

Risk analysis for project based infrastructure financing a reference framework

Dametken Turekulova¹, Berik Beisengaliyev², Bekarshin Zhumanova³, Nazgul Syrlybayeva⁴, Gulzhan Nigmatova⁵

¹Doctor of Economics, Kazakh University of Economics, Finance and International Trade, Head of Department Management, Astana, Kazakhstan

²Doctor of Economics, Kazakh University of Economics, Finance and International Trade, Professor Department Management, Astana, Kazakhstan

³Candidate of Economic Sciences, Associate Professor, Head of Department of the Kazakh University of Technology and Business, Astana, Kazakhstan

⁴Candidate of Economic Sciences, Associate Professor, Department of «Finance» Kazakh University of Technology and Business, Department of Business Technology, Astana, Kazakhstan

⁵Associate Professor, Head of the department «Accounting and Auditing» Caspian State University of Technology and Engineering, Aktau, Kazakhstan

kairat_phd@mail.ru

Abstract: This work is a part of an ongoing research that addresses the issue of exploring a risk profile of Project Financing (PF) mechanism and Public-Private Partnership (PPP) projects for infrastructure development and focuses on developing a risk analysis framework for the Kazakhstani PPP market. To achieve this the research is carried out in three stages. First, the authors provide a pertinent literature review of PPP projects being delivered in Kazakhstan and gain advantages from experienced countries with the purpose of establishing the research background for the risk analysis. Second, an exploratory analysis will be conducted to investigate the risk profile and factors that might affect the success of the PPP projects. Finally, a risk analysis framework and model is expected to be developed as a reference for future PPP projects. It is noted, that the research is still in progress and no final results are derived as yet, hence, in this paper the authors attempt to present the first stage's preliminary results highlighting relevant points with suggestions for further research.

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1. Introduction

Infrastructure projects can be delivered in a number of ways with a purely public- or purely private-based scheme being two extremes of funding. To overcome both government failure (due to its budget constraints, lack of project-specific skills etc.) and market failure (inequalities in the distribution of infrastructure services etc.), a Public-Private Partnership (PPP) approach can be incorporated to strengthen the parties' involvement and achieve the synergy effect [1]. PPP is referred to as an arrangement between two or more parties who have agreed to work cooperatively toward shared and/or compatible objectives and in which there is a shared authority and responsibility; joint investment of resources; shared liability or risk-taking; and ideally mutual benefits [2].

In recent years, Project Financing (PF) has gained worldwide popularity as a funding and contracting mechanism to establish a long-term PPP for the purpose of delivering a variety of infrastructure and service facilities. Under the PPP

scheme, one or more investors join a special purpose vehicle (SPV) company to design, build, finance, and operate a facility for a specified concession period, which usually spans from 20 to 40 years after which the public owner gets back the facility for its own usage, typically with no extra cost. The initial investment is intended to be recovered through revenues from the service provided during the concession period, which is determined to pay off the debt incurred and earn an acceptable profit from the project cash flows [3, 4].

2. Material and Methods

Despite the advantages that the PPP can bring into infrastructure development, striking nature is its high level of risks, due mainly to the long concession period and the diversity of participants involved in the consortium; therefore, risks are always an active research topic in this field [5, 10]. In this regard, the current work provides a pertinent literature review of the PPP projects being delivered in Kazakhstan and gain advantages from experienced

countries with the purpose of establishing the research background. This serves for the risk analysis of the projects to be referred to as a reference framework for future PPP projects in Kazakhstan.

3. Results

The PPP market emerged in Kazakhstan in the early 2000s. As a further step towards gaining the advantages from the PPP scheme, in 2006, the Law “On Concessions” was adopted, according to which Build-Transfer-Operate (BTO) contracts became legal [6]. This Law was not the first move toward PPP, several contracts between government and private sector were implemented long before it and was regarded as pre-PPP period for Kazakhstani economy. From 2006 till 2013 six PPP projects were underrun; not all of them were successful. For example, the Shar to Ust-Kamenogorsk railway has seen to have lower than expected freight volumes. In the beginning of 2013 new amendment to legislation was adopted, the main changes were connected with entrance of new forms of PPP delivery systems such as Build-Own-Operate (BOO), Build-Operate-Transfer (BOT), and Design-Build-Finance-Operate (DBFO).

Sectors where the PPP can benefit include the transportation, energy, and social infrastructure sectors. The practice of toll roads is expected to be realized in the short-term. For example, a road from Astana to the northern resort area of Borovoye is under consideration to be turned into the toll road granting the construction, operation, and maintenance to the private sector. Kazakhstan Public-Private Partnership Centre states that the PPP system is also expected to be applied to railroad construction projects with the primary goal of establishing a private company to operate these projects for 25-30 concessionaire years. Those include a segment of railroad between Eraliyevoye and Kuryk, and a segment of railroad between Korgas and Zhetigen [6, 11]. Another PPP project in Kazakhstan is the construction and operation of an international airport passenger terminal in Aktau, also as a long-term concession [7].

According to Kazakhstani PPP center [6] there are 27 ongoing PPP projects in different areas. Table 1 presents information on industry sector, number, location, and contract type of ongoing projects. Among all this projects only six have passed feasibility and bidding documents' preparation stages.

Table 1 - Current PPP projects by type of industry

Industry	№	Location	Type of Contract
Health and social service	3	Almaty region (1), Karaganda region (1), South-Kazakhstan region (1)	Concession
Urban infrastructure	8	Astana city	Concession
Education	4	East-Kazakhstan region (2), Karaganda region (2)	Concession
Energetics	2	Aktobe region	Concession
Transport (roads)	3	Almaty region (1), West-Kazakhstan region (1), Mangystau region (1)	Concession
Transport (railroad)	6	Almaty region (1), East-Kazakhstan (2), Magystau region (3)	Concession
Airports	1	Mangystau region	Concession

Infrastructure assets usually in PPP have the comparatively low risk to the other types of assets due to their tangible characteristics. But the value of assets depend not only its ability to be easily located, but also on their liquidity and ability to generate revenue. Variability or volatility in the value or in their ability to generate revenue is basically what describes their riskiness of any project in general sense. If plans are realized and revenues are streamed, infrastructure assets might have bond like characteristics and thus could be valued accordingly.

Risk management is an essential tool in PF which aims in mitigating and limiting (restricting) the activities of the entity into a single purpose, SPV (Fig. 1). Created for the purpose of successful delivering a project, the vehicle is mostly off balance sheet entity that implies that companies cannot do anything outside of its framework. It represents the first step in the risk management process, especially

in oil and gas projects and in politically unstable environment.

Infrastructure investments in PPP involve the development, operation and ownership either by a private sector or via joint venture. Infrastructure projects incur high initial capital costs; long duration and need to be managed and paid for on a long-term basis, which once again underlines the risk management of this type of projects.

One of the solid illustrations where SPV was effectively used is a Petrozuata [8, 12] – an offshore oil drilling project near Venezuela, which had seen a political and economic instability for prolonged time. It would be impossible to realize this project without a SPV type of structure, which is pretty much isolated from many risks and interferences. Types of risk involved with Petrozuata project were 1) off-take risk; 2) market risk (price); and 3) political risk.

Off-take risk was mitigated by including leading oil companies such as Conoco in the project. When in fact a project had a BBB bond rating, with Conoco involved to the project, its implied rating improved to AA and in a sense was hedged by Conoco. Not only cost of capital was decreased, but also risks involved with the project were drastically diminished.

Market risk which mainly depends on the price volatility of oil was another concern. In this case the risk could be mitigated but only partly. Fortunately the price of oil increased right after the competition phase of the project and hence was never a problem. But when fortune turns itself over, some financial instruments such as futures could have been used to secure the oil prices. The only drawback that comes with those types of derivatives is that their duration is usually much shorter and cannot help to secure the price for the longer term.

Political risk is not a non-solvable problem as it previously was. The MIGA under the World Bank has all the means and instruments to influence any country, hence can provide a political insurance for large foreign infrastructure projects. If the

consortium decides to deal with the political risk, they can also increase the cost of capital accordingly, as it was the case with Petrozuata, where 300 basis points were added to the cost of capital.

Additionally, the following early warning system could be built into projects:

- 1) Built-in triggers (covenants tied to some indicators and measures);
- 2) Incentives (so that each party has more to gain if milestones are met);
- 3) Transparency (information system about the project and its progress);
- 4) Finite leverage and adequate equity (equity is good for project governance);
- 5) Syndication (good for risk transfer and risk sharing, this lowers the risk and the cost of capital).

There could also be many other types of risk that infrastructure projects in PPP projects. As depicted in Fig. 2, more detailed analysis and a general breakdown of risk includes technical, business, financial, environmental/social and external risks [9].

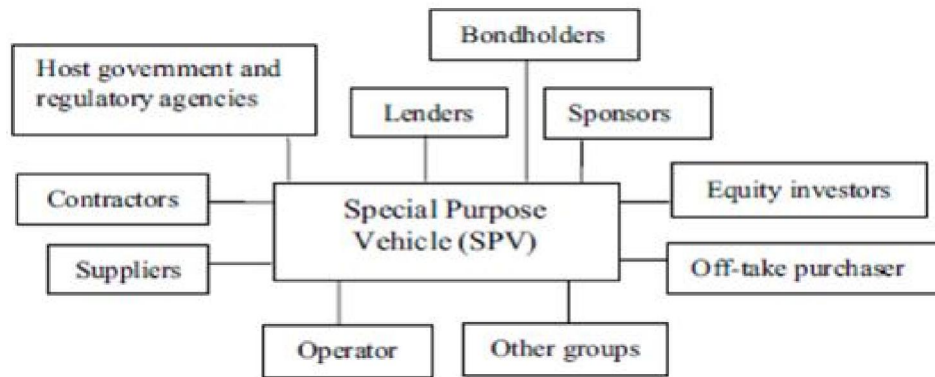


Figure 1 - A typical SPV structure

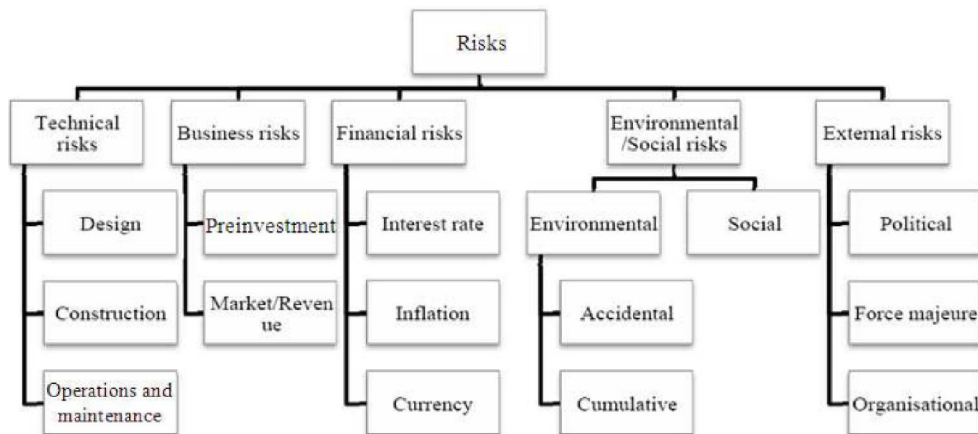


Figure 2 - Proposed risk breakdown structure for a typical PPP/BOT project

Furthermore we plan to create a methodology for analyzing and quantifying the risk, which could be then used in establishing a rating of the project's success probability, based but not limited to the mentioned risk factors. We would like to refine the CAPM approach, since it heavily depends on the beta (systemic covariance risk), which is more applicable to the countries with developed equity markets. Our approach to the project's preliminary risk assessment will also include regional business climate analysis, region's population density and growth, per capita income and etc., which play important role in project's cash flows forecasts and ability to attract partners for syndication.

4. Discussions

PF/PPP is a new project delivery mechanism for the Kazakhstani infrastructure market. The approach covers some disciplines such as construction and project management, public policy and administration, and project finance. It has proliferated in the developed world and is becoming important alternative to other approaches for project-based infrastructure development. However, as we can see from the foreign experience it is easier said than done. This is because PF/PPP is not well understood yet, which further increases the role of risk management of PPP projects. Hence it is important to understand the context in which PPP can work and not to limit it to the macro level framework. Businesses and governments need to have common goals and understand that each of them have different priorities. Likewise, it is paramount that all the parties understand the risks and also able to quantify them, since the success of the project depends on hard numbers. Understanding risks could also help to transfer the risks to the parties that can better shoulder them (based on previous experience), thus decreasing the cost of capital and risk for the projects.

As far as future research directions are concerned, the authors plan to explore the role of equity, which is underplayed in many PPP projects, but play important role in effective project management. Last but not least, as many empirical studies have shown, the success of many PPP projects also depend on the business climate (on macro and micro level) and hence should be factored in the analyzing their probable success. As a final note, the authors aim to refine a CAPM approach in the risk analysis, to make it more applicable to the emerging markets and include in the risk analysis. Finally, a risk

analysis framework and model is expected to be developed as a reference for future PPP projects.

Corresponding Author:

Turekulova
Kazakh University of Economics, Finance and International Trade, Head of Department Management, Astana, Kazakhstan
E-mail: kairat_phd@mail.ru

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