https://doi.org/10.52131/joe.2021.0303.0051

*i*RASD Journal of Economics

Volume 3, Number 3, 2021, Pages 368 – 375

Journal Home Page:
https://journals.internationalrasd.org/index.php/joe

Risk Management in the Malaysian Build Operate Transfer Projects

Dr Usman Ahmad[1], Dr Kashif Akram[2], Erum Fatima[3], Muhammad Hussain[3]

[1] DHA Suffa University, Karachi, Pakistan. Email: usmanahmadjee87@gmail.com
[2] Department of Management and HRM, IBMAS, The Islamia University of Bahawalpur, Bahawalpur. Email kashif.akram@iub.edu.pk
[3] DHA Suffa University, Karachi, Pakistan. Email: efatima@dsu.edu.pk
[4] DHA Suffa University, Karachi, Pakistan. Email: muhammadhussain637@gmail.com

ARTICLE INFO

Article History:
Received: November 30, 2021
Revised: December 28, 2021
Accepted: December 29, 2021
Available Online: December 30, 2021

Keywords:
Build Operate and Transfer
Public Private Partnership Projects
Risks
Risk Management

JEL Classification Codes:
D64, G32, H54,

ABSTRACT

In Malaysia, Public Private Partnership (PPP) is one of the tools to develop infrastructure. Although, there are various forms of PPP projects but Build Operate and Transfer (BOT) is commonly used in infrastructural projects. Despite, the benefits of adopting PPP, there are a few issues that require focus of the practitioners and researchers such as; risk management in PPP projects. Therefore, this study describes the process of risk management in Malaysian BOT Projects as this PPP arrangement is applied in infrastructure development. The study has employed the exploratory sequential research method to achieve the objective. The results of the study concludes that most of the extreme risks are allocated to SPV thus selection of SPV is crucial for BOT projects.

Corresponding Author's Email: usmanahmadjee87@gmail.com

1. Introduction

The Malaysian government seeks the involvement private sector for the provision of infrastructure by using Public Private Partnership (PPP) due to budgetary pressures (Ismail, 2013a). This tool of PPP benefits the government through increase in innovation and reduction of capital investment of government (Ismail, 2013b). This exertion permits the transfer risks from public sector to the private sector. Despite the aids of PPP, a few numbers Malaysian infrastructural PPP projects have underachieved the desired objectives (Ahmad, Ibrahim & Minai, 2017; Mohamad, Ismail & Said, 2018). The Malaysian public audit report emphasized the various problems PPP projects; delay in constructions, the dearth of monitoring and risk management ("Auditor General's Report", 2012, 2015 & 2016). Similarly, Mottain (2017) also reported the issues of technical feasibility as main reason of low cash flows for the Malaysian Light Rail Transit (LRT). Moreover, inaccurate cost-benefit assessment in LRT projects and Kulim-Butterworth Highway is one of the reasons of failure (Markom, 2012). The literature identifies that the deficiency in risk management practices is primary reason of underperformance of Malaysian PPP projects (Ahmad, Waqas & Akram, 2021; Fischer, Leidel, Riemann, & Wilhelm Alfen, 2010; Keers & Van Fenema, 2018; Khadaroo, Wong, & Abdullah, 2013; Markom, 2012).

Ahmad, Ibrahim and Abu Bakar (2018b) identify that the recent literature stresses more on the identification, allocation and analysis of risk, than overall risk management. Therefore, the robust understanding of risks in PPP and the appropriate risk management is vital in PPP projects to achieve the desired objectives (Fischer et al. 2010, Ahmad et al., 2018b). In Malaysia,

the Build Operate and Transfer (BOT) has been adopted in Malaysian infrastructural sector (Ahmad, Ibrahim & Abu Bakar, 2018).

Hence, this study intents to elucidate the risk management, analyze the risks and elaborate the risk mitigation process of Malaysian BOT Projects. The findings of the study may contribute in managing the risks for BOT projects and may create a better understanding for researchers. In addition, the description of risk management practice may help manager in analyzing, mitigation and monitoring of the risks.

2. PPP Projects

Governments worldwide seek private sector involvement in infrastructure and public services delivery. This involves the privatization of public owned industries or property, contracting out services or using private finance for infrastructure development (Sindane, 2000; Ng, 2000). It is accepted that concept of PPP is more prominent and used by different governments including UK, USA, Europe and Malaysia as compared to other tools of seeking private sector participation in public projects.

Li (2003) mentioned various forms of PPP arrangements though, the concession agreement is the most frequently used model because in this model the ownership is transferred to the private contractor for the definite time and BOT is one the form of concession agreement.

In BOT, the Special Purpose Vehicle (SPV) (Private Partner) contract to finance, build, and operate the infrastructure (for instance, highways) project for a fixed period of time (Li, 2003; Yescombe, 2011). During the fixed period, the SPC collects the revenue from users and after the expiry of the concession period the ownership would revert to the host government (Finnerty, 1996). The government saves the capital cost of developing an infrastructure through BOT arrangements and attains the ownership after the specified concession period (Stein, 1994).

3. PPP Risk Management

The literature (Ahmad et al., 2018b; Fischer et al., 2010 & Li, 2003) describes the following steps of risk management in PPP projects:

- Risk Assessment: it involves the identification and assessment of risks.
- Risk Treatment: Development of strategies to respond the particular risk.
- Risk monitoring: Maintaining risk registers and database for continuous monitoring

4. Methodology

This exploratory sequential research design is adopted for the current study (Cresswell, 2013). In the first stage, the study conducted interviews to, explain the process of BOT projects, examine the risks and to describe the BOT risk management process. In the second stage, to illustrate the severity of risks the risk are ranked and allocated to contracting parties on the basis of questionnaire survey.

In first part of interview, the respondents selected the risk from a catalogue that was established on the basis of literature (Ahmad et al., 2017; Hwang et al., 2013, Li, Akintoye, Edwards & Hardcastle, 2005). Moreover, the respondents of interview discussed the categorization and allocation of the risks involved in BOT. In the third part, the respondents were enquired to share the strategies for managing identified risks in BOT projects. All the eighteen interviewees had the experience of at least 5 years in the BOT projects. The Atlas ti 8.1 was

employed for thematic analysis of interview data. The thematic analysis results into themes/codes and relationship of these themes explains the BOT risk management process.

The questionnaire survey was conducted in the second stage through email/mail to rank and allocate the risks. The study selected the managers of both public agency and SPV for survey who were involved in Malaysian BOT projects.

5. Results and Discussion of Interviews

The Atlas ti 8.2 analyze the interview data and produce the report that contains all quotations for each theme/codes that elucidate the risk management process in BOT.

5.1. Risk Management in BOT Projects

The analysis of interview data depicts that the process of BOT risk management consists of assessment, treatment and monitoring of the risk. The detailed process follows as;

5.2. Risk Assessment

Risk assessment process comprises of identification, analysis and evaluation of risks in certain BOT project.

5.3. Risk Identification

The identification process in Malaysian BOT projects includes the identification of technical risks, financial risks, and legal risks. First, a committee of technical experts is formed in the technical risk identification. The government agency (i.e., UKAS/Ministry) elucidates the objectives and desired service level from the project. In order to meet the requirements of public agency, the SPV develops the "Design Concept". The technical experts describe all potential technical risks related to BOT project. After technical risk identification report, a committee of financial experts is formed to identify the financial risks. Lastly, legal experts highlight the legal factors.

The Table 1, lists the identified risks of Malaysian BOT projects. The identified risks are different from the risks identified in literature such as; Ahmad et al. (2018), Ahmad et al. (2017) and Li et al., (2005).

5.4. Risk Analysis & Evaluation

The main objective of the PPP is to transfer risk to private sector (Dey & Ogunlana, 2004), whereas the transfer of all risks is problematic. Prior to the allocation of risks, the risks are ranked based on risk analysis. In risk analysis the severity of risk and possibility of occurrence of risk is measured.

Based on survey, Table 2 illustrates the allocation and ranks risks based on survey. The mean score technique is adopted to rank the risks (Ahmad et al., 2017). The risks ranks 1-15 are extreme risks, 16-18 are high, 19-23 are moderate, 24-35 are low and remaining are negligible risks.

Table 1
Risks in BOT Projects

No.	Risk Category	Risks
1	Political and government policy	Unstable government
2		Expropriation or nationalisation of assets
3		Poor public decision-making process
4		Strong political opposition/hostility
5		Level of public opposition to project
6	Macroeconomic	Poor financial market
7		Inflation rate volatility
8		Interest rate volatility
9		Influential economic events
10	Legal	Legislation changes
11		Change in tax regulation
12		Industrial regulatory change
13	Natural	Force majeure
14		Geotechnical conditions
15		Weather
16		Environment
17	Project selection	Land acquisition (site availability)
18		Level of demand for project
19	Project finance	Availability of finance
20		Financial attraction of project to investors
21		High finance costs
22	Design	Delay in project approvals and permits
23		Design deficiency
24		Unproven engineering techniques
25	Construction	Construction cost overrun
26		Construction time delay
27		Material/labour availability
28		Late design changes
29		Excessive contract variation
30		Insolvency/default of sub-contractors or suppliers
31	Operation	Operation cost overrun
32		Operational revenues below expectation
33		Low operating productivity
34		Maintenance costs higher than expected
35		Maintenance more frequent than expected
36		Staff Crises
37	Relationship	Organisation and co-ordination risk
38		Inadequate experience in PPP/PFI
39		Inadequate distribution of authority in partnership
40		Inadequate distribution of responsibilities and risks
41		Differences in working method and know-how between partners
42		Lack of commitment from either partner
43		Corruption and bribery

5.5. Risk Treatment

In BOT project, risk treatment includes risk allocations and establishing risk mitigation policies. The detailed analysis of interviews explains the BOT risk treatment process as;

5.6. Risk Allocation

ISO (2009), divides the risk treatment techniques include risk sharing and risk transfer. In BOT projects, the allocation of risk is conducted at planning stage with mutual agreement of public agency and SPV. The analysis of survey data results the risk allocations between SPV and public agency for Malaysian BOT projects (Table 3). The study has concluded the risk allocations through comparisons of percentages.

Table 2
Risk Rankings

Risk factor	Mean Score	Risk Ranks
Construction time delay	4.70	1
Construction cost overrun	4.60	2
High finance costs	4.45	3
Design deficiency	4.37	4
Low operating productivity	4.35	5
Financial attraction of project to investors	4.30	6
Operational revenues below expectation	4.25	7
Operation cost overrun	4.23	8
Staff Crises	4.23	9
Organisation and co-ordination risk	4.23	10
Maintenance costs higher than expected	4.22	11
Maintenance more frequent than expected	4.12	12
Availability of finance	4.10	13
Delay in project approvals and permits	4.02	14
Unproven engineering techniques	4.01	15
Insolvency/default of sub-contractors or suppliers	3.98	16
Late design changes	3.90	17
Level of demand for project	3.70	18
Material/labour availability	3.12	19
Influential economic events	3.10	20
Excessive contract variation	3.10	21
Inadequate experience in PPP/PFI	3.10	22
Corruption and bribery	3.10	23
Interest rate volatility	2.90	24
Inadequate distribution of authority in partnership	2.90	25
Inflation rate volatility	2.80	26
Poor financial market	2.70	27
Differences in working method and know-how between partners	2.65	28
Unstable government	2.55	29
Legislation changes	2.50	30
Inadequate distribution of responsibilities and risks	2.50	31
Geotechnical conditions	2.30	32
Industrial regulatory change	2.22	33
Lack of commitment from either partner	2.15	34
Change in tax regulation	2.01	35
Weather	1.90	36
Level of public opposition to project	1.80	37
Strong political opposition/hostility	1.70	38
Force majeure	1.70	39
Environment	1.60	40
Expropriation or nationalisation of assets	1.50	41
Poor public decision-making process	1.20	42
Land acquisition (site availability)	1.20	43

Table 3
Risk Allocations in BOT Projects

Risk factor	Public Agency	SPV	Shared	Risk Allocations
Late design changes	83.90%	1.30%	14.80%	Public Agency
Influential economic events	79.00%	12.30%	8.70%	Public Agency
Excessive contract variation	76.10%	13.40%	10.50%	Public Agency
Unstable government	56.70%	1.10%	42.20%	Public Agency
Legislation changes	61.20%	19.00%	19.80%	Public Agency
Industrial regulatory change	71.20%	19.20%	9.60%	Public Agency
Change in tax regulation	67.00%	23.00%	10.00%	Public Agency
Level of public opposition to project	61.10%	12.00%	26.90%	Public Agency
Strong political opposition/hostility	73.70%	1.90%	24.40%	Public Agency
Expropriation or nationalisation of assets	96.30%	1.10%	2.60%	Public Agency
Poor public decision-making process	98.10%	0.00%	1.90%	Public Agency
Land acquisition (site availability)	87.30%	0.34%	12.36%	Public Agency
Organisation and co-ordination risk	16.00%	25.30%	58.70%	Shared
Delay in project approvals and permits	26.10%	27.30%	46.60%	Shared
Level of demand for project	23.50%	26.70%	49.80%	Shared
Inadequate distribution of authority in partnership	21.00%	31.00%	48.00%	Shared
Differences in working method and know-how between partners	23.10%	23.10%	53.80%	Shared
Geotechnical conditions	16.60%	21.00%	62.40%	Shared
Lack of commitment from either partner	21.00%	37.90%	41.10%	Shared
Weather	14.50%	12.00%	73.50%	Shared
Force majeure	1.20%	3.50%	95.30%	Shared
Environment	1.60%	5.60%	92.80%	Shared
Construction time delay	17.00%	67.10%	15.90%	SPV
Construction cost overrun	19.50%	66.60%	13.90%	SPV
High finance costs	7.50%	53.00%	39.50%	SPV
Design deficiency	3.00%	78.00%	19.00%	SPV
Low operating productivity	5.80%	81.00%	13.20%	SPV
Financial attraction of project to investors	21.00%	61.00%	18.00%	SPV
Operational revenues below expectation	14.00%	71.60%	14.40%	SPV
Operation cost overrun	21.50%	61.30%	17.20%	SPV
Staff Crises	1.50%	95.60%	2.90%	SPV
Maintenance costs higher than expected	12.40%	75.90%	11.70%	SPV
Maintenance more frequent than expected	7.80%	90.40%	1.80%	SPV
Availability of finance	2.40%	87.40%	10.20%	SPV
Unproven engineering techniques	12.30%	79.10%	8.60%	SPV
Insolvency/default of sub-contractors or suppliers	8.10%	86.20%	5.70%	SPV
Material/labour availability	0.13%	79.10%	20.78%	SPV
Inadequate experience in PPP/PFI	3.10%	84.50%	12.40%	SPV
Corruption and bribery	12.00%	78.60%	9.40%	SPV
Interest rate volatility	24.50%	58.10%	17.40%	SPV
Inflation rate volatility	9.10%	83.10%	7.80%	SPV
Poor financial market	1.20%	86.90%	11.90%	SPV
Inadequate distribution of responsibilities and risks	0.10%	94.00%	5.90%	SPV

5.7. Risk Mitigation Strategies

The Malaysian BOT project comprises of planning, construction and operational phase and the strategies of the risk mitigation are articulated at all of these stages by respective contracting

parties. However, most of the strategies are formulated at planning stage by public agency and SPV. The both contracting parties formulate the strategies for their allocated risks however, the mitigations strategies of shared risk are formed with mutual consent.

5.8. Risk Monitoring

In BOT risk management the risk monitoring occurs throughout the project, from planning stage to operational stage. During risk monitoring a Dispute Resolution Committee (DRC) and Project Monitoring Committee (PMC) are constituted that contains members from both SPV and public agency. The PMC performs the primary function of monitoring in BOT projects.

6. Conclusion

The study concludes that there is a dearth of literature to describe the PPP risk management, in particular for BOT projects. In addition, based on exploratory sequential method, the study identified forty-three risk factors for BOT projects. Among these risks, the fifteen risks are considered extreme risks for BOT projects and most of these risks are allocated to the SPV. In addition, ten risk factors are shared among the SPV and public agency.

Therefore, the study concludes that selection of the SPV is crucial in for risk management in BOT projects. Moreover, the planning stage of the BOT project is vital as most of mitigation strategies are formulated in the planning stage.

References

Abdul Rahman, I., Memon, A. H., Zulkifli, M., & Sheda, N. (2014). Failure reasons of PPP infrastructure projects: case study of Kuala Lumpur LRT Project. *Life Science Journal, 11*(7), 238-246.

Ahmad, U., Ibrahim, Y. B., & Bakar, A. B. A. (2018). MALAYSIAN PUBLIC PRIVATE PARTNERSHIP. *Academy of Accounting and Financial Studies Journal*, *22*, 1-6.

Ahmad, U., Ibrahim, Y., & Bakar, A. A. (2018b). Risk management in the Malaysian public private partnership projects. *Jurnal Pengurusan (UKM Journal of Management)*, *54*.

Ahmad, U., Ibrahim, Y., & Minai, M. S. (2018). Malaysian public–private partnerships: Risk management in build, lease, maintain and transfer projects. *Cogent Business & Management*, *5*(1), 1550147.

Ahmad, U., Ibrahim, Y., & Minai, M. S. (2017). Public Private Partnership in Malaysia: The Differences in Perceptions on the Criticality of Risk Factors and Allocation of Risks between the Private and Public Sectors. *International Review of Management and Marketing, 7*(2), 138-150.

Akintoye, A., Beck, M., & Hardcastle, C. (2008). *Public-private partnerships: managing risks and opportunities*: John Wiley & Sons.

Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*: SAGE Publications.

Dey, P. K., & Ogunlana, S. O. (2004). Selection and application of risk management tools and techniques for build-operate-transfer projects. *Industrial Management & Data Systems, 104*(4), 334-346.

Durdyev, S., & Ismail, S. (2017). The build-operate-transfer model as an infrastructure privatisation strategy for Turkmenistan. *Utilities Policy*, *48*, 195-200.

Fischer, K., Leidel, K., Riemann, A., & Wilhelm Alfen, H. (2010). An integrated risk management system (IRMS) for PPP projects. *Journal of Financial Management of Property and Construction, 15*(3), 260-282.

Grimsey, D., & Lewis, M. K. (2004). The governance of contractual relationships in public-private partnerships. *The Journal of Corporate Citizenship*(15), 91.

Groenewald, T. (2004). A phenomenological research design illustrated. *International journal of qualitative methods, 3*(1), 42-55.

Hwang, B.-G., Zhao, X., & Gay, M. J. S. (2013). Public private partnership projects in Singapore: Factors, critical risks and preferred risk allocation from the perspective of contractors. *International Journal of project management, 31*(3), 424-433.

Ismail, S. (2013a). Critical success factors of public private partnership (PPP) implementation in Malaysia. *Asia-Pacific Journal of Business Administration, 5*(1), 6-19.

Ismail, S. (2013b). Factors attracting the use of public private partnership in Malaysia. *Journal of Construction in Developing Countries, 18*(1), 95-108.

ISO, I. (2009). 31000: 2009 Risk Management—Principles and Guidelines. *International Organization for Standardization, Geneva, Switzerland*.

Jin, X.-H., & Zhang, G. (2011). Modelling optimal risk allocation in PPP projects using artificial neural networks. *International Journal of project management, 29*(5), 591-603.

Khadaroo, I., Wong, M. S., & Abdullah, A. (2013). Barriers in local e–government partnership: evidence from Malaysia. *Electronic Government, An International Journal, 10*(1), 19-33.Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*, *30*(3), 607-610.

Li, B. (2003). *Risk management of construction public private partnership projects.* Glasgow Caledonian University.

Li, B., Akintoye, A., Edwards, P. J., & Hardcastle, C. (2005). The allocation of risk in PPP/PFI construction projects in the UK. *International Journal of project management, 23*(1), 25-35.

Ng, B. (2000). Privatisation of ethnic wealth redistribution in Malaysia: experiences and lessons for developing countries. *Public and Private Sector Partnerships: the Enabling*, *1009*, 461-467.

Peters, B. G. (1998). 'With a little help from our friends': public-private partnerships as institutions and instruments *Partnerships in urban governance* (pp. 11-33): Springer.

Sindane, J. (2000). Public–private partnerships: case study of solid waste management in Khayelitsha-Cape Town, South Africa. *National Business Initiative, Cape Town*.

Simanjuntak, E. B., Collins, J. S., & Dwiyandhari, M. R. (2017). OPTIMIZATION OF TIDAL FENCE POWER PLANT AS A SOLUTION TO FULFILL THE HIGH ELECTRICITY NEEDS THROUGH BUILD, OWN, OPERATE AND TRANSFER (BOOT) SCHEME IN INDONESIA.

Takim, R., Ismai, K., & Nawawi, A. (2011). A value for money assessment method for Public Private Partnership: A lesson from Malaysian approach. *International Proceedings of Economics Development & Research, 4*, 509-514.

Tarantello, R., & Seymour, J. (1998). Affordable housing through non-profit/private-public partnerships. *Real Estate Issues, 23*, 15-17.

UKAS. (2017). Maklumat UKAS. Retrieved December 10, 2017, from http://www.ukas.gov.my/soalan-lazim

Yescombe, E. R. (2011). *Public-private partnerships: principles of policy and finance*: Elsevier.