Journal of Industrial Engineering and Management

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

Determination of risk identification process employed by NHS for a PFI hospital project in the UK

F. E. Mohamed Ghazali, Shahid Kabir

Universiti Sains Malaysia (MALAYSIA)

cefarid@eng.usm.my; shahid.kabir@usherbrooke.ca

Received September 2009
Accepted December 2009

Abstract: Long-term concession contracts associated with Private Finance Initiative (PFI) projects, such as National Health Service (NHS) hospitals, are subject to substantial risks, which may not only emerge from project activities such as design and construction, but also from global issues beyond the control of project parties, such as commercial, legal and political risks. Therefore, the principal parties involved must manage risks effectively and efficiently, as early as the project initiation stage, in order to ensure a successful delivery. The aim of this paper is to examine the risk identification process of the NHS PFI hospital in the UK, as a case study, in order to determine the techniques used in risk identification, and their significance, based on estimated probabilities of occurrence. These objectives were achieved through interviews with key personnel within the NHS Trust involved. Results found the sole technique used in risk identification to be brainstorming, through which more than thirty risks were identified and classified under six risk categories: planning, pre-commissioning, design, land purchasing, construction and operation. Thirteen risks were identified as significant based on their estimated probability of occurrence had the project been developed via public procurement. The results of this research will enable public sector clients like the NHS Trust to not only identify the significant risks, which will allow them to focus more attention on developing appropriate mitigation strategies and contingency plans, but also to improve its risk identification process through the use of other techniques in order to support findings from the brainstorming process.

Journal of Industrial Engineering and Management
doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

Keywords: National Health Service, private finance initiative, risk identification, public procurement

1 Introduction

The construction business, like any other business, is considered to be risky, as construction projects are perceived to have more inherent risks due to the involvement of many contracting parties, such as owners, designers, contractors, subcontractors, suppliers, etc. (El-Sayegh, 2008). In other words, every construction project is subject to risk (Chicken, 1994; Latham 1994). Risk is a potential problem that has not yet occurred, but if it does occur, then it could prevent or limit the attainment of the objectives defined at the beginning of the project (Burke, 1999). Project risk is a combination of the probability of occurrence of a defined hazard, an uncertain event or a condition, and the consequences of the event should it occur (Burke, 1999). In the construction industry, risk is the possibility that an event will cause loss, injury, disadvantage, destruction, or have a negative effect on at least one project objective, such as time, cost, scope or quality (PMI, 2004).

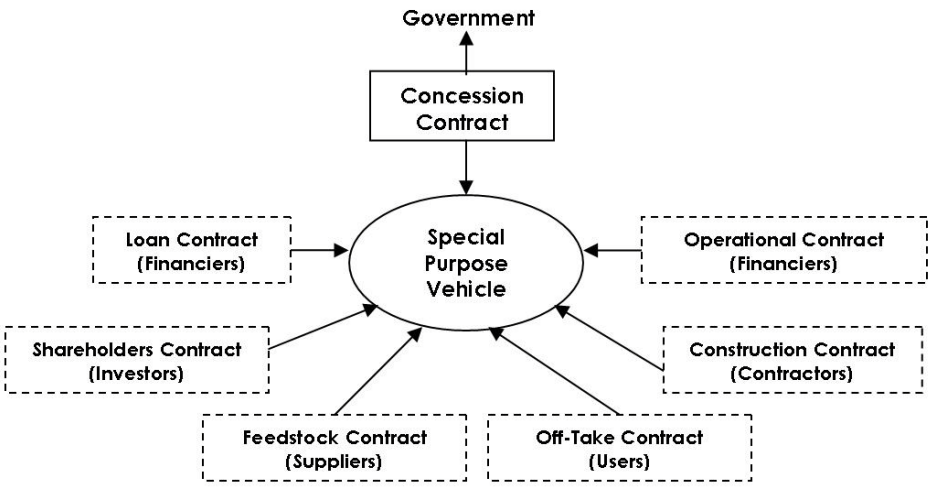

Figure 1. "Primary and Secondary Contracts in PFI".

The use of advanced procurement approaches in construction projects, such as private finance initiative (PFI) projects in the UK, complicates effective and efficient

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

project delivery. With a PFI, there is a long-term concession contract between the principal party, usually the Government, and the private sector, which acts as a Special Purpose Vehicle (SPV) for the project involved. The contract structure for long-term and complicated projects, like NHS PFI hospitals, requires complex contractual networks between the granting authority, the SPV and other key private sector entities with various areas of expertise (Figure 1).

The key sub-agreements between the SPV, also known as the concessionaire, and the sub-contractors include shareholder contracts, financing/loan contracts, as well as operation and maintenance contracts. Since concession agreements usually involve various long-term contractual agreements, PFI projects are subject to substantial risk, due to the complexity of the contracts involved. According to Zhang (2005), these complex contractual networks assist in the identification and the allocation of risks. Therefore, effective risk management is required for every construction project, including those being procured through PFI.

Risk management is not a technique, but rather a framework, within which potential courses of action may be reviewed, judged and evaluated in terms of risks and opportunities. Risk management describes how risks can be identified, assessed, mitigated, monitored and controlled to ensure they are fully understood and that they fall within the tolerance limit of the clients and stakeholders (Figure 2). Rosenau (1998) describes risk management as "…a systematic process of managing an organisation's risk exposures to achieve its objectives in a manner consistent with public interest, human safety, environmental factors, and the law. Therefore, risk management is a systematic approach to minimising risk occurrences that may affect the achievement of key objectives of a project".

Effective risk management starts with risk identification, which is a *sine qua non* for any meaningful risk management exercise (O'Reilly, 1994). During risk identification, potential risks that may affect the achievement of a project's goals are identified, as are appropriate courses of action that can be taken to manage them. Several techniques have been established for risk identification in the construction industry, including brainstorming, checklists and the Delphi technique. Risks can be analysed both qualitatively and quantitatively (Hayes, 1987). Qualitative risk analysis involves identifying the anticipated probability of occurrence of risks, whereas quantitative risk analysis usually involves the use of computer-based programmes to determine the impact of risks on a particular

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

project should they occur. Risks should be mitigated once they are identified and analysed, usually by project parties that are best able to manage them. Risk monitoring and control are conducted with the intent of assessing the progress of each mitigated risk during project implementation.

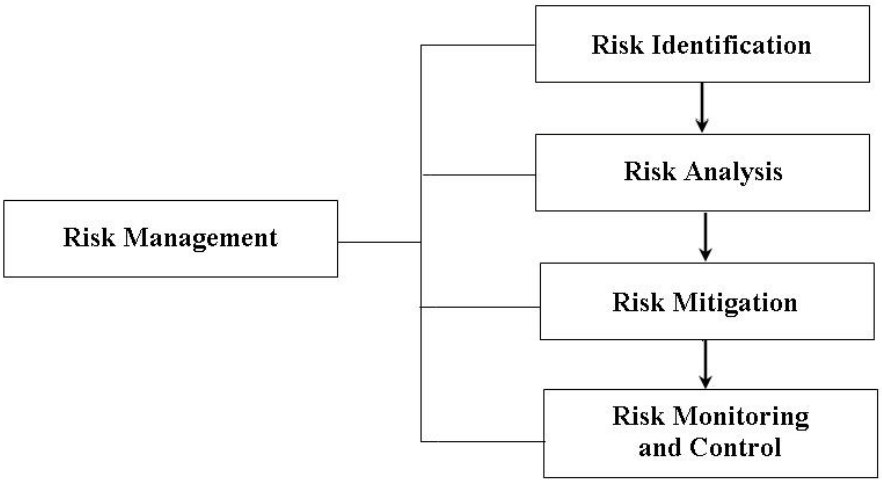

Figure 2. "Fundamental Concept of Risk Management".

This paper focuses on determining how risks have been identified and initially managed by public sector clients in the UK, through a case study on an NHS PFI project for mental health facilities and services in Leeds, which was selected due to readily available data. This research examines the protocols used and the techniques implemented by the NHS Trust to identify risks and to conduct qualitative risk analysis, which requires estimating the probability of occurrence of the risks identified under two circumstances: (i) if the project is publicly funded and (ii) if PFI is used to procure the NHS hospital project.

The significance of this study is that it will provide insight on how effectively risks have been managed by public sector clients in achieving successful public sector projects that deliver value-for-money outcomes to the Government and also to end users. Findings from this case study can be used as a milestone to increase the awareness of public sector clients of the possible consequences to such projects if risk identification processes are not conducted in an effective and efficient manner.

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

2 Methodology

The relocation scheme for mental health facilities and services in Leeds was among the first hospital projects in the UK to adopt the PFI approach. The relocation scheme was initiated in 1996, construction was started in 1999, and the hospital was completed in 2002 and is now in operation. Due to the availability of project data and the willingness of the project's key personnel to be directly involved in this research, the Leeds Mental Health Trust (LMHT) was chosen for this case study, which is based primarily on information gathered from a series of interviews with the contract manager, who acted as the representative for LMHT. The project's Full Business Case (FBC) report, which incorporates service requirements of the new hospital with the proposed facilities, was also thoroughly reviewed. The accuracy of the data acquired from the FBC report was then verified through the contract manager.

3 Results and findings

This section focuses on the risk identification and qualitative risk analysis processes conducted by the LMHT in the relocation scheme for their mental health facilities and services.

3.1 Risk identification

The NHS Trust used only a single technique to conduct the risk identification process for its relocation scheme: brainstorming. Owing to a lack of knowledge on the PFI procurement strategy, the NHS Trust was represented by only three key personnel in each brainstorming session: the Project Director (who was also the head of the project board), the Assistant Director of Finance, and the LMHT's representative (who was then the Project Manager for the relocation scheme). Other participants in these brainstorming sessions were primarily external consultants who were appointed to provide technical, legal and financial advice to the LMHT. As a result of the risk identification process, six major risk areas were identified (i) planning, (ii) pre-commissioning, (iii) design, (iv) land purchasing, (v) construction and (vi) operation. More than thirty sub-risks were identified within these six areas.

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

3.2 Qualitative risk analysis

The same technique used to conduct risk identification was used to determine the probability of occurrence of the identified risks. The top five sub-risks with high probability of occurrence estimates within each key risk area were included in Table 1, whereas only three sub-risks had been identified by the LMHT in the actual process. For the qualitative risk analysis, the probability of each identified sub-risk occurring was estimated in two ways: what the probability is for the risk to occur if (i) the project was publicly funded, and (ii) if it was procured through PFI. The probability of project risks such as design and construction risks to occur in an actual LMHT project is expected to be minimised by the NHS Trust involved if it is procured through PFI compared to publicly funded procurement as a result of collaborative work between the parties involved in the PFI.

Risk	Sub-Risk	Public Funding (%)	Private Financing (%)
1. Planning	Procedural Delay	80	80
	Planning Permission Delay (Non-NHS sites)	70	30
	Planning Permission Delay (NHS sites)	30	20
	CDM regulations compliance	10	10
	Consultation delay	5	5
2. Pre-Commissioning	Delay of infrastructure improvements	10	5
	Access to sites (Non NHS sites)	10	5
	Availability/ capacity of utilities	5	5
	Access to sites (NHS sites)	5	5
	Environmental conditions	5	5
3. Design	Trust variation	60	10
	Delays through design phase	50	10
	Design consultants delivery/life expectancy	25	10
	Fit for purpose	5	5
	Contractor variation	5	5
4. Land Purchase	Land purchasing delay	60	30
	Cost of land purchase	40	20
	Identification of site suitability/acceptability	25	5
5. Construction	Trust variation	90	50
	Time overrun	75	25
	Cost overrun	50	20
	Phasing/decanting	30	5
	Weather conditions	20	20
6. Operation	General legislative change	95	95
	Health specific legislative change	95	95
	Residual value	70	30
	Poor quality of services	50	50
	Maintenance and repair cost overrun	50	20

Table 1. "Actual Probability Estimates for Key Risks". Source: LMHT (1999)

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

4 Analysis and discussion

This section analyses the application of the technique used in risk identification and the results obtained from the qualitative risk analysis in the actual studied case. Only brainstorming was used by the LMHT in its risk identification process, where only a few key personnel were involved as representatives of the public sector clients. This minimal involvement in brainstorming was a result of the inexperience of key personnel at LMHT in regard to PFI transactions. Unlike other public sector organisations in the UK, such as the Highways Agency (HA), where most of the PFI projects are centralized and managed by the HA, each PFI transaction in the NHS has a new learning curve for each NHS Trust, such as the LMHT, as each NHS Trust is usually involved in one major PFI project throughout its lifecycle. Thus, the LMHT had to acquire services from outside experts in legal, financial and technical areas to cover its weaknesses in PFI transactions during the brainstorming sessions. Although brainstorming can solve problems through collective consensus and decisions, thus reducing bias, brainstorming can also produce some peculiar results, especially when it is the only technique used for risk identification and qualitative risk analysis, along with minimal involvement of the client's key personnel in clarifying the objectives and service specifications of the project.

There are thirteen risks that can be identified as critical for the case study, where the probability of occurrence for public procurement were estimated to be equal to or more than 50%, as presented in Figure 3. Three of the thirteen risks were estimated to have the same probability of occurrence, as seen in Table 1, whether the relocation scheme was publicly or privately funded, namely general legislative change, health specific legislative change and procedural delay. Since the LMHT project involved a long-term operational concession contract and the future government is unknown, it was anticipated that the probability of occurrence for these risks was high. These legislative changes usually result from politically motivated alterations of the current policies due to a change in the ruling government and to changes in the political climate resulting from election campaigns. These events are uncertain and beyond the control of project parties, so the high probability and the identical estimates made by LMHT for both procurement approaches are reasonable.

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

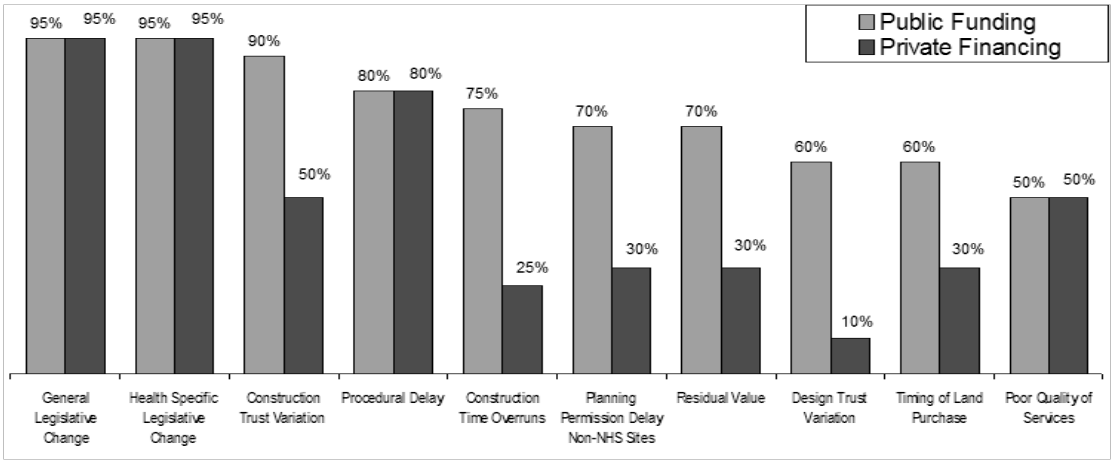

Figure 3. "Thirteen High Probability Risks for Public Procurement".

Procedural delay is another risk with an estimated high probability that is the same for both public procurement and PFI options. Most government departments in the UK, such as the Department of Health, will approve a PFI project only if the proposed solution can provide a better value-for-money (VFM) solution than the public procurement. Thus any proposal where its VFM solution is unjustified may require the public sector client to further negotiate with the SPV involved in order to arrive at a VFM deal prior to signing the contract. Any additional activities that occur during the pre-contractual stages, which are not included in the actual plan, are classified as procedural delay risks. The occurrence of a procedural delay in an actual project increases the capital costs due to increased work changes and late project commissioning. Thus the high probability and identical estimates for public procurement and PFI options for procedural delays were reasonably estimated. Of the ten remaining critical risks, six risks had been peculiarly estimated either for public procurement or the PFI in terms of their probability of occurrence by the LMHT. They are planning permission delay, land purchasing delay, cost overrun in construction, poor quality of services during operation, cost overrun in repair and maintenance as well as the residual value. Two of these risks were analysed, planning permission delay and cost overrun in construction, to determine possible reasons that lead towards peculiar probability estimates by the LMHT.

The probability of occurrence of the planning permission delay risk for public procurement and PFI was estimated to be 30% and 70%, respectively. However, these probabilities can be considered as poorly estimated by the LMHT due to several reasons. One is the existing close collaboration between the local city

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

council and the health authority, which includes NHS Trusts and Primary Care Trusts. This close collaborative work allows a particular NHS Trust to develop hospital projects according to specific guidelines set by the local city council for new buildings. Thus, a more reasonable probability of occurrence of procedural delay would be lower than those estimated, at 20% and 50% for public procurement and PFI, respectively.

Typically, any time overruns in construction significantly impact the capital costs of a construction project. When there is a delay or time overrun during construction, clients may have to rearrange the remaining planned work to accommodate new activities that would surely increase the capital costs of the project. Thus, when there is a time overrun during construction, there will also be a cost overrun in the project. However in the qualitative risk analysis of the LMHT project, the probability estimates for cost overrun and time overrun in construction had been peculiarly estimated at 50% and 75 %, respectively, under public procurement. Since any time overrun in construction would result in a cost overrun in construction also, the probability estimate for cost overrun should be more or less similar to the one estimated for time overrun in construction, at about 70% - 80%, rather than 50%. However, the probability estimate for cost overrun in construction in the PFI option, which was anticipated at 20%, can be considered a reasonable approximation by the LMHT. This low probability estimate is due to the work efficiency of the SPV in completing the construction work on time and within budget, as they only receive their payment from clients on yearly or monthly basis, via unitary charges, once the project is completed and operating.

5 Conclusion

Risk identification and qualitative risk analysis processes cannot be conducted adequately if only brainstorming is used as a single technique to identify risks and generate probability estimates for complex construction projects, such as the one examined in this case study. The use of other established techniques, such as checklists and the Delphi technique, which require controlled views and feedback from a group of experts in PFI transactions, would result in more reliable predictions and estimates for risk identification and qualitative risk analysis. This kind of practice would also minimise the possibility of inexperienced public sector clients from producing peculiar and incorrect estimates. Although the accuracy of the probability estimates made in the actual project is uncertain, the thirteen risks

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

identified as critical risks should be managed in an effective and efficient manner by public sector clients to ensure a successful project delivery. Appropriate mitigation strategies and contingency plans must also be developed in regard to the thirteen risks to ensure that they can be managed effectively and efficiently should they occur during the actual project.

Once risks have been identified and analysed qualitatively, it is important to quantify the impact of those risks on a project through risk analysis. This paper identifies how risk analysis processes have been carried out and the possible implications to public clients in the case study involved, as a result of their current risk management practices. This type of study is essential to ensure that appropriate measures are taken by public sector clients during risk analysis processes to ensure that the risks identified can be mitigated by appropriate project parties based on an accurate risk analysis result.

Acknowledgement

The authors would like to acknowledge the collaboration of the Leeds Mental Health Trust (LMHT), as well as that of Mr. David Brown, for providing sufficient information on this PFI hospital project through the Full Business Case report that enabled the comprehensive assessment of this case study.

References

Burke, R. (1999). *Project Management Planning and Control*. West Sussex: Wiley.

Chicken, J. C (1994). *Managing Risks and Decisions in Major Projects*. London: Chapman & Hall.

Hayes, R. W. (1987). *Risk management in engineering construction: implications for project managers*. Report of research supported by the SERC specially promoted programme in construction management and prepared by the Project Management Group, UMIST.

Latham, M. (1994). *Constructing the team: Joint review of procurement and contractual arrangements in the UK construction industry*. London: Department of Environment of UK.

doi:10.3926/jiem.2009.v2n3.p558-568 © © JIEM, 2009 – 2(3): 558-568 - ISSN: 2013-0953

Leeds Mental Health NHS Trust (LMHT). (1999*). Full Business Case: Reprovision of Mental Health Services to Facilitate the Closure of High Royds Hospital and Roundhay Wings, St James's Hospital, Leeds*. Public document of the LMHT.

O'Reilly, M. (1994). *Risk, construction contracts and construction disputes*. London: CIRIA publication.

Project Management Institute (PMI). (2000). *A Guide to the Project Management Body of Knowledge, 2000 edition*. Newtown Square, PA: Project Management Institute.

Rosenau, M. (1998). *Successful Project Management*. New York: Wiley.

Zhang, X. (2005). Critical success factors for public-private partnerships in infrastructure development. *Journal of Construction Engineering and Management,* 131(1), 3-13.