Risk Management in
Public Private Partnership (PPP) Contract

Presented by

Marwa Sayed Ahmad

A Thesis submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirement for the degree of

Master of Science
In
Architecture

Faculty of Engineering, Cairo University
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ABSTRACT

In 2006 the Government of Egypt adopted a new long-term policy of pursuing partnerships with the private sector to expand and increase the country’s infrastructure investments.

PPP is a long-term contractual relationship between the public sector and the private sector for the purpose of having the private sector deliver a project or service traditionally provided by the public sector. PPP projects do not minimize the public sector’s responsibility to improve public services, only the methodology for its provision and procurement is different.

The fundamental aspects of Egypt’s PPP policy framework are the use of performance based contracts under which the Private Sector provides public services over contract duration and is paid by the Public Sector, end user or a hybrid of both. Output requirements are specified by Line Ministries while specific inputs are generally the responsibility of the private sector partner. Under the PPP contract, the Government retains strategic control on the service, secures new infrastructure which generally reverts back to the public sector at the end of contract life, and allocates project and performance risks to the party best able to manage or mitigate these risks.

PPPs have multiple contractual components enabling the private sector to participate in project implementation through its participation in one or more aspects of the project’s development and implementation, including such project phases as project design, finance, build, operate, manage, and/or maintain.
Hence, Public-Private Partnerships (PPPs) are a form of legally enforceable contracts between the public and private sectors, which requires new investments by the private contractor (funds, technology, expertise/ time, etc.) and which transfers key risks to the private sector (design, finance, construction, operation, etc.), in which payments are made in exchange for performance, for the purpose of delivering a service traditionally provided by the public sector.

The thesis addressed analyzes the extent of the application of risk management in three of international existing projects uses public private partnership contract are: New Cairo Wastewater Treatment Plant, the Yan’an Donglu Second Tunnel and schools in Frankfurt (ranked the risks and highlight the top 10 risks for each case, define the common and different cases between the cases) then redesign a comprehensive risk matrix by made a questionnaire and distributed it for engineers participated in PPP projects in Egypt then ranked the risks into three levels high, moderate and low found there were 35 risks grouped into 9 categories after that compared between the risk matrix and cases study to get the all risks in the case are found in the risk matrix except the safety risks and foreign exchange risks.
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Chapter 1: INTRODUCTION

1.1. Introduction

Public-private partnerships (PPP) can be described as a contractual relationship where a private party takes responsibility for all or part of a government's (departments) functions. In essence, it is a contractual arrangement between a public sector agency and private sector concern, whereby resources and risks are shared for the purpose of delivering a public service, or for developing public infrastructure.

Project risk is always in the future. Risk is an uncertain event or condition that, if it occurs, has an effect on at least one project objective. Objectives can include scope, schedule, cost, and quality. A risk may have one or more causes and, if it occurs, it may have one or more impacts. A cause may be a requirement, assumption, constraint, or condition that creates the possibility of negative or positive outcomes. A risk occurs where either the outcome or consequence of an activity or decision is less than certain (Boothroyd & Emmett, 1996). Both the outcome and consequence of a decision could simultaneously be uncertain. The presence of risks in a project could hinder the achievement of its objectives. Therefore, risks must be managed carefully, in order to achieve any set of project objectives.

Risks and risk transfer are at the heart of PPP, and the intention is that risks should be held by the party best able to manage them (HM Treasury, 2003).
1.2. **Problem statement**

Public Private Partnership (PPP) is an arrangement under which public and private sectors collaborate to ensure the fulfillment of a public service. In 2006, the Egyptian government, in an attempt to increase the role of the private sector, adopted the PPP model as a way to refurbish and establish the country’s infrastructure.

The Government of Egypt has launched an ambitious programme of PPPs to improve public infrastructure and encourage private sector involvement. It is estimated that Egypt should allocate from 5.5% to 7% of its annual Gross Domestic Product to cover its infrastructure needs representing annual spending of USD 13 billion. The Government of Egypt estimates it can realistically mobilize 20% to 25% of infrastructure spending through PPPs.

A main problem faced many construction projects is optimize defining the major risks may face the project and by consequences affect negatively the project main objectives cost, time and quality.

A key principle of PPPs is that risk should be allocated to the party best able to manage it. The effective allocation of risk has a direct financial impact on the project as it will result in lower overall project costs and will therefore provide enhanced value for money if compared to traditional procurement methods.

1.3. **Research objectives**

Risks are inherent in all PPP projects as in any other infrastructure projects. They arise due to uncertain future outcomes which may have direct effect on the provision of services by the project, and/or the commercial viability of the project. The risk allocation to parties in contract and the management of risks are, therefore, at the heart of a PPP design. This is also an important element in establishing the business case for a PPP project.
The main goal of the thesis is to identify the main common risks in construction projects.

The objectives of this research are:
- To analyze the main risks in the international and local construction projects.
- To improve the current risk matrix in order to increase its effectiveness.
- To increase the awareness of risk management in PPP projects.
- To highlight the important stages of the life cycle of the PPP contract.

1.4. **Scope of the research**

The scope of this research is to analyze three international projects as case studies which involve PPP contracts which are:
1. New Cairo Waste Water Treatment Plant (Egypt).
2. YD2nd Tunnel in Shanghai (China).
3. PPP schools in Frankfurt (Germany).

1.5. **Methodology**

In order to fulfill the mentioned goal and objectives the research applies the following methodology:
- Analyzing the life cycle of PPP of contracts.
- Redesign the current risk matrix.
- Summarizing the management of risks in construction projects which use PPP contract models.
- Applying a comparative analytical study among three international projects as case studies.
- Conducting interviews to discuss the research hypothesis and findings.
1.6. Thesis structure

This research consists of five chapters as followings:

- **Chapter one Introduction:**
  This chapter is a general introduction to the thesis. It describes the problem statement for the research, the objectives, and the scope and outlines the methodology of the research.

- **Chapter two Literature review:**
  This chapter presents a literature review of PPP contract, Project Preparation, PPP Implementation and Contract management. Finally the chapter provides an overview of PPP in Egypt.

- **Chapter three risks and risk management in PPP:**
  This chapter presents an overview of risks and risk management in PPP contract.

- **Chapter four public private partnership (PPP) for the cases study**
  This chapter presents an overview of projects (objectives, scopes, stakeholders, criteria, key elements and risk work breakdown structures) then risk identification, risk allocation and risk mitigation for the three international cases study.

- **Chapter five conclusions and recommendations:**
  This chapter presents conclusion and recommendations for parties involved in PPP construction projects.

- **Appendices:**
  Appendix 1: PPP Projects in Egypt
  Appendix 2: Risk Matrix
  Appendix 3: Comparison between the three cases study
Chapter 2: Literature Review of PPP

2.1. Public–Private Partnerships (PPPs)—an Overview

2.1.1. Definition of a PPP contract
The definition embraced by The Canadian Council for Public-Private Partnerships is as follows:
A cooperative venture between the public and private sectors, built on the expertise of each partner that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards.\(^1\)

2.1.2. The main general principles of the PPPs:
a) PPPs are aimed at the satisfaction of collective needs
A PPP generally occurs in the context of the provision of a public service (in other terms a service of general interest), or the construction and management of a public infrastructure, which is intended for the use of the population. Examples include public utilities and transportation services for the former and roads, airports, generation plant, hospitals, prisons and water and wastewater treatment plants for the latter. Due to its public purpose, there are obligations and principles of public service that must be respected and enforced in order to achieve a successful PPP. Principles such as universality, continuity, equality of treatment (fairness in both the process and in outcomes), high quality of service, existence of reasonable profits (returns are commensurate with the risks borne by the private party), and transparence of the activities carried out are important requirements for services directly provided to the citizens and their assurance is fundamental when they are delegated to the private sector.

\(^1\) The Canadian Council for Public-Private Partnerships
b) PPPs often involve long term arrangements

Often, PPP implies a long term relationship, comprising various phases of the infrastructure project or its provision (design, construction and operation). When the activities of construction and financing correspond to a significant part of the contract value, the projects should be designed in a whole-life costing perspective, assuring their economic and financial balance, and enabling an effective transfer of risks to the private sector and promoting the project’s financial self-sustainability. For example, a PPP for a dam which has long-life should have a contract duration corresponding to a long-term.

c) PPPs involve the total or partial financing of the project

PPPs involve, almost always, the partial or total funding of the project by the private partner. Financing and the arrangements associated with financing are very complex and difficult to standardize. Although there might be PPPs without private financing, the fact that the private partner participates with its own capital provides incentives for good performance. Therefore, a financing structure of the PPP which includes equity from the private sector is considered a good practice.

d) PPPs are output oriented

Unlike traditional public procurement, where an input-based payment system is often adopted, PPPs are remunerated according to the results and performance obtained. This approach towards results consequently leads to a clear incentive for the private partner to be efficient and innovative in the contract management, enabling higher profits if it outperforms the initial performance targets. These productivity earnings sooner or later will be transferred to the public partner (generally in the form of lower prices to customers, better quality or minor charges for the tax-payer). PPPs also target the achievement of pre-specified goals.

e) The private partner bears a significant number of risks

The various risks associated with the contract must be allocated to the party best able to manage them, that is, the party able to mitigate the risk.
As a rule, the risks relative to the infrastructure operation and service provision should be allocated to the private partner, as well as the project and construction risks. It is more difficult to determine who is best able to mitigate consumption/demand risks (for example in the case of a toll road where the private sector only has limited influence over traffic volume) and these, as well as foreign exchange risks and political risks are often retained by the public sector. The adequate risk transfer and allocation is a condition sine qua non for the success and effectiveness of the PPP.²

2.1.3. Models of Public-Private Partnerships
The following terms are commonly used to describe partnership agreements in Canada, although this should not be considered a definitive or complete listing:

**Design-Build (DB):** The private sector designs and builds infrastructure to meet public sector performance specifications, often for a fixed price, so the risk of cost overruns is transferred to the private sector. (Many do not consider DB’s to be within the spectrum of PPP’s).

**Finance Only:** A private entity, usually a financial services company, funds a project directly or uses various mechanisms such as a long-term lease or bond issue.

**Operation & Maintenance Contract (O & M):** A private operator, under contract, operates a publicly-owned asset for a specified term. Ownership of the asset remains with the public entity.

**Build-Finance:** The private sector constructs an asset and finances the capital cost only during the construction period.

**Design-Build-Finance-Maintain (DBFM):** The private sector designs, builds and finances an asset and provides hard facility management (hard fm) or maintenance services under a long-term agreement.

**Design-Build-Finance-Maintain-Operate (DBFMO):** The private sector designs, builds and finances an asset, provides hard and/or soft

---

² Body of Knowledge on Infrastructure Regulation [Response by Rui Cunha Marques, February 2010]
facility management services as well as operations under a long-term agreement.

**Build-Own-Operate (BOO):** The private sector finances, builds, owns and operates a facility or service in perpetuity. The public constraints are stated in the original agreement and through on-going regulatory authority.

**Concession:** A private sector concessionaire undertakes investments and operates the facility for a fixed period of time after which the ownership reverts back to the public sector.

Other terms used in the PPP field:

**RFEI:** Request for Expressions of Interest

**RFQ:** Request for Qualifications

**RFP:** Request for Proposals

Table 2-1 summarises the advantages and disadvantages of the four main groupings of PPP relationships.

2.1.4 **TYPICAL PROJECT STRUCTURE**

The following figure 2-1 shows a typical PPP project structure (adapted from Radford, 2003):

2.1.5. **Critical Success Factors in PPP/PFI (Private Finance Initiative)**

Rockart (1982) defines Critical Success Factors (CSFs) as: “those few key areas of activity in which favourable results are absolutely necessary for a manager to reach his/her goals”. Table 2-2 shows summary of critical success factors in PPP/PFI

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3 The Canadian Council for Public-Private Partnerships
4 European Commission Directorate -General Regional Policy Guidelines For Successful Public – Private Partnerships
5 International legal news (an international lawyers & network publication) Tuesday, June 20, 2006 Procurement and Risk Management - The Drafting of PPP Documents
Gadens Lawyers, Queensland, Australia by Roger Quick
6 Critical Success Factors For PPP/PFI Projects In The UK Construction Industry: A Factor Analysis Approach Hardcastle, C.1, Edwards, P.J.2, Akintoye, A.1 and Li, B.1 11 School of the Built and Natural Environment, Glasgow Caledonian University, Scotland. 2 School of Property, Construction and Project Management, RMIT University, Melbourne,Australia (currently Leverhulme Trust Visiting Fellow in the School of the Built and Natural Environment, Glasgow Caledonian University).
<table>
<thead>
<tr>
<th>PPP Type</th>
<th>Main Features</th>
<th>Application</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracting</td>
<td>• Contract with Private party to design &amp; build public facility</td>
<td>• Suited to capital projects with small operating requirement.</td>
<td>• Transfer of design and construction risk.</td>
<td>• Possible conflict between planning and environmental considerations.</td>
</tr>
<tr>
<td></td>
<td>• Facility is financed &amp; owned by public sector</td>
<td>• Suited to capital projects where the public sector wishes to retain operating responsibility.</td>
<td>• Potential to accelerate construction programme.</td>
<td>• May increase operational risk.</td>
</tr>
<tr>
<td></td>
<td>• Key driver is the transfer of design and construction risk.</td>
<td>•</td>
<td>•</td>
<td>• Commissioning stage is critical.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>• Limited incentive for whole life costing approach to design.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>• Does not attract private finance.</td>
</tr>
<tr>
<td>BOT</td>
<td>• Contract with a private sector contractor to design, build and operate a public facility for a defined period, after which the facility is handed back to the public sector.</td>
<td>• Suited to projects that involve a significant operating content.</td>
<td>• Transfer of design, construction and operating risk.</td>
<td>• Possible conflict between planning and environmental considerations.</td>
</tr>
<tr>
<td></td>
<td>• The facility is financed by the public sector and remains in public ownership throughout the contract.</td>
<td>• Particularly suited to water and waste projects.</td>
<td>• Potential to accelerate construction.</td>
<td>• Contracts are more complex and tendering process can take longer.</td>
</tr>
<tr>
<td></td>
<td>• Key driver is the transfer of operating risk in addition to design and construction risk.</td>
<td>•</td>
<td>•</td>
<td>• Contract management and performance monitoring systems required.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>• Cost of re-entering the business if operator proves unsatisfactory.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>• Funding guarantees may be required.</td>
</tr>
<tr>
<td>DBFO</td>
<td>• Contract with a private party to design, build, operate and finance a facility for defined period, after which the facility reverts to the public sector.</td>
<td>• Suited to projects that involve a significant operating content.</td>
<td>• As for BOT plus:</td>
<td>• Possible conflict between planning and environmental considerations.</td>
</tr>
<tr>
<td></td>
<td>• The facility is owned by the private sector for the contract period and it recovers costs through public subvention.</td>
<td>• Particularly suited to roads, water and waste projects.</td>
<td>• Attracts private sector finance;</td>
<td>• Contracts can be more complex and tendering process can take longer than for BOT.</td>
</tr>
<tr>
<td></td>
<td>• Key driver is the utilisation of private finance and transfer of design, construction &amp; operating risk.</td>
<td>•</td>
<td>• Attracts debt finance discipline;</td>
<td>• Contract management and performance monitoring systems required.</td>
</tr>
<tr>
<td></td>
<td>• Variant forms involve different combinations of the principle responsibilities.</td>
<td>•</td>
<td>• Delivers more predictable and consistent cost profile;</td>
<td>• Cost of re-entering the business if operator proves unsatisfactory.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>• Greater potential for accelerated construction programme; and</td>
<td>• Funding guarantees may be required.</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>• Increased risk transfer provides greater incentive for private sector contractor to adopt a whole life costing approach to design.</td>
<td>• Change management system required.</td>
</tr>
<tr>
<td>Concession</td>
<td>• As for DBFO except private party recovers costs from user charges.</td>
<td>• Suited to projects that provide an opportunity for the introduction of user charging.</td>
<td>• As for DBFO plus:</td>
<td>• As for DBFO plus:</td>
</tr>
<tr>
<td></td>
<td>• Key driver is the Polluter Pays Principle and utilising private finance and transferring design, construction and operating risk.</td>
<td>• Particularly suited to roads, water (nondomestic) and waste projects</td>
<td>• Facilitates implementation of the Polluter Pays Principle; and</td>
<td>• May not be politically acceptable</td>
</tr>
<tr>
<td></td>
<td>•</td>
<td>•</td>
<td>• Increases level of demand risk transfer and encourages generation of third party revenue.</td>
<td>• Requires effective management of alternatives / substitutes, e.g alternative transport routes; alternative waste disposal options)</td>
</tr>
</tbody>
</table>