such clauses are the result of delays caused by third parties (such as another prime contractor), by disrupted or accelerated work, by failure to coordinate or properly schedule work, and by design errors. However, there are four exceptions to the no-damage clause in which contractors are entitled to monetary damages because of delays, e.g., the delay was not contemplated or anticipated by the parties to the contract.

A typical liquidated damage provides that the contractor will pay the PC a stipulated sum of money for each day of delay beyond the agreed completion date. Such clauses are intended to compensate the PC for actual loss, but they are not designed to punish or penalize the contractor for the failure to achieve the contract schedule. In most jurisdictions, the inclusion of a liquidated damage clause precludes the PC of recovering actual damages, although actual damages may exceed stipulated liquidated damages.

Subsurface Risks

A large project like a thermal power plant involves a lot of excavation and earthwork. The unforeseen subsurface conditions are risk factors that should be taken into account in the contract documents. As a general rule, the contractor bears the risk of unforeseen subsurface conditions unless evidence shows that the information provided by the PC is imperfect, incomplete, or it would be impossible for the contractor to have discovered the error through a reasonable site investigation. The PC may elect to combine subsurface information, along with exculpatory language (disclaimers) with the deletion of the changed condition clause. Such contractual languages are not advisable because they increase the adversarial relationship between the PC and the contractor. In addition, they are not always effective in many jurisdictions because of the unjust enrichment doctrine that prevents a party from unjustly benefitting at the expense of another party.

Exogenous Project Risks

Foreign Exchange Trade

Preconstruction

The bidding documents are often denominated in foreign currency, as is often the case in international markets. If the project is accepted, then the PC is exposed to foreign currency appreciation *vis-à-vis* the domestic currency. During the construction duration, the exchange rate could easily snowball and, as such, could potentially result in catastrophic consequences. One possible hedging strategy is to purchase call options in the foreign currency with different maturities depending on the procurement schedules. A call option provides the purchaser with the right (but not the obligation) to purchase an asset (a commodity or a foreign currency) at a certain price agreed (called the exercise price) for a certain time period regardless of future price fluctuations. There are two possible outcomes under this hedging strategy (Fig. 6):

- If the bid is accepted, the PC would exercise the calls at maturity to purchase foreign currencies in case the currency spot price rises above the exercise price. Accordingly, the PC is protected against foreign currency appreciations. The call options are not exercised in case the foreign currency spot price remains below the exercise price.
- If the bid is rejected, the PC would exercise the options at maturity if the foreign currency spot appreciates above the exercise

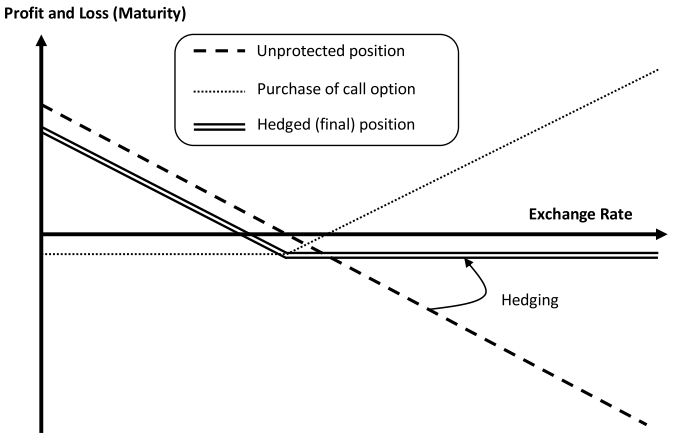

Fig. 6. Hedging strategy with call options on foreign currency during bidding stage

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price. The PC would then immediately sell the foreign currency in the spot market. The gain that is received from exercising the calls may partially or fully offset the premium (price) for the options. If the foreign currency spot rate depreciates below the exercise price, then the PC will obviously not exercise the calls at maturity. The loss is limited to the premium (price) paid for the options (i.e., it is similar to purchasing an insurance premium).

During Construction

The PC is also subjected to foreign currency fluctuations during construction. It is therefore incumbent on the PC to hedge against the price increase of foreign procurements. As an example, steel is to be purchased from a foreign supplier over a multiple-year period. The PC has signed a contract with the supplier, thus fixing the price of the steel in advance. In effect, the company has protected itself against the commodity price fluctuations. Nonetheless, the PC is still not protected against the foreign currency appreciation *vis-à-vis* the domestic currency. An example of a hedging strategy consists of purchasing a forward contract on the foreign currency. A forward contract allows the PC to buy the foreign currency at a future date for a specific price agreed in advance regardless of future spot price fluctuations. The difference between a forward contract and an option is that the former carries with it an obligation (and no corresponding premium), whereas the latter carries with it a right (and a corresponding premium). As shown in Fig. 7, the purchase of the forward contract removes the foreign currency risk because any loss incurred in the actual transaction is offset by the gain incurred in the forward contract, and vice versa. In other words, a forward contract effectively decouples the financial risk from the business risk.

During Operations

The net revenue of the project (the selling of the electrical power) is often denominated in foreign currency. The PC is therefore exposed to exchange rate risk as the foreign currency may significantly depreciate *vis-à-vis* the domestic currency of the PC, thus significantly lowering the revenue of the project. An example of a hedging strategy to protect against this risk is to engage in a currency swap transaction. Under this scheme, the PC agrees to transfer the cash flows of the revenues (denominated in foreign currency) to the counterparty in the over-the-counter (OTC) financial market. In turn, the counterparty provides the PC with an equivalent cash flow denominated in domestic currency. The net present values of both cash flows (principals and interests) are equivalent at the time of the swap agreement. Under such an agreement, the PC is no longer exposed to foreign currency fluctuations as the net cash outflow is ultimately denominated in domestic currency.

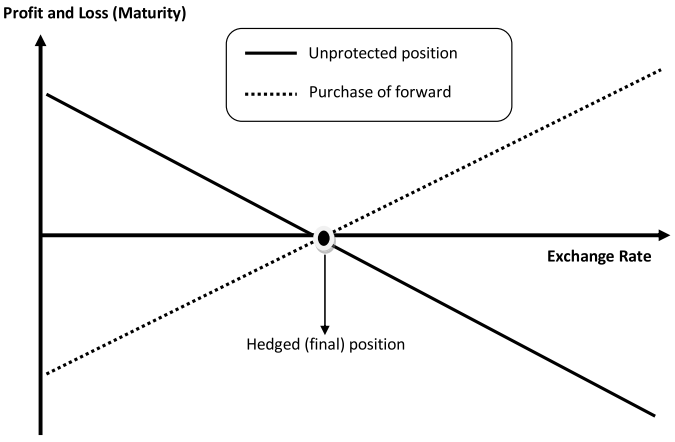

Fig. 7. Hedging strategy with forward contracts on foreign currency during construction

Political Risk

The project may be subjected to unwarranted government intervention. For instance, the government may unilaterally decide to nationalize or expropriate some or all of the project (either partially or fully). The extent of political risk and governmental interference is influenced by the prevailing political regimes and the economical importance of the project to the local economy. The public is also a highly influential stakeholder. The public resentment for the project is usually high if the sponsor is a foreign entity and if the project is located in an urban setting with no perceived value-added benefit. The public resistance to the project may slow down construction and may even result in the abandonment of the project. Conversely, public resentment is reduced if the project provides value in terms of output (e.g., improved quality of life) and social issues (e.g., increased work opportunities for the local population). The hiring of local contractors is advantageous from the standpoint that they are more accepted by the community, and they are more familiar and responsive to the specific political and business environment within the country.

Operational Risk

The project faces performance risk during the operation phase. The thermal power plant may not generate power at the expected performance standards because of technological malfunctioning, including latent defects. The utilization of known and well-tested technologies minimizes the occurrence of such risk. The contractor should provide the PC with warranties for proper performance for an adequate time period after the project completion. The PC faces market risk or fluctuation in the price and quantity of the power demand from the marketplace (this risk is often referred to as off-take risk). In a typical scenario, the demand for energy output is expected to increase with projected growth in GDP. If the expected GDP growth is less than expected, then the revenue of the project would be lower. The PC also faces supply risk in terms of shortage and price increase. A long-term agreement with the government (a power purchase agreement and a gas supply agreement) will help minimize the market risk. In such circumstances, the government assumes the economic risk of supply, demand, and price fluctuations. Nonetheless, the PC still faces default risk as the government may not honor its contractual agreement. The risk is magnified in a foreign environment because of the possible ineptness of some foreign jurisdictions to enforce contracts and agreements, particularly when it involves government agencies.

Risk Factors of Emerging Markets

Shortage of Skills

A thermal power plant is highly sophisticated and complex, and therefore requires a special set of skills to operate the technology. The main risk factor facing the PC is the potential lack of human resource skills in emerging countries. A PPP project undertaken in a foreign environment is often exposed to safety problems associated with strife, war, and terrorism. This safety risk factor further exacerbates the shortage of talent risk of emerging countries. Accordingly, a formal training and development (T&D) program should be established during the construction phase and operation phases of the project. To be meaningful, T&D should not be a one-time occurrence, but rather an ongoing process that

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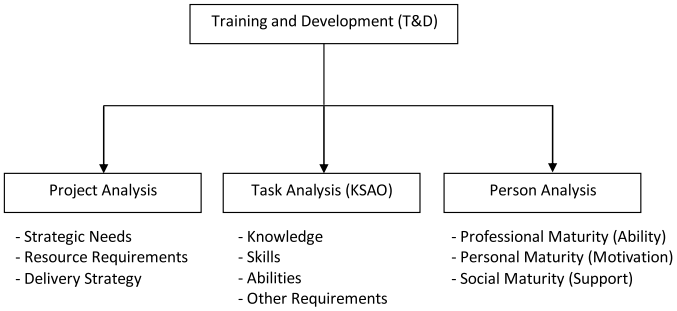

Fig. 8. Training and development ongoing needs analysis for the BOOT project

involves organizational analysis, task analysis, and person analysis (Fig. 8).

- Project analysis: The PC needs to first assess whether T&D is necessary for the project, whether it is cost effective, whether it has the resources to conduct T&D, and whether T&D should be conducted in-house or outsourced to a separate entity.
- Task analysis: In case T&D is needed and affordable, the next step consists of identifying the important jobs for which T&D is needed. Each job is then subdivided into different tasks that are scrutinized in terms of knowledge (facts or procedures), skills (competency in performing a task), abilities (physical and mental capacities to perform a task), and other conditions (such as working conditions) to successfully complete the job.
- Person analysis: The final step entails identifying the employees who are most suited for the T&D program. The objective is to close the gap between actual skills and needed skills. The T&D programs should concentrate on hard skills (e.g., scheduling, equipment operations) and soft skills (e.g., coaching, empowering, team building, cultural sensitivity). Three important characteristics are important in this regard: (1) Professional maturity: The employee should have the aptitude to acquire new skills; (2) Personal maturity: The employee should have the motivation and the willingness to learn new skills (i.e., personal maturity); (3) Social maturity: The employee should have the capacity and the opportunity to put the new skills into use through social support.

The types of T&D that could be offered are as follows:

- Basic skills training: This type of training is common and fairly standard across organizations. It focuses on technical skills to improve functional competency in a specialized area. Ability to use specialized expertise in solving complex problems through design/analysis, estimating, scheduling, budgeting, and others. Because of the highly dynamic nature of the marketplace, the training program should focus on the development of flexible skills with depth and breadth. A flexible workforce also produces a reduction in the bureaucratic layer as fewer supervisors are needed.
- Interpersonal and diversity training: This training provides the skills necessary to interact with people of different cultures and to operate effectively in a team environment. The construction professionals should be able to communicate effectively with people of different cultures and maneuver with ease in a multicultural team environment. It is indeed not sufficient for an engineer to possess technical knowledge about foreign codes and specifications. The employee should also possess "cultural intelligence," meaning an awareness and appreciation of various customs and habits, and a diverse portfolio of behaviors.
- Management development: This development initiative helps sharpen one's ability to plan, organize, delegate, inspire, and identify problems by clearly delimitating between symptoms and root causes. An integral part of the development process is to provide the skills necessary to make decisions using a systematic process and analytical reasoning.
- Leadership development: The construction project needs to develop effective leaders who can orchestrate positive and significant changes. Such leaders should be able to devise a meaningful vision, stimulate commitment from the followers, and achieve superior organizational results.

The successful implementation of a formal T&D program requires the following:

- The establishment of a competent T&D team consisting of subject-matter experts: The function of the team is to decide on training themes, learning goals, delivery modes, training evaluations, and roadmaps for future improvements.
- The appointment of a knowledgeable person who drives the T&D process, namely a T&D champion. The champion gives the T&D program an enthusiastic and credible support in the forms of resources and tangible support. The T&D champion also seeks psychological supports from top leadership. In fact, leadership should be intimately involved in the T&D program through time commitment to the training endeavor (e.g., teaching, coaching, mentoring). In addition, leadership should empower the employees and provide them with the opportunities to practice their newly acquired skills through enriched job experiences.

Corruption Risk

Thermal power plants, by their very nature, are particularly prone to corrupt practices such as change order manipulations, unbalanced bids, bid shopping, reverse auctions, over billing, payment games, falsified claims, and other unwarranted practices. There are three levels of cost associated with corruption.

- The lowest level (level 1) consists of direct and indirect costs (including fines and penalties) resulting from unethical practices.
- The intermediate level (level 2) consists of monitoring costs, auditing, and remedial actions to prevent future mishaps.
- The highest level (level 3) entails the erosion of trust and loyalty, and the ensuing loss of confidence and morale. Level 3 is by far the most damaging cost because reputation is the most valuable asset of the organization. In effect, it takes a long time for the organization to build its brand equity, but it only takes a fraction of that time to lose the confidence of the marketplace with sometimes irreversible consequences.

The management of corruption should start at the earliest time possible and should encompass all construction players including the owner's representative, the procurement manager, government officials, trade contractors, consultants, and many other stakeholders. The PC should take a leadership role in forming an ethics committee at the earliest stage of the process. The ethics committee should include representatives from the major stakeholders. The first function of the ethics committee is to write a code of ethics and to devise an anti-corruption management program to ensure the effective implementation of the code of ethics. The anti-corruption management program includes awareness building, whistle-blowing procedures, training and development initiatives, anonymous assistance, and other issues aimed at mitigating corruption practices.

Another important role of the ethics committee is to ensure that all contractual agreements with suppliers, contractors, consultants, government agencies, and others contain anti-corruption warranties. A provision should also be made to incorporate anti-corruption clauses in all subcontracting and third-party contracts. Clear accountabilities in case of violations should be clearly articulated in the

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contract documents; otherwise, the anti-corruption clauses may not be enforced by the concerned parties. The contractual safeguards are supplemented by integrity pacts in which all parties ascertain that they will act with integrity in relation to that project.

The ethics committee should also appoint an independent assessor to monitor the project from its inception to its completion. The assessor should have access to all relevant information and records of the parties involved in the construction endeavor, particularly those pertaining to officers' expenses and use of corporate assets. The independent assessor should first review the firm's ethical standards and procedures, including scope, procurements, human resource practices, environmental compliances, and conflicts of interest. The assessor should engage in due diligence in screening business partners and ensure that the project operates in a corruption-free environment. The assessor should maintain an arm's-length relationship with the various construction parties to ensure impartiality and complete independence. The assessor should be skilled at recognizing moral dilemmas (i.e., having a keen sense of moral awareness) and at delimiting between what is right and what is wrong (i.e., having a sound moral judgment).

Conclusions

A PPP provides the opportunity for a construction firm to team up with other international private sponsors for the design, construction, and operation of an infrastructure project. This form of project delivery method enables the construction firm to take advantage of its core competency, to customize its services, and to export its capabilities. It also improves the competitive standing of the construction firm because domestic work volumes may not be large enough to fully accommodate economies of scale and learning/experience curve effects. In addition, it allows the construction firm to take advantage of lower labor cost and to diversify the risk across different markets rather than being entirely dependent on its own domestic economy. The hallmark of superior management depends on the crafting of a proactive risk management plan, followed by a vigilant implementation process. In emerging markets, the construction firm should not only manage project and country risk factors, but also the risks related to corruption practices and potential shortages of human talent. In fact, PPP projects are most effective in country environments that foster transparent, expeditious, and reliable transactions with minimum political interferences.

As a final note, the World Bank could provide valuable assistance to emerging countries in planning and executing PPP projects. This assistance could take the form of a country assistance strategy (CAS), a strategic document prepared by the World Bank in consultation with the host government. The CAS intends to identify relevant infrastructure projects that fulfill the specific developmental needs of the country. The World Bank could also provide technical and financial assistance for PPP projects, including the preparation of bidding documents. The World Bank Group constitutes five basic institutions, namely the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), and the International Center for the Settlement of Investment Disputes (ICSID). The roles of these institutions are as follows:

- The IBRD extends loans and technical assistance to middle-income countries.
- The IDA provides grants and low-interest loans to low-income countries.
- The IFC promotes private-sector investment by supporting high-risk sectors and high-risk countries.
- The MIGA offers political risk insurance to investors and lenders working in developing countries.
- The ICSID settles potential legal disputes between foreign investors and the host government.

Such a wide ranging involvement from the World Bank Group would decrease the actual and perceived macro-environmental risk factors of PPP projects. In turn, it would increase the pool of potentially interested and qualified foreign construction firms and investors, which is an important consideration for the ultimate success of PPP projects.

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