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LITERATURE REVIEW - MANAGING INFORMATION AND COMMUNICATION TECHNOLOGY PROJECT RISK

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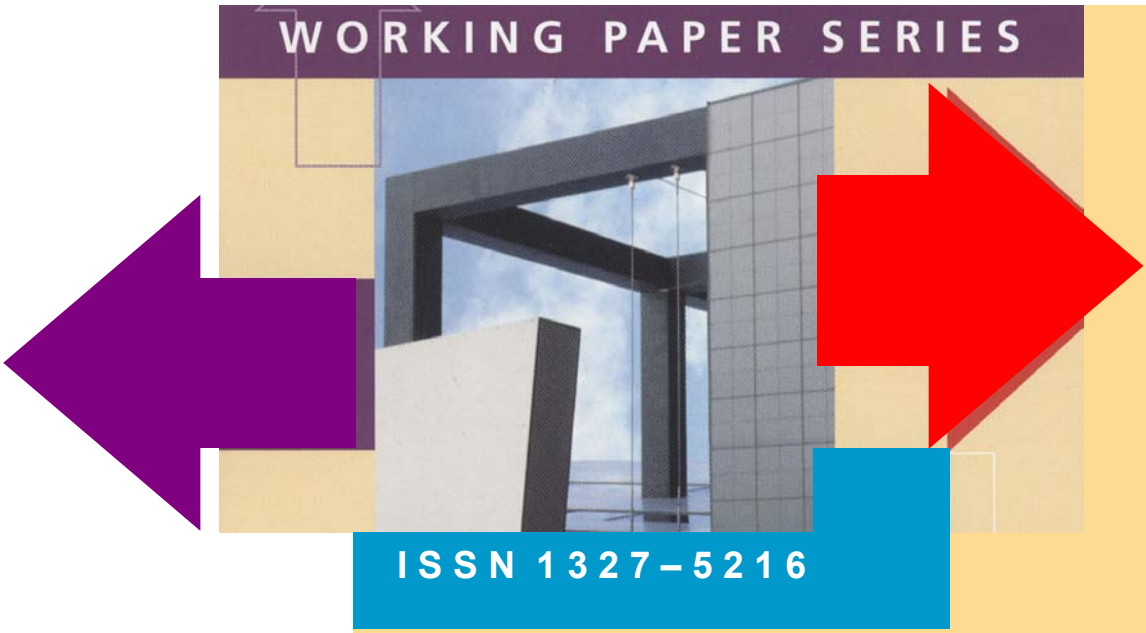

Abstract

The abstract nature of Information and Communication Technology (ICT) creates unique issues for IT practitioners and non-practitioners as they manage project uncertainty and its associated risk. Organisations are often driven by the need to acquire the latest technology without assessing potential risks, often believing the technology will be able to evolve to fit their user requirements. This paper examines the literature to ascertain if themes pertaining to the type of strategies organisation have adopted or should adopt to reduce or remove risks due to project uncertainty have emerged.

DEPARTMENT OF MANAGEMENT

LITERATURE REVIEW - MANAGING INFORMATION AND COMMUNICATION TECHNOLOGY PROJECT RISK

Rapid advances in Information and communication technology (ICT) have increased the number and size of information system (IS) projects as organisations seek to exploit new technology (Irani et al., 2002). These projects consume significant amounts of organisations' time, resources and energy and failures are extremely costly (Barki et al., 1993, Whittaker, 1999). The Standish Group found that 31.1% of ICT projects are cancelled prior to completion, and a further 52.7% of projects exceeded the original costs estimate by an average of 189%. Vowler (1998) suggested that 70% of ICT projects are doomed by practitioners' inability to deliver projects on time, within budget, and with appropriate quality. The abstract nature of ICT creates unique issues for IT practitioners and non-practitioners as they manage project uncertainty and its associated risk (Jiang et al., 2002b). As the complexity of IS projects increases the risk of failure from a variety of causes (table 1) increases.

DEFINITIONS

Project Failure

A search of the literature failed to isolate a single succinct definition for project failure. Larson and Gobeli (1987) imply that project failure is related to poor planning and lack of organisational support specifically; lack of top management support, a weak business case, poor definition of user requirements, lack of user participation, unrealistic time lines and inadequate budgets. Cannon (1994) and Whittaker (1999) argue that a definition of project failure varies amongst organisations but they all measure failure in terms of: budget overruns; time overruns; and failure to deliver promised functionality, i.e., to provide a system that did what the user wanted and expected. Jiang, Klein and Ellis (2002a) suggest that project failure is directly related to managerial inability to manage time and budget constraints. In this paper, project failure will be defined as by Cannon and Whittaker: project failure is needed by: budget and time overruns and the inability to deliver the promised functionality.

Table 1: Major causes of Project failure

	Lack of Experience	Size of Project	Unclear Roles	Poor Planning	Weak Business Case	Weak Technical/Cost Benefits
Alter & Ginzberg (1978)	x	x	x	x	x	x
Boehm (1991)	x	x	x	x		x
Cannon (1994)	x	x		x		
Jiang, Klein & Discenza (2001)	x	x	x			
Larson & Gobeli (1987)	x		x	x	x	
Nicholas (1990)			x	x		x
Taylor (2001)	x	x	x	x	x	x
Weston (2001)	x	x		x		x
Whittaker (1999)	x			x		

Risk Management

There are many definitions of risk management. McLeod and Smith's (1996) definition suggests that project risk comprises chance encounters with events that may prevent the achievement of the project goal. Philips (1998) dichotomizes Risk Management as 1) Risk Management is a set of tasks that address any potential problem in a project and 2) Risk Planning anticipates possible problems and appropriate actions. Schwalbe (2000) similarly suggests that Risk Management is a set of principles whereby the project manager continually assesses risks and their consequences, and takes appropriate preventive strategies. McManus

(2001) argued that project failure is caused by a combination of abnormal events or failures and the consequences these events have on the system.

We define Risk Management as the sequence of actions occurring throughout the project life cycle and which the project manager continually assesses the potential negative effects of uncertainties and provides strategies and responses to minimize their effects on the project. Risk Assessment should occur throughout the project life cycle. The magnitude of the Risk Management task varies with the size of the project, and its importance to the business.

STRATEGIES FOR RISK FOR ASSESSMENT

Alter and Ginzberg (1978) explored various dimensions of managing uncertainty in IT implementations using the step change management model of Klob and Frohman (1970). They argued that IT implementations are actually a special kind of organisational change and that the IT discipline would benefit if theories of organisational change were adapted by IT project managers. They identified eight risk factors relevant to IT projects and suggest risk-reduction strategies for each of them (Table 2). Boehm (1991) argues that the non-tangible nature of software makes it difficult for non-IT people to understand what the IT defined deliverables are. This often leads to differing perceptions amongst software providers, the organisation and functional groups of what the deliverables are. . Organisations are often tempted to acquire the latest technology without assessing potential risks; often believing that the technology can be modified to their requirements. Boehm (1991) proposes that early detection and management of risk will lessen the long-term costs and result in fewer failed projects. Boehm (1991) describes a Risk Management typology comprising two dimensions; Risk Assessment (further subdivided into Risk Identification, Risk Analysis, and Risk Prioritisation) and Risk Control (further subdivided into Risk Planning, Risk Resolving and Risk Monitoring). He argues that Risk Management is a tool designed to better manage the project life cycle and that Risk Assessment is an ongoing process that must occur throughout the project.

Barki, Rivard and Talbot (1993) argue that ICT projects must be properly managed if risks of failure are to be minimised. They suggest that the war stories of the 1970's are still being replicated with little or no effort being made to understand the causes of costs and time overruns and the inability to meet user requirements or agreed performance improvements. They examine several "runaway" project failures manifest in budget blowouts and/or time overruns. They cite the example of the Allstate Insurance Company in which the original estimates for a new computer system were $8US million and five years duration. The project was delayed by four years, ultimately costing $100US million. Their research sought to develop a tool that facilitating measurement of risks associated with software development projects.

Table 2: Possible risk with strategies to reduce (adapted from Alter and Ginzberg (1978))

Risk	Strategy to reduce
Lack of user participation or involvement	Motivate users to participate and obtain commitment, sell system
Multiple users and designers have different view of what the project will deliver	Motivate users to participate and obtain commitment
Staff turnover	Obtain management support, review compensation, and offer training for new system.
User requirements unclear and too broad.	Adopt modular approach, prototype system
Lack of Top Management support	Broadcast progress, motivate organisation, sell system
No prior experience with systems	Keep systems simple
Unpredictable impact - inability to understand how all stakeholders will accepts the new system	Obtain management support, sell system
Technical problems cause cost blowout due to lack of understanding of new system.	Keep system simple, use a modular approach

They tested their risk measurement tool for reliability and validity using quantitative data analysis obtained from surveying 120 projects. They established that a limitation of their tool was its inability to relate particular kinds of risk and project outcomes as different kinds of risks had different impacts on different projects. Their research suggests this would be only the first step in understanding the complex issues of Risk Assessment in the context of IT project management. The article did not suggest any strategies, helping to identify or manage risks if they appeared. Philips (1998) monograph was developed as a handbook for project managers and devotes an entire chapter to risk management. Philips argues that risk analysis and Risk Control are two distinct, albeit overlapping, steps that most organisations fail to differentiate. Philips categorised the major causes of risk as: People, Process and Product. Philips recommends that Risk Planning should contribute to decisions as to whether to continue with the project. It is also the phase in which risk-dependent strategies are developed based on the probability of a risk occurring. Risk Planning should happen throughout the cycle, not merely when adverse events threaten. Risk Control (deciding how identified risks will be controlled if they appear) is critical. The project manager must scan the environment for known or unknown risks and plan to minimise them before they threaten the project's success. Philips argues that it is important to incorporate Risk Management into the project plan and not see it as a separate task only addressed when disaster is imminent.

Schwalbe (2000) suggests that Risk Management is often overlooked in project management but that its appropriate use yields significant improvements and makes the project's ultimate success more likely. Risk Management ensures that the project scope allows for realistic schedules, cost and performance expectations. Schwalbe proposes four dimensions of Risk Management, namely: Risk identification, Risk quantification, Risk response development, and Risk response control. Risk Management should be costed and included in the total cost of the project; organisations need to realise that Risk Management is intrinsic, is unavoidable , and will cost less if it is recognised has an essential part of project management. The success of the project is often measured by the project manager's ability to implement the following three element of Risk Management: avoidance, acceptance, and mitigation.

Jiang, Klein and Discenza (2001) sought to explain why ICT projects continue to fail despite advancing ICT development, arguing that organisations need to improve Risk Management if they are to reduce high project failure rates. The main purpose of their research was to analysis behavioral, technological and technical risks and propose matching behavioral, technological, and technical strategies. They assumed that such strategies would not eliminate risk but would reduce its impact on the project and organisation. They noted that projects often succeed in the delivering the specified functionality but still fail budget and time criteria. They suggested that strategies designed to alleviate technical risk should to be simple to implement and not distort or unnecessarily change user requirements. They found, through quantitative research methods, that the major indicators of project failure included: the acquisition of new hardware or software, project size, team dynamics, user support, unclear role definitions and lack of user experience.

McManus (2001) identified the major causes of project risk as lack of planning and lack of top management control during the project life cycle. He suggests that IT projects are usually initiated in the context of change and that these projects are different from normal, perhaps incremental, change processes. They have a clear set of objectives to be realised within an agreed time and cost. He proposed a Risk Management cycle, comprising four phases, each of which must be executed and, if necessary, repeated as required to minimise risk. The four phases were: 1) Establish that a risk exists; 2) Analyse the risk severity and probability; 3) Plan to manage the risk using the risk's severity and probability of occurrence; and 4) minimise risk consequence. These four phases are analogous to Edward Deming's quality cycle (Evans and Lindsay, 1999) that comprises the four phases Plan, Do, Study, Act.

McManus , also examines issues related to software development opining that the major risks of IT projects are often arise from group dynamics, especially those involving the project manager, project teams and steering committees. These groups are essential to the good management and success of ICT projects and their dysfunction poses serious project risks. He recommends that simple methods such as using a risk register can materially contribute.

Weston (2001) argued that many organisation continue to fail when implementing IT projects such as Enterprise Resource Planning systems (ERP). He asserts that causes of failure include poor management, poor planning, slow and/or ineffective implementations, resistance to change, failure to meet user requirements, project size, and combinations of these factors. Weston discusses the effect of external influences on project success. External influences include the poor communication with the software vendor, sheer size of the project and lack of top management support. He agues that the high cost of ERP system implementations and failure to adopt appropriate risk strategies endangers the entire organisation. This is exemplified by the recent bankruptcy of the pharmaceutical company FoxMeyer that attributed its demise to its failed ERP system implementation (Bicknell, 1998).

Irani, Sharif, Love & Kahraman (2002) explored the traditional justification methods for selecting new ICT systems and the impact of inappropriate selections on the organisation's objectives and priorities. Traditional selection methods include the return on investment, internal rate of return and net present values, all financial frameworks that use only tangible measurements. Irani et al suggest that these types of methods failed to identify the often substantial intangible benefits and costs of ICT projects and suggested that risk analyses that ignore the intangible costs and benefits of new ICT systems multiply project risk. The justification for new systems need to be evaluated in terms of the strategic advantage they offer the organisation even if these cannot be reduced two dollars. Irani et al's hierarchical model has four levels: Strategic, Tactical, Operational and Financial. They suggest that projects should only progress to financial evaluation after other kinds of risk and benefit have been evaluated and the need for the project has been justified on strategic, tactical and operational and as well as financial grounds. They provide a model for project selection but do not state how risks should be evaluated to ensure the appropriate system is selected.

Meyer, Loch and Pich (2002) suggest that Risk Management is orientated towards identifying and controlling project variation and foreseeable uncertainty. Unforeseeable uncertainties are (they assert) the biggest risks to project success. Project managers need to recognise deviations from the plan and push through solutions to ensure the project remains on track. Failure to manage deviations risks both project and organisation Project managers must constantly monitor risks and objectively communicate them to key stakeholders. The article does not identify risk strategies but focuses on the role of the project manager and project team members once risks have been identified.

Summary

Examination of the literature provides an understanding of past research into Risk Management in the context of IT projects. The literature documents common strategies for assessing and managing risk. Many writers have proposed, tested, and evaluated methods for assessing and minimising IT project risk (Alter and Ginzberg, 1978, Boehm, 1991, Barki et al., 1993, Schwalbe, 2000, Jiang et al., 2001, McManus, 2001, Weston, 2001, Irani et al., 2002).

A common theme was that Risk Management has two dimensions; Risk Assessment and Risk Control (Boehm, 1991, Barki et al., 1993, Phillips, 1998, Schwalbe, 2000, McManus, 2001, Meyer et al., 2002, Irani et al., 2002). Table 3 summarises different writers' terminologies. An emerging theme is that early detection of risk reduces the likelihood of project failure. (Boehm, 1991, Phillips, 1998, Schwalbe, 2000, McManus, 2001). Philips (1998) argued the benefits of being able to estimate risk of failure and the development of contingency plans in the event the risk is manifest. This is similar to Risk Assessment but is more proactive in seeking to uncover or predict the unknown whereas Risk Assessment suggests an attempt to quantify an already recognised risk.

Table 3: Dimensions of Risk Management

	Risk Management	Assessment	Control
Barki, Rivard and Talbot (1993)	Risk Management	Assessment	Management
Boehm (1991)	Risk Management	Assessment	Control
Irani et al. (2002)	Project Appraisal	Evaluation	Control
McManus (2001)	Risk Management	Planning	Management
Meyer, Loch and Pich (2002)	Uncertainty	Evaluation	Control
Phillips (1998)	Risk Engineering	Analysis	Management
Schwalbe (2000)	Risk Management	Identification	Response

Five of the ten articles discussed (Meyer et al., 2002, Weston, 2001, McManus, 2001, Schwalbe, 2000, Phillips, 1998) argue the importance of project planning in evaluating risk suggesting that risk evaluation must continue through the entire project life. Project plans need to incorporate Risk Assessment early in the process as risk can affect the time and budget constraints.

Emerging from the literature were six dimensions that appear to be instrumental in determining the success or failure of a project: Top Management support; People; Size of Project; Experience with technology; Skills of the project manager; and External Influences.

CONCLUSION

Risk Management needs to address all factors (organizational, human and technical) that can affect project success. Risk Management for IT projects is not solely an IT responsibility. The entire organisation must be involved if risk of failure is to be minimised. Technology alone does not cause projects to fail, human and organisational factors are much more frequent causes of project failure. The six most common causes of project failure are: Failure to attract top management support; lack of project ownership and commitment, poor planning, inappropriate staffing levels, inadequate funding and unrealistic schedules. Management must not assume that what cannot be measured is unimportant, Risk Management must focus on both the tangible and non-tangible costs and benefits if risks of failure are to be minimised.

Risk of project failure cannot be eliminated but, with appropriate strategies and management, it can be minimised. Despite the considerable literature on the risks pertaining to ICT projects and their frequent failure we did not discover a Risk Management framework and model specific to ICT projects. ICT projects are still failing. This suggests that strategies implemented to reduce the risks are themselves failing, and that substantial business benefits would flow from better management of IT project risk.

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