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RISK MANAGEMENT WITHIN THE ELECTRICAL DISTRIBUTION SUPPLY INDUSTRY IN SOUTH EAST QUEENSLAND

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RISK MANAGEMENT WITHIN THE ELECTRICAL DISTRIBUTION SUPPLY INDUSTRY IN SOUTH EAST QUEENSLAND

ABSTRACT

The electrical distribution industry in South-East Queensland is currently experiencing a period of rapid change as growth in the region far exceeds what could have been reasonably forecasted 10 years ago. It is due to this growth and the capacity requirements of customers that all distribution entities are significantly building up their program of works to meet this demand. Whilst this increased work is providing supply to the public, there is some uncertainty over the effects of this on the quality of the associated management involved due to the correspondingly increased amount of time and attention needed. Of especial concern is the extent to which effective project risk management is currently conducted or even possible under these circumstances.

The research reported in this paper aimed to shed some light in this situation by capturing the 'real world' experiences, with respect to the risk management skills and application of those managers involved, and identify any deficiencies in current practice. This involved a questionnaire survey in 2004 of a sample of forty-six project managers, representing a thirty-one percent response rate, within the electrical distribution industry in South-East Queensland.

Surprisingly, in view of the supposed unusual local circumstances involved, the results agree substantially with previous studies of actual risk management practices generally in that there is an underutilisation of risk management due to managers' concerns about the time and resources needed, together with a desire for a more thorough assessment of risks by means of a formal risk management process.

Key Words: Risk Management, Electrical distribution, Project Management.

INTRODUCTION

Electrical distribution projects involve the provision of precision engineering solutions, from cable fault location services to live line capabilities, via engineering skills in planning, design, construction, operation and maintenance of infrastructure networks. These networks include high voltage electrical substations, overhead and underground transmission and distribution lines, along with protection and control systems to operate and monitor the network. Power is almost always received at a high voltage level by way of a transmission network from Generators and is then transformed to a lower level suitable to the particular distribution system's requirements by way of a substation. The substations primary function is to transform power from one voltage to another. At different stages of the distribution system, transformers are strategically located on either an overhead or underground line to step down the voltage until supply has reached 240 volts for general use by consumers.

Typically, projects are design, build and commission which include:

- high voltage substations
- overhead and underground subtransmission and distribution lines and cables
- overhead to underground conversion projects
- network reinforcement projects
- distribution substations
- subdivisions
- protection and control of high voltage systems
- new or upgraded services, external domestic, industrial and commercial projects.

The complexity of such networks requires highly skilled resources with live line expertise, distribution management systems and a reliability-based asset management approach. On-going training is essential as is the associated provision of safety, quality and environmental systems.

In the case in South-East Queensland, the electrical distribution industry is currently experiencing a period of rapid change as growth in the region far exceeds what could have been reasonably forecasted 10 years ago. It is due to this growth and the capacity requirements of customers that all distribution entities are significantly building up their program of works to meet this demand. Whilst this increased work is providing supply to the public, there is some uncertainty over the effects of this on the quality of the associated management involved due to the corresponding increased amount of time and attention needed. In a high risk industry such as electrical distribution, this raises major questions over the extent to which risks are being properly identified and handled. In particular:

- How risk aware/tolerant are the industry's managers and their organisations?
- What are the recurring critical risks they face?
- What phases of the project lifecycle are most affected?
- How much time do they spend on risk management activities?
- What criteria do they use to determine the level of risk management needed?

Of the many previous surveys of risk management in general (eg. Klammer & Walker, 1984; Pike, 1988; Ho & Pike, 1989, 1991; Akintoye & MacLeod, 1997; Bodner *et al*, 1998; Baker *et al*, 1999; Turner, 1999; Ropponen & Lyytinen, 2000; Royer 2000; Warzawski 2003; Lyons & Skitmore, 2004), these suggest that, in practice, the activity is not always approached with the rigor of other management processes (i.e., scope/change management, issue management, conflict resolution, deliverable-based work breakdown development and scheduling) (Royer 2000, p.16), with *resource availability* and *competing time commitments* being the two most cited reasons (Warazawski 2003:358). Little is known, however, on how risk management is practised in such high-risk industries as electrical distribution, with the only major study being that of Burchett *et al* (1999) nearly ten years ago. In this was found the degree of utilisation of risk management to be dependent on “managers’ concerns about time involvement, human/organisational resistance and understanding of

quantitative techniques” (p77). They also identified a “drive towards a more thorough assessment of risks ... [by means of] a formal risk management process” (p77).

This paper reports on a survey to see if this situation had improved since Burchett *et al* due to the passage of time or deteriorated due to the special circumstances in this region. A postal questionnaire was distributed in 2004 to 150 project managers employed directly by South-East Queensland electrical distribution companies together with five project managers from the general engineering industry. A total of 46 (31%) completed questionnaires were returned. The main findings are that time, safety and resource availability are the three most evident and critical risks involved in electrical distribution projects. The results also support those of Burchett *et al*, in finding that project risk management is under-utilised, due mainly to the lack of time/support. A major practical implication of this is that there is often a lack of contingency allowances to cover project risks and a lack of use of any risk management methods beyond simple checklists.

RISK MANAGEMENT FOR ELECTRICAL DISTRIBUTION PROJECTS

As a key component of project management, there has been a notable increase of awareness and application of risk management generally over the past decade – with, for instance, one of the highest rates of occurrence in major project management publications (Baccarini 2001:26). In surveying the risk management process for public sector projects, several aspects are immediately relevant. These concern: the recurring risks involved; the extent to which the risk management activity is formalised and fully integrated into the management process; the methods used and criteria for selection; the most influential phases of the project lifecycle; risk tolerance; and behavioural issues.

Recurring risk items

Of course, the basic concepts of risk management can be tailored and applied to any discipline or project within any industry. For public sector organisations, such as those involved in the electrical supply industry, the risk exposure and the consequent risk impacts are very much a function of the cultural environmental framework within which those organisations are required to operate (Baldry 1998:35). At a more detailed level, Elkington (2002:49), Tummala & Burchett (1999:224) and QRMC (2002:15) have evaluated the implication and application of risk management techniques in managing public sector capital projects. In terms of electrical distribution projects, these suggest the key issues to be:

- **Safety:** due to the high risk associated with working with and around live electricity (typically at high voltages), safety is one of the highest risks associated with works within the electrical supply industry.
- **Finance:** capital work budgets within the electrical supply industry are allocated or determined by government and further scrutinised by the competition authority to ensure that network investments meet forecasted requirements. Therefore it is critical for a project’s financial budget to be met as the budget is set to complete all projects in the program, in order to meet the network requirements for that year.

- **Time:** as project completion dates are based on network system requirements to meet load demand, it is critical that approved timing be met so that there is no or minimal impact to supply.
- **Design/technology:** due to the technology and complex engineering design associated with electrical supply networks, there is a high risk of non-compliant design as a result of human error, or technology failure by supplied plant/materials.
- **Reliability:** electrical supply companies have a service obligation to provide customers with a reliable electricity supply. This is continuously at risk whilst works are being undertaken on the network.
- **Social:** as electrical supply companies provide an essential service to the community they have an obligation to be a good corporate citizen. There are continuous risks associated with failing to inform the community of planned works, or providing them with reliable electricity supply. This in turn can lead to a negative impact on brand image and the business.
- **Quality:** due to major plant and materials being provided by suppliers and some of the construction works being undertaken by contractors, quality assurance is a high risk on most projects within the electrical supply industry.
- **Legal:** there are continuing obligations and requirements imposed by legislation that need to be monitored to ensure compliance.
- **Political:** as electrical supply is an essential service and governed by state governments there are many internal and external political influences when undertaking projects, to ensure that expectations are met.
- **Environmental:** Due to the increasing sensitivity of the environment there are many environmental risks associated with each project undertaken within the electrical supply industry.

Formal or informal/integral or separate process

Project risk management is defined as "a *formal* orderly process for systematically identifying, analysing, and responding to risk events throughout the life of a project to obtain the optimum degree of risk elimination or control" (Baccarini 1999, p.8). It is also recommended that risk management must be fully *integrated* into the process (Baccarini 1999, p.7). However, managing risk is an aspect of good management and is something many managers do in one form or another, whether or not the term 'risk' is used. It has been found that project managers manage risks continuously, both consciously and unconsciously, though rarely systematically (Hillson 2002, p.240). Furthermore, risk assessments are commonly seen as ancillary rather than an integral part of the preparation of a tender or determination of a project's feasibility.

Method selection

Many techniques have been developed, including brainstorming, interviews, questionnaires, checklists and prompt lists, assumptions/constraints analysis, SWOT analysis, Delphi groups, nominal group technique, root cause analysis, failure modes analysis and others. Some of these methods are creative and others draw on past experience. Some techniques can be undertaken by individuals while others require group input such as in holding regular group *workshops* to identify risks. Some approaches are simple and rapid where others are labour-intensive and take time. In

increasingly competitive environments, where technological advances impact the way projects are conducted, most projects have characteristics that are unique and warrant more than cursory treatment. According to McVeigh (2002:22), the basic reason for choice of method is to comply with corporate requirements although it is anticipated that some individual discretion will be used.

Phasing and qualitative/quantitative analysis

It is well known that the early phases of a project tend to have the most significant effect on the successful achievement of the projects. This is also the time with the greatest degree of uncertainty about future events (Baccarini 1999:7). It is likely, therefore, that there will be a greater emphasis on risk management during these phases. Moreover, some risk management plans focus on either qualitative or quantitative analysis, or both, with use varying at different stages in the project life cycle and at different points in the risk management plan. In one view, an effective risk management plan will necessarily be a largely qualitative (identifying-and-structuring) process early on and more quantitative (choosing-and-evaluating) process later on (Chapman 2003:28).

Risk tolerance

Attention to risk tolerance is said to lead to more efficient use of resources because the project team has a better understanding of how much of the project's risk should be remedied. In project risk management, risk tolerance is perceived from three different angles

- organisation
- project manager, and
- stakeholder (Kwak 2004, p.21).

An organisation's risk tolerance varies according to the organisation's financial stability and project diversification. A manager's risk tolerance is affected by job security and corporate culture, whilst the stakeholder's risk tolerance is influenced by project objectives (Kwak 2004, p.22).

Individual behaviours

Over time, many managers learn to manage risk by denial, sidestepping, and attempting to shield themselves. Royer (2000, p.13) also found that managers develop various patterns of behaviour to fend off the impact of risk-based failure, including:

- adding non-justified contingency time, money, or resources to the project plan (i.e., "padding" the estimate)
- pointing fingers and placing blame elsewhere
- begging forgiveness and renegotiating scope when the "unknowable" occurs
- taking shortcuts in quality assurance activities in an attempt to avoid risk impact or missing milestones
- eliminating infrastructure deliverables (e.g., training or documentation)
- reacting with an "it's just one of those things" behaviour and expecting the client to accept it.

The trouble with such behaviours is that they tend to be repeated as nothing is being learned. All of these behaviour patterns are reactive, can lead to project failures, and serve to weaken both the credibility and confidence of the manager although it has been suggested that risk-adverse behaviour is a survival trait that should be included as a balancing factor (Royer 2000:14).

METHOD

The survey was conducted by a postal questionnaire survey. This was organised to enable comparisons to be made between current practices and how they might be improved in future, based on the considerations outlined above.

Following a small pilot survey, a questionnaire was administered comprising five sections:

1. *General background and experience*: This was to assess the general background information of the respondent and to gain a better understanding of their depth of relevant experience.
2. *Risk profile*: This was used to determine a risk profile of both the respondent and the respondent's organisation.
3. *Risk tools, methods and time*: These questions identified the tools and response methods used by respondents and also provided an indication of the time allocated per week to manage risk on their projects.
4. *Risk Items*: This was intended to provide an insight into the most significant recurring risks on respondent's projects, along with their suggestions as to what they perceived were critical risks within the electrical distribution industry as a whole.
5. *Risk awareness and commentary*: Assessed each respondent's awareness of risk management techniques and the extent to which they were applied in practice.

The questionnaire was distributed in 2004 to 150 project managers employed directly by South-East Queensland electrical distribution companies together with five project managers from the general engineering industry. A total of 46 (31%) completed questionnaires were returned,

RESULTS

General background and experience

The majority of respondents (52%) were in the 36-45 age group - reflecting the maturity of managers involved in electrical distribution projects and their substantial experience within the field. 41% of respondents manage projects valued between \$2m to \$5m, with the average number of projects managed by one manager being in the range of 10 to 15. Assuming a typical working week of at least 55 hours (Powl & Skitmore, 2005), these project managers devote an average of only 4.4 hours per week to each project. 80% of respondents, on the other hand, believe they can properly manage only 1 to 5 projects at a time. This would allow at least an average allocation of one day per week for managing each project (including risk management).

The majority (50%) of respondents believed that they had a “mature knowledge” of risk management, and (100%) aspired to become an “expert” in the future.

Risk Profile

The majority (52%) of the respondents believe their personal risk tolerance level to be “risk neutral”, while 67% believe that they should become a “risk taker” in the future (Figs 1a and 1b). The respondents’ organisations are perceived to be less tolerant than their own personal tolerance, with 52% believing their organisation is “risk averse”. They did think, however, that their organisation, like themselves, should also become a “risk taker” in the future.

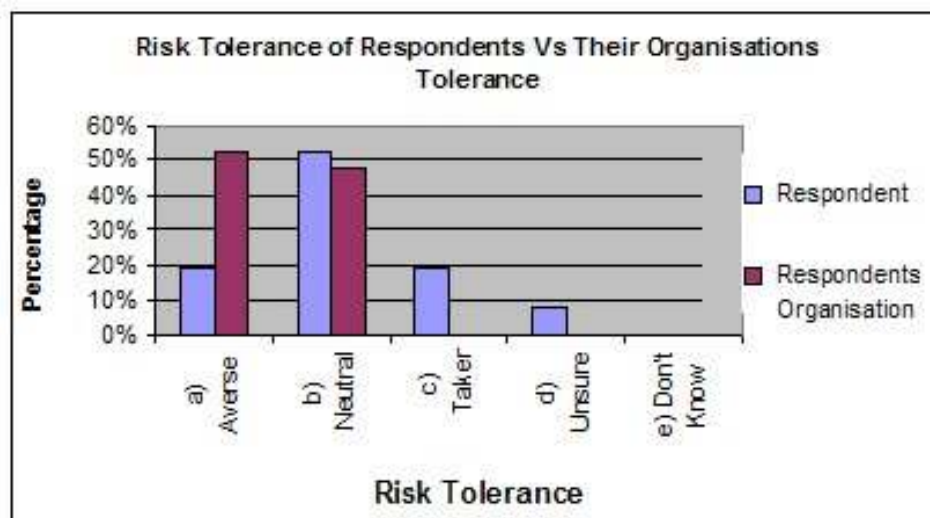


Fig 1a – What is happening now?

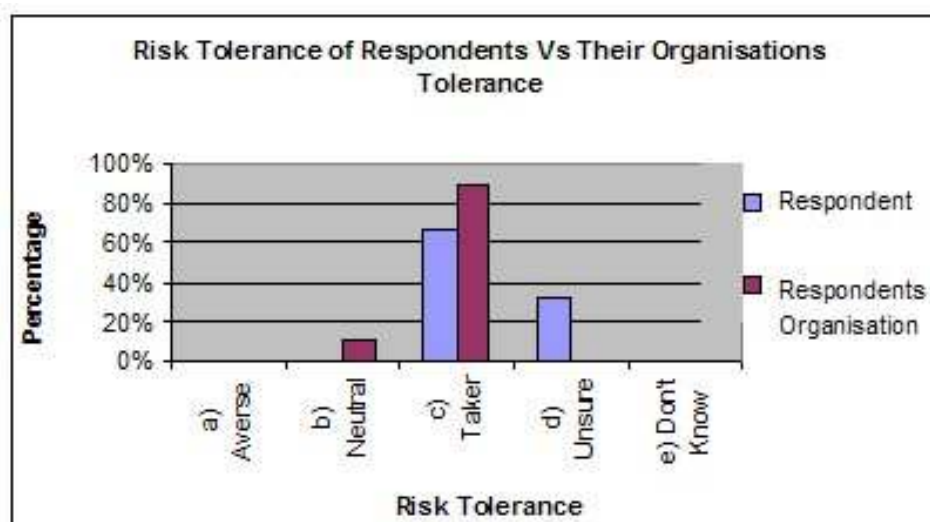


Fig 1b – What should be happening in future?

Fig 2 shows the frequency risk assessments are currently carried out by the respondents, with the majority (48%) undertaking these for all projects. Interestingly, all (100%) respondents expressed the view that risk management assessments should be made for *all* projects in the future.

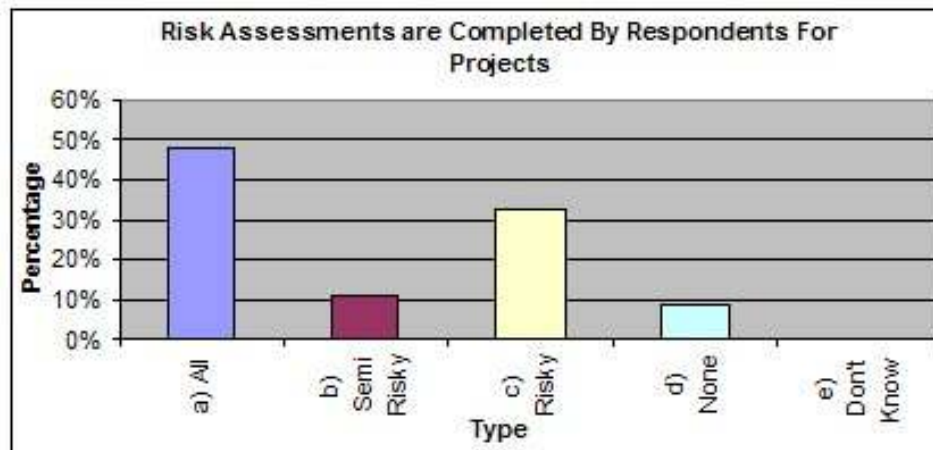


Fig 2 – Type of projects for which risk assessments are completed

In general respondents preferred risk analysis to be qualitative, both now (61%) and in the future (59%). Similarly, both the “conceptual” (52%) and “planning” (39%) stages are confirmed to be the most significant in which risk can be influenced both now and in the future.

Risk tools, methods and time

“Checklists” were currently the most (61%) utilised risk identification tool. However 70% of respondents believe that this would be replaced in future with project team “brainstorming” as the most effective tool.

The current risk response method most used by respondents (70%) is “risk reduction” while for the future the majority (46%) believe that this will be replaced by “risk transfer”. Quite how this might happen however is unclear, as all organisations in the electrical distribution industry in South-East Queensland are government owned (in part or in full) and under the Queensland Competition Authority regulations, government owned corporations cannot be seen to waive or transfer their risk to another party.

The majority (48%) do not allow a contingency percentage of total project value for risks. This suggests, at the conceptual/planning phase of the project, the responsible persons did not perceive any risks to the project would impact budget costs. Alternatively, when they identified these risks they believed that they would be mitigated or managed without impacting the project budget, although this seems very unlikely. For the future however 72% of respondents suggest that 6 to 10% of the project total value should be allowed for the management of risks within the project estimate.

The majority (70%) of respondents are dissatisfied with the average time spent on managing risk (less than 1 hour per week for all their respective projects). As one respondent commented, “Unfortunately at this time due to the workload of our organisation no time has been spent on developing a risk management culture or processes, therefore there has been no improvement in risk management”. For the future, the majority (57%) of respondents suggest that 3-5 hours per week would be

required to effectively manage risks on their projects. This is in marked contrast with the finding above of an average of 4.4 hours per week already spent on the total management activity for each project.

Risk items

The majority (50%) of respondents find *time* to be the most critical risk on projects. As one respondent points out, this can be mainly attributed to the current network capacity demand requirements of the electricity network in South-East Queensland, which is primarily caused by population growth and increased air-conditioning installation. The critical nature of meeting the system requirement date (i.e. time targets) is understandably a major risk to any essential service utility, for if the timing target is not met, a loss of supply is a likely risk impacting customers. As one respondent comments, “We need to ensure capacity of supply is available in-time for demand loads”.

The second most (30%) evident risk identified is *safety*. Due to the high-risk nature of electricity, safety is likely to remain the primary risk to all projects conducted within the electrical distribution industry, as electricity has a well-known fatality rate if people come into contact.

Another recurring risk event for 39% of respondents is *resource availability*. Respondents comment that this risk event can be mainly attributable to the record budget levels being spent on electrical distribution networks as part of their respective program of work to increase capacity in their networks. When combined with the high activity amongst the building industry and other general utilities, it is not surprising that a continuous risk event on the respondent’s projects is resource availability.

Other aspects

| QUESTION | ANSWER - What is happening now? | | ANSWER - What should be happening in future? | |
|--|---------------------------------|-----|--|-----|
| | Yes | No | Yes | No |
| 17. Do you believe that you have sufficient time available to undertake risks management on your projects? | 22% | 78% | 100% | 0% |
| 18. Do you or your company encourage risk knowledge transfer throughout or upon completion of projects? | 39% | 61% | 100% | 0% |
| 19. Do you use risk management techniques on all projects? | 39% | 61% | 100% | 0% |
| 20. Does your company have a criteria for determining when risk management techniques are to be applied to projects? | 41% | 59% | 100% | 0% |
| 22. Do you periodically review and track progress against identified risks? | 48% | 52% | 100% | 0% |
| 23. Do you conduct workshops with others in the project team for your risk assessments? | 20% | 80% | 89% | 11% |
| 24. Does your company (or specifically your project management department) have a risk management process? | 20% | 80% | 89% | 11% |

Table 1 – Responses to additional questions

Table 1 summarises the responses to some additional questions concerning their risk management activities. This shows that, while *all* respondents believe that risk

management assists with ensuring projects are delivered to satisfy their targets, it is currently being under-utilised. In most cases this appears to be attributable to the lack of time/support for the managers to properly undertake these activities, i.e.:

- 90% do not currently conduct any workshops for risk identification activities while the majority (89%) believe that they should in the future
- 80% of respondents do not currently have a risk management process in place while 89% believe that they should in the future
- 78% do not have sufficient time to effectively manage risk while *all* believe that they should be allocated more time in the future
- 61% of respondents stated that neither they nor their organisation currently encourage risk knowledge transfer, however *all* agree that they should do so in the future
- 61% of respondents do not use risk management techniques on all projects, however *all* believe that they should be in the future
- 59% of respondent's organisations do not have criteria for determining when or which risk management techniques are to be applied to projects as a form of guideline while *all* respondents believe that such criteria will be needed in the future.
- 52% do not periodically review and track progress of identified risks while *all* believe that they should do so in the future.

CONCLUSIONS

Despite the feeling that the unexpected recent expansion of the South East Queensland electrical distribution industry has resulted in an overburdened management work force and therefore a diminution of the quality of its services, the results of this survey differ little from those of other such studies of project management being carried out in more favourable circumstances. That the current practice of project risk management in the South East Queensland electrical distribution industry appears to be somewhat under-utilised simply confirms Royer's recent conclusions in the general area of project management. That is, risk management is not as rigorous as other aspects of project management. That the reasons for this situation are perceived as being due lack of resources and competing time commitments also coincides with Warazawski's results in general project risk management. Similarly, the survey confirms Burchett *et al*'s electrical industry specific results of nearly ten years ago, where the use of project risk management was found to be dependent on managers' concerns about time involvement, human/organisational resistance and understanding of quantitative techniques – with the frequent mention of time, resources and organisational limitations together with a preference for more qualitative techniques.

Also in common with Burchett *et al* is the desire by practitioners for a much more formal approach. In their words “a drive towards a more thorough assessment of risks by means of a formal risk management process” (Burchett *et al* 1999:77). That this drive has not resulted in a greater degree of change is not unusual in such a conservative field as project management and several reasons can be offered. Firstly, the mere changing from one process to another is known to create additional risks, simply due to possible presence of ‘side-effects’. Project management is, by its very nature, as very practical and complicated business with virtually no opportunities for

trialling new or alternative approaches to old, established, ways. Second, project management itself hardly exists as *an industry* but more of motley collection of service agents that happen to exist in the market place. It is therefore very difficult for it to impose explicit standards upon itself, especially those that involve extra costs, as there is no real means of passing those costs on to their clients. Third, the benefits of risk management are intangible – there is just no way of knowing what would have happened *for an individual project* in the absence of risk management when it has taken place and *vice versa* – and so the opportunity costs are incalculable. Only time will tell if the situation will change in the future.

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