



RISK IDENTIFICATION FOR THE CONSTRUCTION OF PUBLIC-PRIVATE PARTNERSHIP (PPP) HOUSING IN MALAYSIA

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Received October 30th, 2018; Revised November 28th, 2018; Accepted December 26th, 2018

Abstract

The construction project is quite complex and involves many stages of the process as well as various parties involved in the realization of a construction project whether from the industry itself or the authorities. This work is a preparatory from the full length studies that aiming in developing a risk management framework for PPP Housing. This study is conducted after seen the necessary of a systematic analysis of risk in construction delay from cradle to grave i.e pre-construction to post-construction stages. Nevertheless, this study aim to develop a clear understanding among construction industry players and professionals in Malaysia. It is therefore important to find the risk factors that led to the delay and multiple parties involved that causing the delay.

Keywords: *Public-Private Partnership (PPP), Risk Management, Construction Risk, Pre-Construction, Post-Construction.*

1. Introduction

The construction project is quite complex and involves many stages of the process as well as various parties involved in the realization of a construction project whether from the industry itself or the authorities. However, the issue that is

prolonged from time to time is the delivery of the project itself. After seeing this endless issue, the Malaysian government introduced the Public-private partnership in the Ninth Malaysia Plan in March 2006 [1] which was initially involved in joint venture of private sector projects in infrastructure. Its existence is more geared towards enhancing and sustains the

construction industry whereby it helps in enhancing private sector participation in economic development.

The adoption of Public-Private Partnership (PPP) in housing facility in Malaysia is intended to increase urban housing standard and address housing affordability and convenience. In order to address the affordable housing issue, Federal and State Governments have introduced various programs and incentives to ensure the middle income people could own affordable house. However, it is ascertain even with PPP guideline establishment, the risk management framework in PPP housing projects specifically in PR1MA still not systematically defined and therefore, it need further investigation. Nevertheless, the history of few failed PPP housing project was also captured by National Audit Report that shows lacks of overall strategic focus in PPP housing projects.

This work is a preparatory from the full length studies that aiming in developing a risk management framework for PPP Housing. This study is conducted after seen the necessary of a systematic analysis of risk in construction delay from cradle to grave i.e pre-construction to post-construction stages. Nevertheless, this study aim to develop a clear understanding among construction industry players and professionals in Malaysia. It is therefore important to find the risk factors that led to the delay and multiple parties involved that causing the delay.

Risk Identification

Risk identification as part of risk management process involves in defining risks that have a potential in affecting the project before the characteristic were documented. Project team, risk management team, subject matter experts from other parts of the company, customers, end users, other project managers, stakeholders, and outside experts were targeted as participants in conducting the risk identification process. Risk identification is an iterative process. The first iteration may be performed by a part of the project team, or by the risk management team. The entire project team and primary stakeholders may make a second iteration. To achieve an unbiased analysis, persons who are not involved in the project may perform the final iteration

There are multiple ways in gaining risk identification including extensive literature review, brainstorming, expert review, Delphi technique, questionnaire and others.

2. Methodology

Extensive literature review carried out purposely to discover the risk factors that causing late delivery in PPP housing project. In addition, opinion from construction expert are taken into account in choosing the factors and sub-factors that dominating the delays in construction in terms of project duration, project expenditure cost, and project quality from pre to post construction phases. Further to the factors that were retrieved from extensive literature review, expert opinion and Author's observation in the current situation of construction field, those delays factors will be used in Author further work in designing pair-wise questionnaire adopting Analytical Hierarchy Process (AHP).

3. Results and Discussion

The Present Study Was Designed To Identify The Risk Factors That Causing Late Delivery, Cost Overrun And Impair Quality Among Ppp Housing Construction Project. Table 1 Below Depicts Risk Factors And Sub-Factors That Were Retrieved From Extensive Literature Review, Expert Opinion And Author's Observation In The Current Situation Of Construction Field.

Table 1. Risk Factors and Sub-Factors.

Factors / Sub-factors	References
Economic and Financial	
Inflation Risk	
Fund Risk	[3]–[5]
Contractual	
Inappropriate contract	[5]–[9]
Lack of contract clarity	[6], [10], [11]
Improper Estimation	[4], [12]–[14]
Resources	
Shortage of material on site	[11], [15]–[18]
Late delivery of material and equipment	[6], [15], [19], [20]
Shortage of technical skill personnel	[12], [21]
Shortage of workers	[13], [22]–[24]
Technical	
Insufficient drawings and specification	[15], [21], [25]
Frequent design changes	[11], [13], [26], [27]

Factors / Sub-factors	References
Existing utilities issue	[28]
Unforeseen ground condition	[20], [23], [27], [29], [30]
Organization	
Lack coordination between parties	[18], [24], [28], [31], [32]
Inadequate planning and scheduling in project team	[6], [20], [33], [34]
Unclear job roles and responsibility	[28], [35]
Natural Hazard	
Heavy rain	[15], [21], [25], [27]
Flood	[31], [36], [37]
Heat Wave	[22], [37]

4. Conclusion

This paper undertaken a preparatory work from the full length studies that aiming in developing a risk management framework for PPP Housing in Malaysia. Risk identification as one of the main process in Risk Management conducted by carried out extensive literature review and expert opinion list out seven (7) factors and 22 sub-factors that leads to cause a time, cost overrun in housing construction project.

5. References

1. UKAS, "Malaysia Public Private Partnership (PPP) Guideline," Public-Private Partnersh. Unit, Prime Minist. Dep., 2009.
2. Project Management Institute Inc, A guide to the project management body of knowledge (PMBOK® guide). USA, 2000, p. 211.
3. Y. Zou, A. Kiviniemi, and S. W. Jones, "Retrieving similar cases for construction project risk management using Natural Language Processing techniques," *Autom. Constr.*, vol. 80, no. February, pp. 66–76, 2017.
4. P. Dey, "Decision support system for risk management: a case study," *Manag. Decis.*, vol. 39, no. 8, pp. 634–649, 2001.
5. Y. Ke, S. Wang, A. P. C. Chan, and P. T. I. Lam, "Preferred risk allocation in China ' s public – private partnership (PPP) projects," *Int. J. Proj. Manag.*, vol. 28, no. 5, pp. 482–492, 2010.
6. J. McCord, M. McCord, P. T. Davis, M. Haran, and W. J. Rodgers, "Understanding delays in housing construction: evidence from Northern Ireland," *J. Financ. Manag. Prop. Constr.*, vol. 20, no. 3, pp. 286–319, 2015.
7. Akintola S Akintoye, "Risk analysis and management in construction," *Int. J. Proj. Manag.*, vol. 15, no. 1, pp. 31–38, 1997.
8. A. Senouci, A. Ismail, and N. Eldin, "Time Delay and Cost Overrun in Qatari Public Construction Projects," *Procedia Eng.*, vol. 164, pp. 368–375, 2016.
9. A. Banaitiene, N and Banaitis et al., "Risk management in construction projects," *Technol. Econ. Dev. Econ.*, vol. 21, no. 1, pp. 65–78, 2015.
10. H. Doloi, A. Sawhney, K. C. Iyer, and S. Rentala, "Analysing factors affecting delays in Indian construction projects," *Int. J. Proj. Manag.*, vol. 30, no. 4, pp. 479–489, 2012.
11. G. Agyekum-mensah and A. D. Knight, "The professionals ' perspective on the causes of project delay in the construction industry_pre-print," *Eng. Constr. Archit. Manag.*, 2017.
12. Y. Zou, A. Kiviniemi, and S. W. Jones, "Developing a tailored RBS linking to BIM for risk management of bridge projects," *Eng. Constr. Archit. Manag.*, vol. 23, no. 6, pp. 727–750, 2016.
13. M. R. Abdullah, a a A. Azis, and I. A. Rahman, "Potential Effects on Large Mara Construction Projects Due To Construction Delay," *J. Integr. Eng.* 2013, vol. 1, no. 2, 2013.
14. R. Antunes and V. Gonzalez, "A Production Model for Construction: A Theoretical Framework," *Buildings*, vol. 5, no. 1, pp. 209–228, 2015.
15. 2003 Nasir, D, McCabe, BY, Hartono, L, "A Construction Schedule Risk Model," *J. Constr. Eng. Manag.*, vol. 129, no. 5, pp. 518–527, 2003.
16. A. Alhomidan, "Factors Affecting Cost Overrun in Road Construction Projects in Saudi Arabia," *Int. J. Civ. Environ. Eng. IJCEE-IJENS IJENS I J E N S*, vol. 13, no. 03, pp. 1–4, 2013.
17. R. M. Choudhry, M. A. Aslam, J. W. Hinze, and F. M. Arain, "Cost and Schedule Risk

- Analysis of Bridge Construction in Pakistan: Establishing Risk Guidelines,” *J. Constr. Eng. Manag.*, vol. 140, no. 7, pp. 1–9, 2014.
18. S. Durdyev and S. Ismail, “On-site construction productivity in Malaysian infrastructure projects,” *Struct. Surv.*, vol. 34, no. 4/5, pp. 446–462, 2016.
 19. D. Arditi, S. Nayak, and A. Damci, “Effect of organizational culture on delay in construction,” *Int. J. Proj. Manag.*, vol. 35, no. 2, pp. 136–147, 2017.
 20. M. M. Hossen, S. Kang, and J. Kim, “Construction schedule delay risk assessment by using combined AHP-RII methodology for an international NPP project,” *Nucl. Eng. Technol.*, vol. 47, no. 3, pp. 362–379, 2015.
 21. R. F. Aziz and A. A. Abdel-Hakam, “Exploring delay causes of road construction projects in Egypt,” *Alexandria Eng. J.*, vol. 55, no. 2, pp. 1515–1539, 2016.
 22. B. G. Kang, M. A. Fazlie, B. H. Goh, M. K. Song, and C. Zhang, “Current Practice of Risk Management in the Malaysia Construction Industry—The Process and Tools/Techniques,” *Int. J. Struct. Civ. Eng. Res.*, vol. 4, no. 4, pp. 371–377, 2015.
 23. T. Zayed, M. Amer, and J. Pan, “Assessing risk and uncertainty inherent in Chinese highway projects using AHP,” *Int. J. Proj. Manag.*, vol. 26, no. 4, pp. 408–419, 2008.
 24. S. A. Azlan, A. Smith, M. Pitt, and C. H. Choon, “Contractor’s Perception of Factors Contributing To Project Delay: Case Studies Of Commercial Projects in Klang Valley, Malaysia,” *J. Des. Build Environ.*, vol. 7, no. 1, p. 17, 2012.
 25. C. Kaliba, M. Muya, and K. Mumba, “Cost escalation and schedule delays in road construction projects in Zambia,” *Int. J. Proj. Manag.*, vol. 27, no. 5, pp. 522–531, 2009.
 26. M. Głuszak and A. Leśniak, “Construction Delays in Clients Opinion – Multivariate Statistical Analysis,” *Procedia Eng.*, vol. 123, pp. 182–189, 2015.
 27. A. Anuar Othman, J. Victor Torrance, and M. A. Hamid, “Factors influencing the construction time of civil engineering projects in Malaysia,” *Eng. Constr. Archit. Manag.*, vol. 13, no. 5, pp. 481–501, 2006.
 28. C. S. Goh, H. Abdul-Rahman, and Z. A. Samad, “Applying Risk Management Workshop for a Public Construction Project: Case Study,” *J. Constr. Eng. Manag.*, vol. 139, pp. 572–580, 2013.
 29. M. Sambasivan and Y. W. Soon, “Causes and effects of delays in Malaysian construction industry,” *Int. J. Proj. Manag.*, vol. 25, no. 5, pp. 517–526, 2007.
 30. H. Zhi, “Risk management for overseas construction projects,” *Int. J. Proj. Manag.*, vol. 13, no. 4, pp. 231–237, 1995.
 31. L. M. Sastoque, C. A. Arboleda, and J. L. Ponz, “A Proposal for Risk Allocation in Social Infrastructure Projects Applying PPP in Colombia,” *Procedia Eng.*, vol. 145, pp. 1354–1361, 2016.
 32. N. Hamzah, M. A. Khoiry, I. Arshad, N. M. Tawil, and A. I. Che Ani, “Cause of construction delay - Theoretical framework,” *Procedia Eng.*, vol. 20, no. Kpkt 2010, pp. 490–495, 2011.
 33. M. R. Abdul Kadir, W. P. Lee, M. S. Jaafar, S. M. Sapuan, and A. A. A. Ali, “Factors affecting construction labour productivity for Malaysian residential projects,” *Struct. Surv.*, vol. 23, no. 1, pp. 42–54, 2005.
 34. L. Le-Hoai, Y. D. Lee, and J. Y. Lee, “Delay and cost overruns in Vietnam large construction projects: A comparison with other selected countries,” *KSCE J. Civ. Eng.*, vol. 12, no. 6, pp. 367–377, 2008.
 35. E. Suprun, R. A. Stewart, O. Sahin, and K. Panuwatwanich, “Mapping the construction innovation system in the Russian federation: Conceptual model development,” *IEEE Int. Conf. Ind. Eng. Eng. Manag.*, vol. 2016–Decem, no. December, pp. 420–423, 2016.
 36. M. Zeleňáková and L. Zvijáková, “Risk analysis within environmental impact assessment of proposed construction activity,” *Environ. Impact Assess. Rev.*, vol. 62, pp. 76–89, 2017.
 37. L. Boshier, A. Dainty, P. Carrillo, J. Glass, and A. Price, “Integrating disaster risk management

into construction: a UK perspective,” Build.
Res. Inf., vol. 35, no. September 2014, pp.
163–177, 2007.

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