

A COMPARATIVE STUDY ON PPP AND BOT MODEL OF WORKING CAPITAL MANAGEMENT IN METRO RAIL PROJECTS

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Abstract: In recent decades, the global emphasis has been on infrastructure PPPs and BOTs. Public services are improved through private investment. PPPs require governments to carefully pick private partners. Select the best PPP project partners. Collaboration necessitates a strong public-private commercial relationship. Few technologies assist governments in selecting the best private partner, which is critical for PPP and BOT projects. This research assists governments in making such decisions by identifying and researching the best private partners for PPP projects, developing a model for selecting the best private partner, and developing models and a framework for evaluating a project's risk profile from the perspective of the funding agencies.

First, choose the finest commercial partners for PPP and BOT infrastructure projects. A fuzzy analytic network process (FANP) manages the selection process' imprecision, ambiguity, and uncertainty. This model is more realistic than deterministic models because it considers possible dependencies between alternatives and selection criteria and among selection criteria. Public financial data is used to interpret a project's free cash flow. Four criteria are used to assess private partners' financial capacity using total free cash flows. Two Indian PPP projects—HMR and MAHA-MR—used the strategy to rank and prioritize their private partners by bankability.

Keywords: PPPs, BOT, FANP, bankability, private partners etc.

1. Introduction:

To improve the road network and boost the economy, the private-public partnership (PPP3) model was used in the late 1990s. Modernizing roads to the greatest standards has made several nations more competitive. Institutional actions by the federal government have encouraged private sector road network construction (Bashiri, 2019). The private sector helped create this industry. Private companies that invest in developing nations must upgrade their road networks (Iossa, 2018). PPPs coordinate and share resources with initiatives, use private sector resources, and categorize projects by risk. Cross-sector government investment in financial assets is another concern. PPP in road infrastructure will enable long-term economic growth. There are many PPP models that can be customized to a company's goals. With skilled project managers, the public sector can work with the private sector to achieve its tasks.

Public-private partnerships (PPPs) decrease costs, speed development, and eliminate financial problems for significant infrastructure projects in many countries. Public-private partnerships (PPPs) boost infrastructure projects by integrating public and private resources (Liguang, 2017). A private corporation may receive a concession from the public sector to finance, design, build, own, and operate a big infrastructure project facility. This construction process is called Build-Own-Operate-Transfer (BOT) or Build-Transfer (BT). The private corporation will administer it for a time. Investors can get their money back and fund project operations and maintenance (Singh, 2017).

Public-private partnerships often deploy BOT (Sudhansu, 2015). The concession period frequently raises fees. Correlating growth with internal and external factors can provide proponents a solid internal rate of return. Public-private partnerships and infrastructure use BOT most. A build-operate-transfer (BOT) arrangement is formed when a government agency contracts with a private company to create, operate, and maintain infrastructure. The private party funds the project, controls the facilities, and keeps all earnings (Shastry, 2014). At the end of the concession term, the private entity will receive the facility for free.

1.1. Objectives:

1. Examine the literature review and current partner selection practices, identifying any gaps and limitations.

2. Examine and determine the criteria for selecting the most suitable private partner to collaborate with a government agency on a PPP project.
3. Develop a model for selecting the most suitable private partner.
4. Develop a model to quantify risk factors and evaluate the bankability of private partners in PPP initiatives before approving their request to borrow funds.

2. Literature review:

Iossa, (2018) defines public-private partnerships (PPPs) as programs and services that use private sector resources to offer public sector services and infrastructure. PPP contracts awarded to private companies through open bidding prioritize public benefit results. Traditional procurement is faster and cheaper than PPP tenders (Liguang, 2017). Chou, (2012) found through interviews that parties' expectations, contractual responsibilities, and philosophical perspectives caused the problems. I think disputes cause most relationship problems. Markom (2012) considered concessions. The concessionaire must design and deploy cutting-edge financial instruments and procedures to meet these requirements. Bashiri, (2019) claims that a project's financial package is more significant than its engineering. Financial institutions must evaluate business ideas from inception through maturity. Financial institutions will only invest in projects with complete financial, economic, and technological planning and an acceptable risk allocation approach, according to Mane, (2013). The project, hazards, and financial institutions must be considered in this plan. Financial institutions' credit rating processes are usually kept secret, according to Ebner, (2013). The rating mechanism is only accessible to bankability evaluation model staff. Bank directors and debt assessors alone. Institutions use many internal credit ratings. The banks believe that a well-managed judgement rating system may better assess risk than statistical models from external credit rating organizations.

3. Research methods:

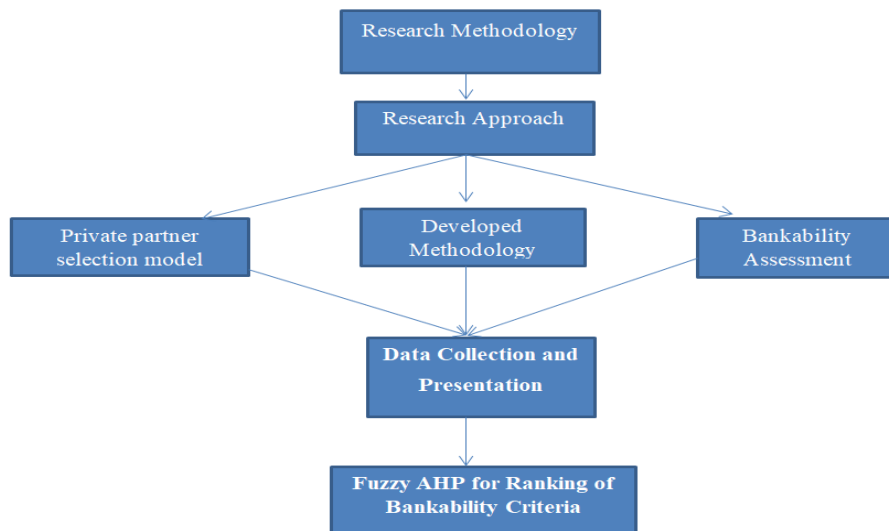


Figure.1. Illustration of methodology Overview (Source: Self Drawing)

The created methodology is meant to fill in the blanks left by the identified research gaps and constraints detailed in depth in literature review. Two models make up this methodology: one for choosing private partners and another for determining whether or not a venture may actually be profitable. Detailed descriptions of the research strategy and the methods used in this study are presented first, as shown in Figure.1. After that is a brief overview of the two models that were created (Ebner, 2013).

3.1. Research approach:

The realization that there is a need for decision support tools to assist in the selection of private partners in PPP projects served as the impetus for this line of investigation. Figure.1. provides a visual representation of the research method that was utilized in the production of this thesis. The method starts with a scan of the current literature to identify the criteria

for selecting a private partner (Bashiri, 2019). We conducted a survey targeting both academics and working professionals in the sector to find out whether or not PPP projects should meet these criteria and, if so, to what extent. The models that are detailed in the thesis are created with the help of the survey data. The validity of models is tested by applying them to empirical case studies taken from the real world, and the findings are recorded.

4. Result and discussion:

The developed methodology for selecting the best private partners in PPP projects was put to the test across four different case studies. These case studies vary greatly in terms of location, scope, type, budget, and concession length (Fan, 2010). This discrepancy was also visible in the predicted criterion weights. The model was applied using the Fuzzy Analytical Network Process (FANP) in this case study. By using this ways, the decision maker can verify the model predictions and increase their trust in the results (Liguang, 2017).

Table.1. Case study of metro project result comparison (Source: Survey data)

Test description	Private partner		BOT		Actual
	P1	P2	B1	B2	
FANP	0.075	0.250	0.245	0.510	—
"	0.175	0.099	1.000	0.651	—
"	0.190	0.125	1.550	0.780	√

FANP takes into account the interdependencies among the selection criteria and the uncertainty and vagueness in the experts' evaluation, and therefore how well they suit the project objectives. Even though Table.1 shows how FANP determine the relative value of several evaluation criteria, the official government assessment of the project in question only considered financial and technical factors (Markom, 2012). Above figure shows that the financial and technical requirements have far greater weights than the management and safety/environmental criteria. The evaluating body's overemphasis on financial and technical considerations led to a subpar choice of private partner. This highlights the relevance of considering all aspects in the selection process to arrive at a complete assessment of the applicants.

Table.2. Case study II metro project result comparison (Source: Survey data)

Test description	Private partner		BOT		Actual
	P1	P2	B1	B2	
FANP	0.095	0.294	0.255	0.601	—
"	0.241	0.100	1.210	0.753	—
"	0.276	0.164	1.750	0.975	√

Table.2 contrasts the FANP approach in terms of the total weight of the criteria, showing that there is a clear distinction. The discrepancy in criterion weight shown in above Figure can be explained by the fact that different weighting procedures produce different results.

4.1. Comparing Two Financing Modes operation procedures

Table.3. Comparing Two Financing Modes (Source: Survey data)

S. No.	Model	BOT	PPP
1	Project cycle	Project Identification Bidding Process Project company set up	Project selection Project Identification and Appraisal Project company set up

		Project financing Construction Operation Project transfer	Bidding Process and project financing Construction Operation Project transfer
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Table.4. Comparison of the two financing Models' Suitability (Source: Survey data)

S. No.	Comparison aspect	BOT	PPP
1.	Risk	High	Medium
2.	Accessibility of fund	Hard	Easy
3.	Ownership of Government	Absolute	Partial
4.	Franchise	None	Partial
5.	Financing costs	High	Medium
6.	Financing Time	Long	Short
7.	Risk of Government	High	Medium
8.	Policy Risk	High	Medium
9.	Impact for Macroeconomic	Both	Favorable
10.	Scope	Infrastructure projects with proven technologies and reliable returns on investment have less rivalry.	Low-return-on-investment policy infrastructure projects in metropolitan areas

4.2. Development of Two Financing Models in India:

4.2.1. The Development of BOT in India:

India was the first country to adopt BOT, the most advanced financial system now in use. Government support for a BOT project is essential to its ultimate success. It's important to think about because it could affect the BOT project in a variety of ways. As a result, our government needs to keep the following worries about BOT in mind. The government's BOT project selection process should be robust enough to accommodate the projects' distinctive features. The investment needed to complete the project is directly proportional to the scope of the endeavor. If the sponsors take on all of the risk, the project's price tag will skyrocket for the end user and the government; hence the government should bear some responsibility for the project's success or failure. Government approval of BOT project financing is a grey area that needs further attention (Markom, 2012).

4.2.2. The Development of PPP in India:

The Indian government has studied and experimented with the PPP since the 1990s in an effort to shift away from its traditional role as a supplier of investment and money and toward a more open and accountable contractual relationship with the public. In 2013, the government introduced the operational and legal documentation required to launch the PPP for its many objectives (Iossa, 2018).

Despite the nation's outstanding achievements in space exploration, India's public-private partnership (PPP) sector is far from ideal. Before the government to fully benefit from PPP financing, it must address these challenges. The first step is for the government to quit taking the lead in infrastructure projects and start working with others. Second, there must be a fair system for allocating risks (Mane, 2013). The government is ultimately responsible for formulating effective regulations. Typically, multinational conglomerates are the private companies that participate in PPP. The government and they must adhere to the letter of the law in all discussions (Sudhansu, 2015).

5. Conclusion:

This study prioritizes projects by economic viability and examines what factors influence private partner selection in PPP infrastructure projects. The technique uses private partner selection and bankability evaluation to achieve its goals. Fuzzy Analytical Network Process (FANP) was used to choose business partners. Our study lacks hierarchical structure and well-defined values for paired judgements, unlike AHP and Goal Programming. To account for uncertainties, the FANP makes priority decisions within fuzzy intervals.

Two case studies tested bankability analysis. Both case studies calculated their base case, worst case, and best case Debt Service Coverage Ratio, Free Cash Flow for Debt Services, and Present Value. Accounting data values vary, so each project's income statements and balance sheets were updated. Changes to either account immediately affect the cash flow statement. Calculations are visualized. All ventures will share some ground, although it may change over time. These evaluations found that PPP project bankability depends on technical feasibility, operations, completion, environmental impact, market impact, and counterparty reliability.

5.1. Future scopes:

The following are suggestions for future studies based on the available data. The suggestions range from minor tweaks to complete overhauls of the current system.

1. More information regarding actual PPP projects, such as through surveys distributed to experts in different countries, could increase model accuracy.
2. Additional project data can verify the effectiveness of the process. Therefore, models may be calibrated using real-world data and expert input can be incorporated.
3. Create a web-based software program that government organizations can utilize to access and gather model data in order to increase accuracy.

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