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

Lyons, Terry; Skitmore, Martin

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PROJECT RISK MANAGEMENT IN THE QUEENSLAND ENGINEERING CONSTRUCTION INDUSTRY: A SURVEY

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.

Key Words: Risk Management, Project Management

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 six 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 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.

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 (5 responses)
- Experience (3 responses)
- MBA (1 response)
- Feasibility analysis (1 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 x 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.

DISCUSSION

The statistical tests show the responses to be remarkably homogeneous, with only three significant differences recorded (relating to organisational risk tolerance and decision trees, decision analysis and subjective probability). This encourages a comparison with the other previous studies made in this topic, as it is clear that the results here are unlikely to be overly idiosyncratic. This is summarised in Table 3 in relation to Akintoye and MacLeod [6]; Uher and Toakley [11]; Baker et al [7] and Raz and Michael [12] and examined in more detail below. It is, of course, acknowledged that differences in findings between this survey and previous similar surveys may in part be due to the different wording of questions. For this reason, comparisons are only provided where findings are substantially in agreement or disagreement with the references.

Risk Management Training

Respondents considered their individual experience / knowledge of risk management to be moderate to high, which is consistent with Uher and Toakley's [11] findings of 'average or better than average'. The level of training in risk analysis and management techniques was found to be low to moderate, which is consistent with Akintoye and MacLeod's [6] finding that there was a 'lack of formal training in risk analysis and management techniques by most of the respondents'. Respondents indicated that the most beneficial risk management training that they had received was by way of in-house training and experience, with only three respondents referencing external courses (MBA; Feasibility analysis and Institute of planning supervisors, Scotland).

Risk Management Usage

When considering a project, the organisations surveyed undertake a risk identification and allocation process on a moderate to high frequency (WAS=3.4 to 3.8). The survey results on the factors preventing organisations from implementing risk management showed no dominant reason for this. All factors rated a moderate response with 'lack of time' (WAS=3.0) the highest and 'cost effectiveness' (WAS=2.2) rated the lowest. Akintoye and MacLeod [6] also found project time constraints to be a major limitation.

The use of computers was found to be consistently lower for risk management than for cost accounting, databases or scheduling. This is consistent with the findings of Akintoye and MacLeod [6] and Uher and Toakley [12]. As Nikander and Eloranta [13] observe, computer based risk management programs 'have not yet been developed into commonplace tools of project management in the same way as time management programs have'.

Risk Management Application

Project teams are the most likely group, according to this survey, to be used for risk analysis, ahead of in-house specialists and consultants. Cost appears not to be the limiting factor in the use of in-house specialists and consultants, given that 'cost effectiveness' (WAS=2.2) was rated the lowest risk management limiting factor. Surprisingly, the factors that rated higher as limiting risk management: 'difficulty in seeing the benefits' (WAS=2.6); 'lack of dedicated resources' (WAS=2.9); 'lack of expertise in the techniques' (WAS=2.8); 'lack of familiarity with the techniques' (WAS=2.9) and 'lack of time' (WAS=3), are all areas where in-house specialists and consultants could offer assistance. This highlights a possible opportunity to provide assistance to industry in risk management application.

An overall preference was found for the use of qualitative methods of risk analysis ahead of quantitative and semi-qualitative methods. With the exception of consultants, this preference is not as strong as that indicated by Uher and Toakley [11] who found 'a distinct preference for using qualitative methods in data elicitation and

risk analysis techniques'. The moderate average (WAS=2.9) obtained for quantitative methods across all respondents is closer to the qualitative (WAS=3.5) than would be expected. This relatively frequent use of the more complicated quantitative methods suggests an increase in the sophistication of risk management application among the survey respondents over previous surveys, which would indicate a change in approach as risk management gains support in the engineering construction industry.

Risk identification (WAS=4.0) and risk assessment (WAS=3.9) were found to be the most often used risk management elements ahead of risk response (WAS=3.5) and risk documentation (WAS=3.2). Uher and Toakley [11] also found risk identification to be the best-known component. Risk management usage in the execution (WAS=3.6) and planning (WAS=3.4) stages of the project life cycle was found to be higher than in the conceptual (WAS=2.8) or termination (WAS=2.9) phases. The lower usage in the conceptual phase is consistent with Uher and Toakleys [11] findings. However, this result contrasts with Elkington and Smallman [15], for example, who found that 'the earlier that risk management was used in a project, the more successful it was'. This finding may be partially explained by the high proportion of contractor responses (39%), as contractors tend to be involved in the execution phase more than the conceptual phase of projects. However, all the response groups indicated a higher frequency of risk management usage in the execution and planning stages of the project life cycle.

The use of risk management databases to record project risks was found to be low to moderate (WAS=2.3), along with the usage of such risk data on other projects (WAS=2.8). This may be because respondents record risks in other ways, eg., by the

use of hand written risk registers. Indeed, the use of computers for risk management was found to be lower than for other tasks. Given the obvious benefits of risk documentation, there would seem to be an opportunity to make better use of risk management data.

The most frequently used tools to identify risks are brainstorming, the case-based approach and checklists. Raz and Michael's Israel survey [12] also found brainstorming to be the most frequently used tool. Among the risk assessment techniques available, intuition, judgement and experience are the most frequently used, which is consistent with Akintoye and MacLeod's [6] findings. This result is also consistent with Fayek and Rolla's [10] conclusion that 'experience, judgement, and subjective assessment are the main tools used' in their own and Ahmad and Minkarah [3], Shash and Abdul-Hadi [4], Shash [5], Hegazy and Moselhi [8], Ting and Mills [9] and Uher and Toakley's [11] surveys. Owners (WAS=2.5), consultants (WAS=2.4) and developers (WAS=2.4) indicated similar overall average usage of risk assessment techniques, with contractors (WAS=1.9) recording the lowest average frequency of use.

Risk reduction (WAS=3.5) is the most frequently used risk response method, closely followed by risk transfer (WAS=3.3), risk elimination (WAS=3.1) and risk retention (WAS=2.9). Given that the respondents' preference for risk reduction is not substantially higher than the other methods, this result is not as conclusive as Baker et al's [7] finding that the methods available are favoured 'in the order of risk reduction, risk transfer, risk retention, and risk elimination'. Furthermore, over 90% of Baker et

al's responses 'suggested the constant use of risk reduction techniques'. This close result is consistent with the predominantly risk neutral response obtained earlier.

Among the risk response techniques, the survey found a preference for contingencies (WAS=3.5) and contractual transfer (WAS=3.5) over insurance (WAS=3.2). This contrasts with Akintoye and MacLeod [6], who found that 'project managers resort to professional indemnity insurance to transfer risks' and 'contractors transfer risks to their domestic and specialist sub-contractors and through insurance premiums'. The rapid increase in insurance premiums in Queensland over the six months preceding the survey may have contributed to the move away from insurance. Moreover, this result supports the risk neutral response, with respondents prepared to use contingencies to cover retained risks.

CONCLUSIONS

This paper described a survey of the perceived risk tolerance of a sample of individuals and their companies in the Queensland engineering construction industry. The results are 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. This contrasts with

the view that risk management application in the conceptual phase is the most important.

- 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. Consistent with previous survey findings, intuition / judgement / experience are the most frequently used risk assessment techniques. That no single risk assessment technique is best for all cases may be in part be the reason why the respondents have opted for the simplest approach.
- Qualitative methods of risk assessment are used most frequently, ahead of quantitative and semi-qualitative methods.
- Risk reduction is the most frequently used risk response method followed by risk transfer; risk elimination and risk retention - with the use of contingencies and contractual transfer preferred over insurance.
- Project teams are the most frequently used group to be used for risk analysis, ahead of in-house specialists and consultants. The level of training in risk management techniques is low to moderate.
- The use of computers is consistently lower for risk management than for cost accounting, databases or scheduling. The recording and use of historical risk data is also low to moderate, along with the usage of such risk data on other projects. Given the general philosophy for risk documentation and the use of risk management in the early stages of project development, the industry has an opportunity to make better use of risk management in these areas.

No dominant factor was identified that limits the implementation of risk management. All the factors nominated in the survey: cost effectiveness; difficulty in seeing the benefits; human / organisational resistance; lack of accepted industry model for risk analysis; lack of dedicated resources; lack of expertise in the techniques; lack of familiarity with the techniques; lack of information; and lack of time were low to moderately relevant.

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CAPTIONS TO TABLES AND ILLUSTRATIONS

Table	*Caption*
1	Results (1)
2	Results (2)
3	Survey Findings versus Reference Survey Findings

Table 1: Results (1)

	Contractor	Consultant	Owner	Developer	All
Responses					
Questionnaires issued	95	34	44	27	200
Questionnaires received	17	11	10	6	44
Percentage	17.9	32.4	22.7	22.2	22.0
Annual turnover (in A$ millions)					
Less than 10	3	5	1	1	10
10-49	2	2	1	0	5
50-99	1	1	1	1	4
Over 100	11	3	7	4	25
Personal risk tolerance					
Averse	2	2	3	0	7
Neutral	8	7	4	3	22
Taker	7	2	3	3	15
Organisation risk tolerance					
Averse	3	6	4	1	14
Neutral	8	3	3	2	16
Taker	6	2	3	3	14
Knowledge of risk management	*3.2*	*3.5*	*3.6*	*3.8*	*3.5*
Level of training in risk management techniques	*2.2*	*2.3*	*2.7*	*2.7*	*2.4*
Organisations use of risk identification and allocation process	*3.4*	*3.6*	*3.4*	*3.8*	*3.5*
Frequency of groups used for risk analysis					
Consultant	2.0	2.1	3.6	3.4	2.3
In-house specialist	2.9	3.4	3.0	4.0	3.2
Project team	4.1	3.6	3.4	4.2	3.9
Risk analysis method usage frequency					
Qualitative	3.4	4.1	3.2	3.4	3.5
Semi-qualitative	2.8	2.8	3.0	3.4	2.9
Quantitative	2.5	2.9	3.4	3.6	2.9
Risk management element usage frequency					
Risk identification	3.9	3.9	4.2	4.0	4.0
Risk assessment	3.8	3.8	4.1	4.2	3.9
Risk response	3.0	3.8	3.9	3.8	3.5
Risk documentation	2.8	3.3	3.4	4.0	3.2
Risk management usage in project life cycle phases					
Conceptual	2.7	2.9	2.6	3.4	2.8

Planning	3.3	3.6	3.3	3.8	3.4
Execution	3.5	3.7	3.6	4.0	3.6
Termination	2.9	2.6	2.9	3.2	2.9
Risk identification tool usage	*2.4*	*2.6*	*2.7*	*3.0*	*2.6*
Brain storming	3.3	3.3	3.4	3.8	3.4
Case based approach	3.0	3.4	3.3	3.8	3.3
Check lists	3.3	3.5	3.1	4.0	3.4
Flow charts	2.2	2.5	2.8	3.2	2.5
HAZOP	1.9	2.6	2.2	3.0	2.3
Influence diagram	1.6	1.6	1.8	1.6	1.6
Questionnaires	1.4	1.3	1.8	1.4	1.4
Scenario building	2.4	2.3	2.8	3.0	2.5
Frequency of recording risks in a risk management database	*2.2*	*2.6*	*2.1*	*2.6*	*2.3*
Historical risk data usage frequency	*3.0*	*3.1*	*2.0*	*3.2*	*2.8*
Risk analysis technique usage	*1.9*	*2.4*	*2.5*	*2.4*	*2.2*
Algorithms	1.3	1.1	1.3	1.2	1.3
Decision analysis	1.5	2.4	2.6	1.6	1.9
Decision trees	1.5	2.4	2.2	1.6	1.9
Expected monetary value	1.6	1.8	2.0	1.8	1.7
Intuition/judgement/experience	4.0	4.5	4.0	4.2	4.1
Monte Carlo simulation	1.5	2.4	1.9	1.2	1.7
Risk adjusted discount rate	1.1	1.6	1.8	1.8	1.4
Risk impact assessment	2.5	3.3	3.4	3.2	2.9
Risk premium	1.9	1.9	2.6	3.6	2.3
Sensitivity analysis	2.2	2.8	2.6	3.4	2.6
Subjective probability	2.0	2.4	2.8	2.6	2.3
Risk response method usage	*3.0*	*3.4*	*3.3*	*3.8*	*3.2*
Risk elimination	2.8	3.6	3.0	3.8	3.1
Risk reduction	3.2	3.6	3.9	3.8	3.5
Risk retention	2.7	2.8	3.2	3.6	2.9
Risk transfer	3.1	3.4	3.2	3.8	3.3
Risk response technique usage					
Contingencies	3.5	3.4	3.1	4.2	3.5
Contractual transfer	3.3	3.6	3.3	4.0	3.5
Insurance	3.1	2.9	3.2	4.0	3.2
Contingency Percentage Usage					
0-5%	2.6	2.1	1.6	3.8	2.4
6-10%	2.7	3.1	2.3	3.0	2.7
11-15%	1.9	3.1	2.1	2.5	2.3
16-20%	1.7	2.0	1.5	1.3	1.7
>20%	1.4	1.9	0.7	1.0	1.3

Table 2: Results (2)

	WAS
Annual Turnover and Frequency of Using Risk Identification and Allocation Process	*3.5*
Less than 10	3.1
10-49	3.0
50-99	3.8
Over 100	3.7
Frequency of Items Preventing Implementation of Risk Management	
Cost effectiveness	2.2
Difficulties in seeing the benefits	2.6
Human/organisational resistance	2.5
Lack of accepted industry model for analysis	2.3
Lack of dedicated resources	2.9
Lack of expertise in the techniques	2.8
Lack of familiarity with the techniques	2.9
Lack of information	2.7
Lack of time	3.0
Frequency of Use of Computers	*4.3*
Cost accounting	4.8
Databases	4.5
Risk management	3.3
Scheduling	4.5

Table 3 - Survey Findings versus Reference Survey Findings

This Survey Queensland, Australia (2002)	Akintoye and MacLeod; UK (1994)	Uher and Toakley; Australia (1997)	Baker et al, UK (1995)	Raz and Michael; Israel (2001)
Risk Management Perception				
Respondents considered their individual experience / knowledge of risk management to be moderate to high		The knowledge of and skill in risk management were rated by the respondents as average or better than average		
The majority of respondents consider themselves as risk neutral. Contractors and developers indicated the highest risk tolerance	Construction industry is mostly risk averse	The majority of the respondents identified themselves as either risk evaders or being neutral to risk. General contractors and property developers displaying the greatest preference to risk. In contrast, consultants were largely risk averse.		
Organisations undertake a risk identification and allocation process most of the time	The industry uses few formal techniques of risk analysis and management involving calculations due to lack of familiarity			
Factors that prevent organisations from implementing risk management rated a moderate response with 'lack of time' (score 3.0) the highest and 'cost effectiveness' (score 2.2) rated the lowest.	The respondents have identified project time constraint as one of the major reasons for not using risk analysis and management techniques. The major limitations most frequently found for application of risk analysis include managers' inadequate understanding of the risk analysis approach. One major drawback of risk analysis techniques is that the more powerful and sophisticated the technique, the more data and time are required.			
	Construction industry perceive risk in construction as the likelihood of			

	unforeseen events occurring which could adversely affect the potential completion of the project, i.e. in terms of cost, time and quality of performance		
Risk Management Application			
Project teams are the most likely to be used for risk analysis, ahead of in-house specialists and consultants			
An overall preference was identified for the use of qualitative methods of risk analysis ahead of quantitative and semi-qualitative methods		The respondents showed a distinct preference for using qualitative methods in data elicitation and risk analysis techniques.	
Risk identification and risk assessment are the most often used risk management elements ahead of risk response and risk documentation		Risk identification being the best known component of risk management employed in the conceptual phase of a project life cycle	
Risk management usage in the execution (score 3.6) and planning (score 3.4) stages of the project life cycle was found to be higher than in the conceptual (score 2.8) or termination (score 2.9) phases.		Risk management application in the conceptual phase of a project life cycle was relatively low	
The most frequently used tools for identify risks are brainstorming; case-based approach and checklists			The most frequently used tool for risk identification is Brainstorming (Israeli software development and high-tech industrial sectors)
Among the risk assessment techniques, intuition, judgement and experience are the most frequently used.	Construction industry has approached risk management in terms of individual intuition, judgement and experience gained from previous contracts.		The most frequently used tool for risk analysis is Risk impact assessment (Israeli software

			development and high-tech industrial sectors)
Risk reduction (score 3.5) is the most frequently used risk response method closely followed by risk transfer (score 3.3); risk elimination (score 3.1) and risk retention (score 2.9). Among the risk response techniques, this survey has found a preference for contingencies (score 3.5) and contractual transfer (score 3.5) over insurance (score 3.2). By group, the most frequently used percentage range is Contractor 6% to 10%; Consultant 6% to 15%; Owner 6% to 10% and Developer 0% to 5%.	Contractors transfer risks to their domestic and specialist sub-contractors and through insurance premiums Project managers resort to professional indemnity insurance to transfer risks associated with services provided to clients Contractors have a tendency to contract out all the work packages involved in a project to sub-contractors and undertake 'contract management' as part of a strategy to reduce or eliminate their risk	When transferring risk, the construction industry prefers to use both specialists and financial transferral, unlike the oil industry, which prefers to transfer the risks financially. Insurance and exclusion or indemnity clauses in contracts are the most popular way of transferring risks financially. Risk reduction was the most frequently utilised risk response method. Over 90% of the replies suggested the constant use of risk reduction techniques. Risk transfer was next, with risk retention used least. Risk sharing is used frequently, with excess or deductibles being the preferred options.	The most frequently used tool for risk response is Responsibility assignment (Israeli software development and high-tech industrial sectors)
		Overall, the risk response methods are favoured in the order of risk reduction, risk transfer, risk retention and risk elimination. Risk reduction and risk transfer are the methods dominating the construction industry responses, with 85 (91%) and 55 (60%) positive replies respectively	
		Within risk reduction, the respondents within the oil industry classed their companies as being very competent at education and training, to alert staff to potential risks, and used the method of improving working conditions very successfully to reduce these risks. The technique of a bonus system	

			for improved safety standards also was favoured, but was not regarded as highly as the previous two.
			Companies who have ever used a captive insurance company are still using it, with 82% of them believing that this is the best way of insuring ones risks.
			85% of respondents, i.e. those replying to this method, actively retain their risks, the main reason being because the required insurance premium is judged too high. Internal funding and absorbing losses as part of current operating currently are favoured for financing retained risks.
			Company competence in reducing risk was seen by respondents as better than 'adequate' for: education and training; physical protection to reduce the likelihood of risk; brainstorming to identify new risks; and physical protection for people and property.
The use of risk management databases to record project risks was found to be low to moderate (score 2.3), along with the usage of such risk data on other projects (score 2.8).			
Information Technology			
The use of computers was found to be consistently lower for risk management than for cost accounting; data-bases or scheduling	The increased availability of computers does not appear to have made much impact on the tools being used for risk analysis and management in the construction process	Information technology was widely used in the conceptual phase of a project life cycle but mainly for selective applications such as cost accounting, databases, and in scheduling and forecasting.	
		The use of information technology and integration of various information systems appear to have a more positive influence on the use of risk management	

		in the conceptual phase of a project life cycle than the type of organisation structure
		Most respondents were familiar with the concept of risk management
	Construction industry ranks poorly in terms of research activities	
		Most Organisations surveyed enjoyed a relatively moderate level of informal communication and empowerment
		Individuals in the Organisations surveyed were more willing to embrace change than their Organisations