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Identifying and Communicating Project Stakeholder Risks

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Abstract:

A systematic approach to risk management is needed if stakeholders are to effectively manage the risks they face on projects. Risk identification is a critical part of risk management. Using observations from project experience and class workshops, the effectiveness of several risk identification techniques is explored in the context of construction projects. Emphasis is given to the risk communication processes involved, from an intra-stakeholder perspective. While some techniques are effective for particular project stages and situations, a work breakdown structure (WBS) approach is found to be a good ‘fall back’ method for identifying project risks at the schematic and subsequent design stages. The more detailed the WBS, the more comprehensive the risk identification can be. Multiple risk identification workshops are recommended during the pre-construction phase of a project. Precise risk statements are essential for effective risk communication, and project risk schedules should be developed as active documents.

Keywords: Risk; risk management; risk identification; risk communication.

Introduction

Risk management is a systematic way of dealing with risk. There is general agreement in the literature about the process of risk management, albeit with some differences in the labelling and detail of the steps involved (e.g. Flanagan and Norman 1993; Chicken 1994; Grey 1995; Chapman and Ward 1997; AS/NZS 4360 2004; HB436 2004; Cooper *et al.* 2004; Edwards and Bowen 2005). Broadly, systematic risk management should:

- Establish the context
- Identify risks
- Analyse risks
- Respond to risks
- Monitor and control risks
- Capture risk knowledge

The consistency and level of adoption of these processes, the application of appropriate techniques in undertaking them, and the knowledge expertise gained in doing so, hallmarks the risk management maturity of an organisation.

Most projects are not unilateral undertakings – different stakeholders are involved. Projects undertaken in the public sector may often involve the engagement of multiple stakeholders and project failure – rather than project success – will commonly be reported in the media. Clearly risk management becomes more critical for public projects as complexity, community impact and scale increase. Even “in-house” or “entrepreneurial” private sector projects usually have external organisations engaged in the project process at some point. Each stakeholder is likely to be participating in different aspects of the project and may be seeking to fulfil different objectives. Potential conflict between the different objectives of different stakeholders means that they cannot share the same risk management system, since they will each be trying to deal with different risks – possibly in different micro-contexts – on the same project.

Risk has negative and positive connotations: it may pose a threat (to the achievement of objectives) or provide an opportunity (to exceed them or to fulfil them more efficiently). Threat risks tend to command more attention than opportunity risks (both in the literature and in practice) since their realisation inevitably leads to some perception of project failure. The neutral definition of risk: *‘the chance of something happening that will have an impact upon objectives’* (AS/NZS4360 2004: p4) is adopted for this paper, but from a threat perspective.

Construction project threat risks are rarely managed by individuals acting alone, but a team responsible for identifying a stakeholder’s risks will not necessarily be the same as one involved in analysing the risks, nor the one that will treat, monitor and control them. The managerial function assigns different responsibilities to different people/groups (within the stakeholder organisation and beyond). Risk information may have to be transmitted *intra*-organisationally and/or *inter*-organisationally. Communication therefore becomes an important aspect of risk management (and hence of risk identification). HB 436 (2004) notes that risk management is a key business process; not just a technical task but an activity undertaken in a social context where communication and consultation are an integral part of risk management and should be considered explicitly. A guidance document of the Victorian State Government (DTF, 2007: p4) advocates a common risk management methodology that *‘...supports the*

sharing of risk management information at agency, inter-agency and whole-of-government levels...’.

The purpose of this paper is therefore to suggest a conceptual understanding of the project risk context, and to explore techniques for identifying threat risks faced by particular stakeholders on particular construction projects. These are presented from an underlying aim of achieving effective risk communication in the process.

The paper is based upon experiential observation rather than empirical research involving controlled tests or surveys. The authors have drawn upon their own experience in the construction industry, and upon the reflective efforts (in class workshops and assignments) of many postgraduate students in project management programs at universities in Australia, South Africa, Scotland and Singapore.

The context for project risk management

Unless the context is properly established, there is little chance of identifying project risks thoroughly. Given the theme of this conference, the obvious macro-context for risk management is the unique construction project. However, this context has to be elaborated more carefully.

Project risks arise from the decision-making associated with the pursuit of project objectives (Parkin 1996). The nature of construction projects means that decisions are made at a very early stage that might affect the delivery/procurement of a project, its operational phase, or even its eventual disposal – or any combination of these (Edwards and Bowen 2005). Project management students with a background in construction projects, given their preoccupation with the delivery/procurement phase, sometimes find this concept difficult to follow through in terms of the risk management context. The conceptual gap can be bridged by considering short term events projects, such as a Formula 1 grand prix motor race on a temporary street circuit, where construction risks may be encountered by a stakeholder (over a period of no more than a few weeks) in the delivery, operational and disposal (street/amenity restoration) phases of the project.

Decision making is associated with every element of a project, including the tasks (what is to be done); technologies (how it is to be done); and resources (materials, labour, finance etc. required to do it). The decisions are made within a co-ordinating element of organisation (planning, ordering, staffing, supervising, etc.) which itself involves extensive decision- making.

Furthermore, projects do not take place in a vacuum. They arise, and are undertaken within an environment which embraces aspects which may be perceived as physical, social, or economic. These are not mutually exclusive, and form the *drivers* of project risk (Russell and Nelms 2007). All risks are shaped in some way by them. Physical environmental risk drivers might include factors such as location, topography, geology, hydrology, seasonal weather variation, technical feasibility, etc. Social risk drivers could include cultural factors (Edwards *et al.* 2005a), issues such as indigenous land ownership and mineral exploitation rights, as well as statutory instruments and codes. Employment creation policies, loan finance availability, loan interest rate variability, rental market climate, materials and labour supply, and prevailing levels of construction demand constitute some of the economic risk drivers for a project. This concept of project context is depicted in Figure 1.

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Fig. 1. The project context for risk identification (project phases, elements and environmental risk drivers).

Establishing the context for identifying project risks for a particular stakeholder entails:

- Identifying the target project.
- Clarifying the stakeholder's contribution and project objectives.
- Selecting the relevant project phases(s): delivery/procurement; operation; disposal.
- Identifying the dominant organisational aspect of the stakeholder where project decisions are made.
- Selecting, and then assessing the available information, the stakeholder's task, technology, resource and organizational elements of the project.
- Assessing the presence and strength of relevant environmental risk drivers.

Project risk management workshops often proceed in the belief that the project context is familiar to all participants. This is rarely completely true. Most participants will have some knowledge of some aspects of the context, but few will enjoy a complete and comprehensive grasp. Communication processes at the start of a risk identification workshop should therefore focus on achieving an acceptable and common level of understanding about the project context. Knowing the context allows risk identification to proceed.

Risk Identification

“Unknown” projects are inherently more risky than “known” projects (Smith 1999) and unless some attempt is made to explain the unknowns – and expose their assumptions – their associated risks will not be identified. If risks are not identified, they remain risks but cannot be managed proactively and thus may eventually become crises requiring reactive treatment (and possibly disaster recovery). Nor should risk identification be seen as a “once only” stage of risk management, since the progress of a project from concept through plan to reality may give rise to new risks that must then also be identified, analysed and treated. The same progression should generate more information that will decrease the level of uncertainty in some aspects of the project (see Figure 2): thus some risks may have to be revisited and their characteristics (likelihood and impact) reassessed in the light of new knowledge. Project risk management should therefore be applied as an iterative cycle of activities (Edwards and Bowen 2005) to match the dynamic nature of the risks.

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Fig.2. Project pre-construction stages and risk identification techniques.

The focus in this paper is on the pre-construction stages of a project since this part of the procurement phase provides the best period for effective risk identification. It is also the stage where many decisions are made that will affect the subsequent operational and even the eventual disposal phases of the project.

Figure 2 indicates typical pre-construction design stages for a project, and risk identification techniques/resources appropriate to each stage. Brainstorming is an essential ingredient across all stages and all techniques, preferably used on a group basis within a facilitated risk identification workshop. The workshop group participants should be capable of providing expert judgement in all relevant areas of the project, and should represent the decision-making hierarchy of the stakeholder organisation. While a workshop itself may be conducted informally (but with clearly recognisable structure and experienced facilitation/leadership), the workshop outcomes should be recorded formally – preferably by using a lap-top computer and/or electronic whiteboard. Suitably edited summaries of these outcomes, including a complete list of risks identified for the stakeholder organisation on that project, should be communicated back to participants after the workshop, for comment and confirmation or correction. It is important for the stakeholder to “own” its risks in this way.

At the conceptual stage of project design, little may be decided about the project other than its scope and nature in terms of procurement and functional objectives.

Checklists are advocated (Chong and Brown 2000) but their effectiveness in risk identification at this point is constrained by their reliance on the availability of information from similar historical projects. Limitations also arise because such lists frequently comprise only one- or two-word descriptions of risks that do not necessarily convey the same meaning to all workshop participants; e.g. for one participant “cost over-run” is a risk event but for another it is a consequence of some other prior risk event. Similarly “safety” may be construed as alluding to threat risk events but is more likely to be a project procurement objective for a construction company. A further problem at this stage is that, while a checklist may help to identify many risks, there is

unlikely to be sufficient information available in the conceptual design stage to reliably assess the comparative severity of those risks, and the subsequent risk management process may stall.

Risk registers may also be used at the conceptual stage of a project. These differ from checklists in that they should comprise a fuller exposition of the organisation's formal repository of risk knowledge. Risks recorded in the register will include descriptions of source events, frequency of occurrence, magnitude and timing of potential consequences, treatment options, control procedures and indications of risk management costs. In this sense, a risk register is distinguished from a project *risk schedule* in that the latter is an explicit record of the risks that an organisation proposes to manage for a specific project. It is the product of the risk management workshops for a specific project. A risk register, on the other hand, is a compendium of risk knowledge gained from the organisation's experience across all projects and from other external sources. Although risk registers are technically better than checklists for identifying risks at the conceptual stage of design, they share some of the disadvantages of checklists, and a strategic approach may be more desirable at this early point. Techniques such as *situation awareness and mind/concept mapping* can be effective (McLucas 2003), but prior training and an experienced facilitator in the risk identification workshop are essential if brainstorming structured in this way is to be successful. Rich pictures and storyboarding can also be used but suffer from similar constraints (postgraduate project management students have reported them to be useful in some specific situations but generally "woolly" and imprecise, especially if workshop participants begin to stray from the project context). A more appropriate approach might be to use *scenario testing* (or *scenario analysis*, see HB436 2004) particularly since the design concept stage often marks a strategic decision point when major "go/no-go" decisions about a project are made. The scenario approach asks workshop participants to brainstorm the risk implications if "situation X" was to arise during a particular phase of the project. Multiple scenarios can test a variety of potential "X" situations. Micro-scenarios might relate to intra-organisational events (e.g. key personnel are suddenly lost). Macro-scenarios can be escalated to higher levels of concern (e.g. a sudden increase in oil prices occurs beyond a global benchmark; political unrest arises in a project location or nearby country; anticipated government support fails to materialise; or another "9/11" or "tsunami" disaster happens). Scenario testing can reveal (often dramatically) the vulnerability of a project to crisis-type events. While threat risk scenarios are most commonly used, opportunity risk scenarios are also possible if workshop time permits. Any scenario proposal for a risk identification workshop requires careful consideration beforehand, and should not be based on sudden whim, but the workshop focus needs to stay on the implications for the project and not on the event itself.

The pre-construction sketch plan and schematic design stages develop physical form and texture for a project, and allow decisions to be made regarding the main technical design solutions, together with some notion of issues of buildability. During these stages, the usefulness of the more strategic risk identification techniques (including scenario testing) falls away quite rapidly as more definitive project information quickly builds up and the cost / benefit ratio of the strategic techniques diminishes. Checklists and risk registers, on the other hand, are far more relevant during these stages since closer, more reliable comparisons can be made with historical project contexts. *Methods statements* (relating to the construction process) may also be useful to guide

risk identification at this point, and can be interrogated in terms of particular types of risk.

The preparation of small-scale detailed layouts and elevations, and the subsequent provision of specifications and large-scale details, mark the stages when decisions about the construction process itself can be considered with sufficient confidence for project planning devices such as *work breakdown structures* (WBS), *bar charts*, *activity networks* and *resource schedules* to be prepared and utilised. Quite early in these stages, it may be possible to create a computerised dynamic rendering of the project and its construction process, using *VCE* (Virtual Constructed Environment) IT applications (Lucas *et al.* 2008). A VCE may offer an effective resource for project risk identification, since it is a powerful visual medium capable of spurring focussed brainstorming.

Questions addressed by a threat risk identification workshop during these stages would focus upon what could threaten a successful outcome for a particular task; the application of a particular technology; the acquisition of a particular resource; or the effective management of a particular process? Since all the techniques noted above are based upon decomposing a project into its constituent parts or activities, they all provide useful foci for answering these questions. The WBS has an additional advantage, since it also allows identified risks to be mapped, using a two-dimensional matrix of work items against risk categories and/or risk shaping factors (Edwards *et al.* 2005a; 2005b). Bar charts and activity networks are less useful for mapping identified risks as they are already two-dimensional graphic representations of project activities against time, and the introduction of a third (risk category) dimension may be too confusing for the workshop. Students and workshop participants generally express enthusiasm for decompositional approaches to risk identification, as most are familiar with techniques of project planning and scheduling. However, they also report that this approach is time-consuming unless the diagrams are pre-prepared for the workshop, and point out that the attainable levels of project decomposition are still limited by the extent of project information available. Nevertheless, WBS and similar techniques are generally regarded as providing a good “fall back” approach under most circumstances, capable of creating a sound platform for risk identification.

More structured, dedicated techniques for risk identification found in the literature include: HAZOPS (Hazard and Operability Studies) and FECMA (Failure Effects and Criticality Mode Analysis) or FEMEA (Failure Events Modes and Effects Analysis) – originating in the chemical engineering and automotive manufacturing industries respectively (AS/NZS 3931, 1998, and the website URLs). While these techniques can be used for risk identification in the detail and specification stages of project design, in practice their effectiveness for construction projects is found to be quite limited. Given their origins they are more suitable for application to the design of the operational requirements of facilities rather than to the procurement (construction) phase. Postgraduate project management students have reported that adapting design interrogation questions formulated for the typical operational flow processes of production engineering systems, to suit the more diverse and complex systemic features of construction projects, is just too difficult and time-consuming.

Sutton (1992) explains event tree analysis (ETA) and fault tree analysis (FTA) as risk identification tools, together with decision tree analysis (DTA), but the real benefit of these techniques is found more in the analytical processes of risk management (HB436 2004). These diagrammatic techniques are capable of exposing risk drivers (mainly for threat risks but also for opportunities) through identifying areas of relative uncertainty

in a project. ETA inductively traces the potential consequences of an identified risk event (so the event must be known before ETA can be applied). FTA deductively analyses causes of an “event” which is actually a consequence of those causes. DTA explores the implications of alternative options/outcomes in a sequence of related decisions. The main disadvantages with all the diagrammatic “tree” approaches are that few workshop participants will be completely familiar with them (particularly in terms of their theoretical logic) and that the essential diagrams cannot be prepared beforehand.

Using a workshop approach to risk identification in the pre-construction stage of a project gives rise to the question as to how many such workshops should be held? The answer will be guided by the scope and scale of the project itself. For construction projects perceived as relatively small, uncomplicated and familiar in terms of stakeholder experience, a single workshop held during the period when detailed layouts and elevations are available should be sufficient to identify risks using a checklist, risk register or WBS approach. Larger, more complex and less familiar projects might warrant a short workshop, using scenario testing, at the conceptual design stage; followed by a longer workshop when layout details and elevations are known. Major projects, in terms of scale, scope, complexity and value would easily justify at least three risk identification workshops during the pre-construction stage.

Whatever the number and size of the risk identification workshops, their outcome should be a project risk schedule (ideally designed as an active “live” document rather than a passive record) incorporating precise statements of the risks faced by the stakeholder organisation. The statements should each describe the type of risk, the risk event and its likelihood, and the consequences for the project, plus an indication of the exposure period where appropriate. For a construction project, a typical contractor’s risk statement might be:

“There is a chance ‘p’ that shortages in the supply of cement will occur over the next 12 months, causing delay and additional cost during the concrete casting phase of the project (Economic Risk).”

While lacking quantitative detail at this stage of risk management, this level of risk statement precision provides a clear framework for subsequent analysis and assessment of risk severity. It may also provide clues about subsequent treatment options for the risk. A spreadsheet provides a good basis for a project risk schedule, facilitating subsequent risk analysis and recording of treatment decisions, together with monitoring and control procedures. The use of IT intra-nets will enable risk communication across the stakeholder organisation to be undertaken effectively in a controlled manner.

Conclusions

Construction projects are complex systems, often undertaken in difficult and uncertain circumstances involving many stakeholders. They are inherently risky endeavours. A systematic approach to dealing with project risks (especially threat risks) is a prudent approach to project management for a stakeholder. Proactive management of risks requires that they be identified as early as possible in the pre-construction phase. Decision-makers in a project stakeholder organisation need to have a comprehensive understanding of the project context and objectives in order to successfully identify risks. Facilitated group-based workshops allow this understanding to be achieved and risk identification to be carried out. The number of risk identification workshops

needed during the pre-construction phase will be informed by the nature of the project and its scope and scale. While several techniques are available to identify project risks, not all are suitable for construction projects and not all can be applied throughout the pre-construction phase. Brainstorming, using a work breakdown structure as a guide, is a practicable approach when a reliable WBS becomes available. The workshop outcomes should comprise precise statements of each identified risk. Achieving these outcomes requires effective communication, both within the risk identification workshops and across the decision-making hierarchy of the stakeholder organisation.

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