



Project risk management in the Queensland engineering construction industry: a survey

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Abstract

This paper provides the results of a survey of senior management involved in the Queensland engineering construction industry, concerning the usage of risk management techniques. These are described in comparison with four earlier surveys conducted around the world and indicate that: the use of risk management is moderate to high, with very little differences between the types, sizes and risk tolerance of the organisations, and experience and risk tolerance of the individual respondents; risk management usage in the execution and planning stages of the project life cycle is higher than in the conceptual or termination phases; risk identification and risk assessment are the most often used risk management elements ahead of risk response and risk documentation; brainstorming is the most common risk identification technique used; qualitative methods of risk assessment are used most frequently; risk reduction is the most frequently used risk response method, with the use of contingencies and contractual transfer preferred over insurance; and project teams are the most frequent group used for risk analysis, ahead of in-house specialists and consultants.

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1. Introduction

Risk management is a critical part of project management as ‘unmanaged or unmitigated risks are one of the primary causes of project failure’ [1]. While numerous papers have been written on the subject of risk management, little current information exists on the actual use of risk management in practice [2]. Surveys have been conducted between 1987 and 1997 in several countries, including the United States, the United Kingdom, Saudi Arabia, Australia, Canada and Israel [3–12]. Of these, Uher and Toakley 1996 survey [11] is the latest Australian work.

In addition to the problems associated with the different times and locations of these surveys, each have sought different types of information—making comparisons between them all, and identification of trends, difficult, if not impossible. In view of this,

together with the 6-years lapse in time since the Uher and Toakley study, a survey was undertaken in Queensland aimed at incorporating many of the features of the previous work. To do this, four of the previous studies were selected to provide a basis, comprising:

- Akintoye and MacLeod’s 1994 UK survey entitled ‘Risk analysis and management in construction’;
- Uher and Toakley’s 1996 Australian survey entitled ‘Risk management in the conceptual phase of a project’;
- Baker et al.’s 1995 UK survey entitled ‘Risk response techniques employed currently for major projects’ and
- Raz and Michael’s Israel 2001 survey entitled ‘Use and benefits of tools for project risk management’.

Analysis of these four previous studies provided the main aims and objectives of the research, which was to

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obtain feedback from practitioners on the following aspects of risk management:

- Perceived risk tolerance of individuals and companies
- Frequency of use of risk management
- Factors limiting the implementation of risk management
- Risk management techniques used
- Risk management usage in each of the project life cycle phases
- The recording and use of historical risk data

By examining the commonality between the four surveys and considering the objectives and findings, a draft questionnaire was developed using a multiple-choice format. Additional questions on the degree of training respondents had had and the benefits obtained were included with the aim of identifying effective risk management training methods. Answers were solicited on a 5-point bipolar Likert scale.

Following a small piloting study, the final version of the questionnaire was developed and which comprises four sections. In the first section, background information, such as business category, annual turnover, years of experience, and respondent's risk tolerance was sought. The second section investigates the risk management training respondents have had and the benefits obtained. The third section sought the frequency of use of risk management techniques and factors limiting the implementation of risk management. The final section focused on organisational experience with the application of risk management. Factors investigated include risk management methods and techniques, usage of computers, project life cycle phase impact and the use of historical risk data.

The survey questionnaire was administered by mail in March 2002 to a random sample of 200 organisations involved in the Queensland engineering construction industry. The survey sample comprised owners, property developers, consultants (project managers, quantity surveyors and engineers) and contractors.

2. Results

Managers in each organisation completed the questionnaires, including directors and general managers. Tables 1 and 2 summarise the results. In total, 44 useable responses were received, representing a response rate of 23%. Based on employment position and work experience, it was inferred that the respondents have adequate knowledge of the activities associated with construction and associated risk. The figures for turnover also indicate that the survey covered a representative sample of small, medium and

large firms in the Queensland engineering construction industry.

All the responses to the questions were statistically analysed for significant differences between the groups: type of organisation (contractor, consultant, owner and developer), turnover, years spent in the engineering/construction industry, personal risk tolerance and organisational risk tolerance. There being 62 questions involved, the usual the significant level of $P=0.05$ was thought to be overly stringent (with 60 questions, the expected number of type II errors is 3). The value of $P=0.01$ was therefore chosen for the significance criterion.

A weighted average score (WAS) is used. This is calculated by summing the product of response rating and the corresponding number of responses and dividing this figure by the total number of responses.

A request for respondents to nominate the most beneficial risk management training produced only 11 responses comprising:

- In house training (five responses)
- Experience (three responses)
- MBA (one response)
- Feasibility analysis (one response)
- Institute of planning supervisors, Scotland (1 response)

One contractor stated that they 'did not find formal training all that useful'.

Significant differences were found between those with different organisational risk tolerances, with risk averse organisations scoring significantly high in their use of decision trees (mean score 2.77, 1.50 and 1.33 for risk averse, risk neutral and risk taking respectively: ANOVA $P=0.0000$), decision analysis (mean score 2.77, 1.79 and 1.25 for risk averse, risk neutral and risk taking respectively: ANOVA $P=0.0004$) and subjective probability (mean score 3.17, 2.00 and 1.83 for risk averse, risk neutral and risk taking respectively: ANOVA $P=0.0055$). Respondents were invited to nominate additional techniques to those listed but no additional techniques were nominated.

Finally in response to a request to raise any other risk management issues, the only response received was 'Profile risk has for managing large projects. Is it the sole driver or just one of the PMBOK elements, treated after scope, cost and time?' In total, 4 replies were obtained out of the potential 195 replies (5 questions \times 39 respondents) from the questions requesting additional risk management factors to those listed in the survey instrument. This low response to requests for additional risk management factors (2% of the potential responses) supports the view that the key risk management issues of the respondents were covered in this survey.

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