School of Architecture, Building and Civil Engineering

Risk Management in NHS Healthcare Infrastructure Projects

Songyang Li: 2nd year PhD student in Civil and Building Engineering
Supervisory team: Prof Andrew Price; Dr. Mohamed Osmani

Loughborough University

Introduction

During the last 60 years, the UK has made huge investments in the delivery of infrastructure projects in health sector, and the amount keeps rising sharply after 2000 (figure 1). Although the public procurement in health sector in the UK has gone through conventional procurement which is known as Design-Bid-Build (DBB, figure 2), PFI (figure 3) and PF2 (figure 4), risk management is still a huge problem. Effective risk management is important to guarantee the performance and success of healthcare infrastructure projects. However, in health sector, it is found variable, intuitive, subjective and unsophisticated. Because of the poor risk management, the performance of these public-procured healthcare infrastructure projects is problematic, with great time and cost overruns and low Value for Money (VFM). This has caused huge debt and poor project delivery for the UK government.

This research focuses on improving risk management in NHS healthcare infrastructure projects, especially in the stages of risk identification, risk assessment and risk allocation. A risk management model will be developed during the research. The findings of this research will help to manage risks more effectively in NHS healthcare infrastructure projects and serve as baseline and guidance for the public clients in achieving better public procurement and project delivery, especially in improving procurement strategies, negotiations and contract transactions.

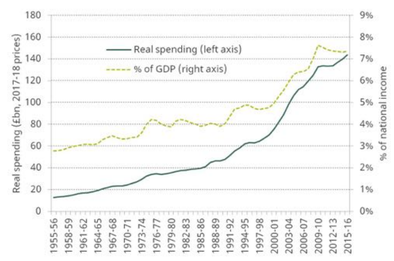


Figure 1: Annual UK public spending on health in real terms (2017–18 prices) (Source: IFS, 2017)

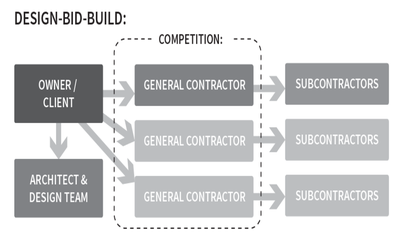


Figure 2: A general framework of DBB (Source: Galloway, 2016)

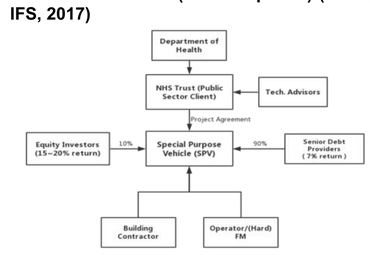


Figure 3: A general framework of PFI on health (Adapted from: TPP, 2013)

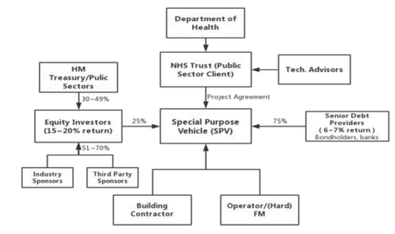


Figure 4: A general framework of PF2 on health (Adapted from: TPP, 2013)

Research Questions







1. What are the typical risk factors in the delivery of an healthcare infrastructure project that might influence the project performance, public spending and VFM?

2. How these risks can be assessed effectively to make sure that evidence and guidance can be provided for the further allocation steps of them?

3. How these assessed risks should be allocated to guarantee that they are undertaken by the best party able to handle them?

4. How to develop a risk management-based model in the procurement and delivery of NHS healthcare infrastructure projects?

Aim

Develop a risk management model in NHS healthcare infrastructure projects in the UK to help improve public procurement and project delivery.

Objectives

1. Examine the relevant theory of risk management in large-capital infrastructure projects.
2. Determine the state of the art of the risk management in NHS healthcare infrastructure projects and identify and classify the typical risk factors in NHS healthcare infrastructure projects.
3. Assess the identified risk factors and groups.
4. Develop a risk allocation process.
5. Develop the model and provide recommendations on how risk can be managed to improve the upcoming in-house public procurement and the delivery of NHS healthcare infrastructure projects.

Methodology

An exploratory sequential mixed research methodology is employed in this research:

Literature Review
- Understand 1) risk management theory; 2) current situation; 3) typical risk factors

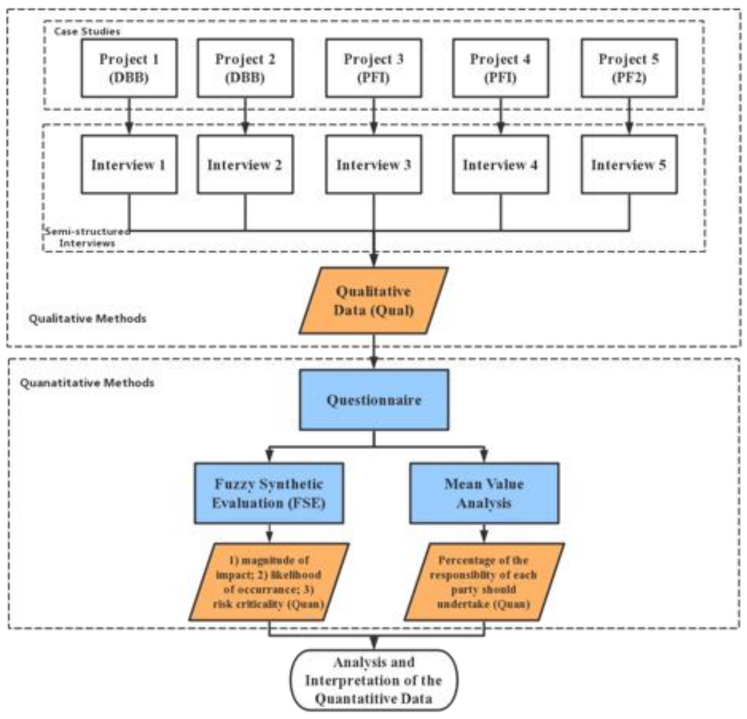
Case Studies
- Examine current used risk management methods;

Semi-structured Interview
- Identify the more relevant risk factors and information gathered from the case study

Questionnaire
- Acquire quantitative data and information from the experts

Fuzzy Synthetic Evaluation (FSE)
- 1) Calculate essential parameters; 2) rank the risk factors and groups; 3) analyse and discuss the results

Mean Value analysis
- Confirm the preferred risk allocation options and the best risk stakeholder(s)



Conclusions

- Risks of infrastructure projects can be managed by quantitative and qualitative methods. However, they both have the limitations and qualitative methods are more frequently used.
- In DBB, the public authority is the main risk holder and has to make a very expensive payment to acquire healthcare infrastructure projects.
- In PPI and PF2, risks are identified and assessed insufficiently and unreliably. Besides, although risk allocation is the lynchpin, few risks are really transferred to the private consortiums. PFI or PF2 doesn't offer very good VFM.
- Risk identification, risk assessment and risk allocation should be focused the most and employed together to improve the performance of the public procurement of NHS healthcare infrastructure projects.
- 50 typical factors and 13 risk groups of healthcare infrastructure projects have been identified from the previous studies and literature (figure 5).

Group	Code	Risk Factor	References									
			1	2	3	4	5	6	7	8	9	10	Total
Political Risks	R01	Unstable government	√	√				√	√		√		5
	R02	Poor public decision-making process	√	√								√	3
	R03	Strong political opposition/hostility	√	√				√				√	4
	R04	Inconsistencies in government policies	√					√	√				3
Macroeconomic Risks	R05	Poor financial market	√	√			√	√			√		5
	R06	Inflation rate volatility	√	√	√		√	√			√	√	7
	R07	Interest rate volatility	√	√	√		√	√			√	√	7
	R08	Unstable value of local currency	√			√							2
	R09	Influential economic event (boom/recession)	√	√									2
Legal and Legislative Risks	R10	Legislation change/inconsistencies	√	√	√	√	√	√	√	√		√	9
	R11	Change in tax regulation	√	√	√		√	√			√	√	7
	R12	Corruption and lack of respect for law	√					√			√	√	4
	R13	Industrial regulatory change	√	√			√				√		4
Social Risks	R14	Public opposition to healthcare infrastructure projects	√	√			√	√	√		√	√	7
	R15	Non-involvement of host-community	√										1
Natural and Environmental Risl	R16	Force majeure	√	√	√	√	√	√			√	√	8
	R17	Georechnical conditions	√	√	√		√	√	√			√	7
	R18	Weather/climate	√	√	√			√	√			√	6
	R19	Environment	√	√	√	√	√	√	√		√	√	9
Project Secection Risks	R20	Land acquisition/site avaliability	√	√		√	√					√	5
	R21	Level of demand for the project	√	√									2
	R22	Prolonged ngotiation period to initiation	√										1
Project Finance Risks	R23	Availability of finance	√	√			√		√			√	5
	R24	High finance costs	√	√				√					3
	R25	High bidding costs	√					√					2
	R26	Inability to service debt	√										1
	R27	Laten defect				√							1
	R28	Bankruptcy of concessionaire/contractor	√				√			√			3
Resudual Risks	R29	Residual value (after concession period or hand-over)	√	√				√				√	4
Design Risks	R30	Delay in project approvals and permits	√	√	√		√	√	√		√	√	8
	R31	Design deficiency	√	√		√	√	√					5
	R32	Unproven engineering techniques	√	√		√	√	√		√		√	7
Construction Risks	R33	Construction cost overrun	√	√	√	√		√			√		6
	R34	Construction overtime (time delay)	√	√	√		√	√		√			6
	R35	Availability of appropriate labour/material	√	√				√			√	√	5
	R36	Late/unreasonable design changes	√	√					√				3
	R37	Poor quality of workmanship	√	√	√			√			√		5
	R38	Excessve contract variation	√	√			√	√	√		√		6
	R39	Site safety and security					√			√	√		3
	R40	Insolvency/defult of subcontractors and suppliers	√	√									2
Operational Risks	R41	Operation cost overrun	√	√	√			√	√		√		6
	R42	Maintenance cost overrun	√	√		√	√	√	√	√			7
	R43	Refurbishment cost overrun					√						1
	R44	Demand of healthcare service below anticipation					√				√		2
	R45	Shortfall in healthcare service quality			√		√						2
Relationship Risks	R46	Inadequate distribution of resibilities and risks	√	√				√					3
	R47	Inadequate distribution of authority between parties	√	√				√					3
	R48	Organisation and co-ordination (including partiners' disputes)	√	√	√		√	√	√	√		√	8
Third Party Risks	R49	Staff crises	√	√									2
	R50	Third party tort liability	√	√									2

References: 1 = Ibrahim *et al.* (2006); 2 = Bing *et al.* (2005); 3 = Ng and Loosemore (2007); 4 = Zhao *et al.* (2011); 5 = Jin (2009); 6 = Hwang *et al.* (2013); 7 = Jin and Zhang (2011); 8 = Ball *et al.* (2003); 9 = Wang *et al.* (2004); 10 = Xu *et al.* (2010).

Figure 5:Risk factors and groups in healthcare infrastructure projects

Future Work

- Developing case studies of typical healthcare infrastructure projects by different procurement methods
- Doing semi-structure interviews after every case and comparing, analysing and summarising the findings from the literature, interviews and cases
- Designing questionnaire and making questionnaire survey to acquire quantitative data
- Analysing, discussing and interpreting the results of the research, developing the model

REFERENCES

1. Akintoye, A. (2001). *Framework for risk assessment and management of private finance initiative projects*. Glasgow Caledonian University
2. Baloi, D. and Price, A. D. (2003). Modelling global risk factors affecting construction cost performance, *International journal of project management*, 21(4), pp. 261-269.
3. Conrow, E. H. (2003). *Effective risk management: Some keys to success*. Aiaa.
4. HM Treasury (2012). *A new approach to public private partnerships*. London: HM Treasury.
5. HM Treasury. (1995). *Private opportunity, public benefit: progressing the private finance initiative*. London: The Stationery Office.
6. Ive, G., Murray, A., Edkins, A. and Rintala, K. (2010). Cost and performance comparison of PFI and non-PFI healthcare infrastructure in England. *In 3rd Annual Conference of the Health and Care Infrastructure Research and Innovation Centre*. Better Healthcare through better infrastructure. Edinburgh (pp. 88-102).
7. National Audit Office (2018). *PFI and PF2*. London: Press Office.
8. Zhao, X., Hwang, B. G. and Gao, Y. (2016). A fuzzy synthetic evaluation approach for risk assessment: a case of Singapore's green projects, *Journal of Cleaner Production*, 115, 203-213.

ACKNOWLEDGEMENTS

Special thanks to Professor Andrew Price and Dr. Mohamed Osmani for their supervising and support throughout this research project.

CONTACT INFORMATION

School of Architecture, Building and Civil Engineering
Loughborough University, Leicestershire LE11 3TU UK
+44 (0)7518612212
S.Li4@lboro.ac.uk
www.lboro.ac.uk/departments/abce