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AN EXAMINATION OF DECISION-MAKING IN IT PROJECTS FROM RATIONAL AND NATURALISTIC PERSPECTIVES

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Abstract

This exploratory research examines the decision-making processes of experienced IT project managers at the initial start-up stage of their projects and at key decision points during project execution. The focus is on the decision-making related to potential problems (risks) at the start, and materialized problems during the course of the project. Decision processes are viewed from the perspective of two contrasting theories of decision-making – the rational method and Naturalistic Decision-Making theory – in order to investigate how well each of these theories describes actual practice. Findings show an intertwining of rational and naturalistic modes of decision-making, and a possible link was revealed between the use of rational methods and fewer subsequent problems. In particular, greater reliance on the naturalistic approach may contribute to poor project performance in terms of management of contingencies and expectancies about client relations.

Keywords: IT project management, decision-making processes, decision theory, IT risk management

Introduction

The poor track record of IT projects has long been used to support calls for better management of these projects. Much attention has focused on issues of project planning and risk management in IT projects, and considerable prescriptive advice is now available for IT project managers on how to manage potential and actual problems in their projects, typically based on an assumption of a rational approach to decision-making about these problems (see, for example, Baccarini et al. 2004; Barki et al. 2001; Boehm 1991; Dey et al. 2007; Heemstra et al. 1996; Keil 1995; Kwak et al. 2004; Powell et al. 1996). However, little attention has been paid to examining if and how managers apply these prescriptions in their actual decision-making processes during the course of their projects.

One common theme in the IT risk management literature is that projects with higher levels of uncertainty and complexity are more risky (Barki et al. 1993; Davis 1982; Dey et al. 2007; Kutsch et al. 2005; McFarlan 1981). A relatively recent strand of research, primarily within the cognitive psychology field, has investigated how experienced professionals make decisions in poorly-defined and uncertain circumstances in a variety of contexts, including fire-fighting, nursing, the armed forces, and hardware and software design (Klein 1999; Vicente 1999). This stream of research has led to the development of a descriptive theory, Naturalistic Decision Making (Zsombok 1997), and a model of decision-making, the Recognition-Primed Decision model (Klein 1993; Klein et al. 1989), which propose that *situation assessment*, *expert knowledge* (i.e. knowledge gained through experience), and *judgment* are important factors in decision-making in real-life settings, and that the rational processes assumed by prescriptive models and frameworks for decision-making are often not applied in practice. Moreover, studies of skilled practitioners in areas such as business management, sales, and military leadership have shown that, when dealing with complex and ill-defined situations, these experts supplement their formal education with tacit knowledge and judgments derived from their experience (Sternberg et al. 1999).

Rational decision processes are a basic assumption of the risk and problem management prescriptions referred to earlier, and are typically learned through a formal education process. However, in practice, experienced project managers of complex and uncertain software projects may rely more on their expert knowledge and judgment than on these prescribed rational frameworks. Thus, the aim of the research reported here was to examine the decision-making processes of experienced IT project managers from the perspective of both rational and naturalistic models of decision-making in order to investigate how well each of these theories described and explained practices described by respondents. By understanding how experienced decision-makers actually make decisions about risky situations in IT projects, rather than simply prescribing a theoretical framework, we may gain a better understanding of how to improve decision-making training for novices.

This study was part of a larger exploratory field study into IT project managers' current practice and management strategies. The research reported in this paper provides a window into inherent work constraints that may limit the applicability of the prescriptive decision-making models found in the literature. Further, the study: (1) highlights aspects of current decision-making practice that may undermine the effectiveness of risk management procedures in IT projects; (2) lays the foundation for a formative model encompassing aspects of both rational and naturalistic decision-making that can provide better descriptions of actual IT project management practice; and (3) offers more practical prescriptive guidance in order to support practitioners effectively.

Rational Decision Making in Project Risk Management

The typical prescription for project risk management (Figure 1), in both academic and practitioner project management literatures, is premised on the assumption that project managers should take a rational approach to decision-making about the potential problems or risks that threaten their projects. This prescription recommends that project managers follow a rational problem-solving approach by first identifying all potential problems that could impact the project, and then assessing each potential problem by calculating the likelihood that the problem will occur and the impact if it does occur. This analysis results in a prioritized potential problem list and also an overall assessment of the level of 'riskiness' of the whole project. In IT projects, the level of riskiness of a project is often considered when determining the management approach to take for the project (Barki et al. 2001; Davis 1982; McFarlan 1981). The project manager chooses a response for each potential problem based on the expected risk value (likelihood times impact) and on an evaluation of the possible alternative options available to address the risk (Lyytinen et al. 1998; March et al. 1987). Contingent actions are planned in case, in spite of the initial response, the problem still eventuates. During the execution of the project, the manager monitors progress, and watches out for

any potential problems that materialize into actual problems. Should such problems arise, then the previously planned contingent actions can be immediately applied to control and resolve the problem.

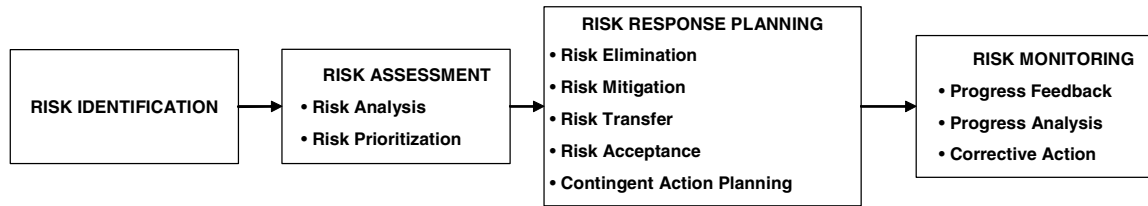


Figure 1: Rational project risk management processes (adapted from Project Management Institute 2000)

Researchers have argued that the application of rational risk management strategies has been demonstrated to improve IT project performance (Baccarini et al. 2004; Baskerville et al. 1996; Dey et al. 2007; Heemstra et al. 1996; Kwak et al. 2004; Lyytinen et al. 1996). However, there is evidence to suggest that IT project managers are not likely to be rational decision makers when assessing risk (Charette 1996a; Schmidt et al. 2001) and that they tend to take what Simon (1979) calls a *satisficing* approach to software development decisions; that is they choose courses of action that are “good enough” to meet the identified needs, but not necessarily the optimal solution (Lyytinen et al. 1996). Rather than react to a risk choice by choosing the alternative that has the lowest expected risk value, IT managers look for ways to manage or change the risk or avoid it altogether, in order to influence and control the likely outcome (Lyytinen et al. 1998). Pablo (1999) observes that software development managers focus more on the impact of a possible risky event, and comparatively less on the likelihood of the event, than managers from either the oil and gas or the commercial banking industries.

While the rational decision-making approach has strong prescriptive support, the evidence about its use in practice is mixed, and the extent to which it describes project managers’ actual decision-making processes is unclear. The naturalistic decision-making approach described next may provide a more accurate description of most project managers’ approaches to address IT project risks.

Naturalistic Decision Making

A more recent strand of applied decision-making research has focused on an approach called Naturalistic Decision Making (NDM), which aims to understand how people use experience to make decisions in real-life settings, rather than to prescribe a particular decision-making approach (Klein 1999). Experienced decision makers in NDM situations use their experience to gain understanding of the situation and feedback on it, rather than comparing and evaluating multiple alternative solutions (Klein 1999; Zsombok 1997). Features of NDM situations include the use of experience, the importance of context and cue learning, and the need to cope with uncertainties and difficulties such as ill-defined goals, time pressure, inadequate information, and dynamic and continually changing conditions. Clearly, there are several similarities between these features of NDM situations and IT projects. For example, the issues of unrealistic time schedules, unclear and changing goals and requirements, amount of organizational change required, and stability of corporate environment feature highly in the IT project risk factors identified by several authors (Barki et al. 1993; Boehm 1991; Heemstra et al. 1996; Moynihan 1996; Schmidt et al. 2001).

The Recognition Primed Decision (RPD) model has been developed to explain how people make decisions in NDM situations (Klein 1993; Klein 1997b; Klein et al. 1989). The RPD model seeks to address research findings suggesting that experts rarely consider more than one option at a time (Klein 1997a; Klein et al. 1989). This research suggests, instead, that experts focus on awareness of the situation, by observing contextual cues and patterns in order to size up the situation and recognize aspects of it as typical of other cases in their experience, maybe with certain anomalies. The anomalies often provide the early warnings that alert experts to prepare for unexpected events.

In the RPD model, illustrated in Figure 2, decision makers first experience a particular situation in its own changing context. This leads to an assessment of the familiarity of the situation. Recognition of aspects of the situation as typical in the decision maker’s experience will have the following by-products: certain relevant cues will be observed; there will be certain expectancies about the situation; plausible goals for this situation will be established; and certain typical actions will be identified that might achieve goals related to this situation. The expectancies are compared with the situation and its context and if anomalies are detected further clarification is sought and the situation is reassessed. If there are no anomalies then the decision maker chooses a promising course of action based

on past experience with similar situations, and conducts a mental simulation of the action to rehearse whether it will work. If the mental simulation is satisfactory, the action is implemented. Otherwise, the action may be modified and tested again, or another action may be chosen and tested.

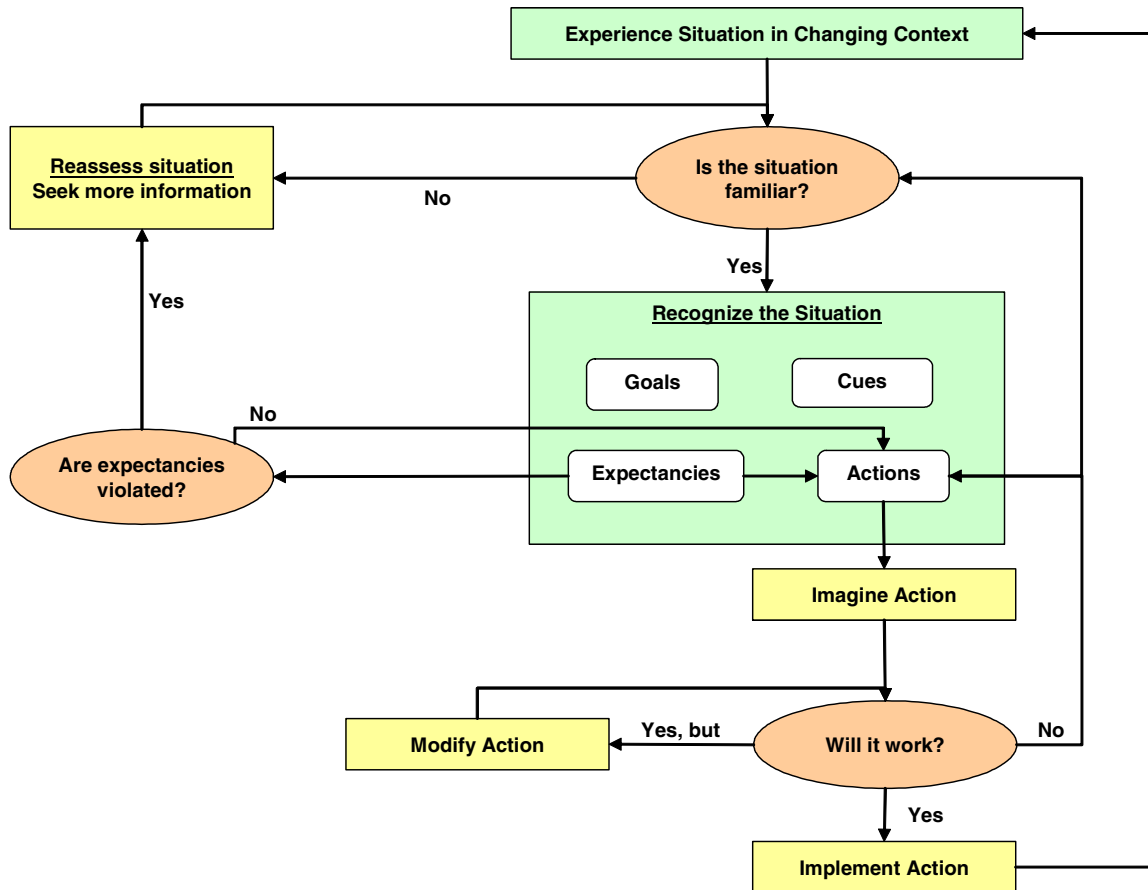


Figure 2: Recognition-primed decision model (after Klein et al. 1989)

Particular features of the RPD model that distinguish it from rational decision-making models include the emphasis on *situation assessment* rather than on option evaluation; the focus on serial evaluation of actions, which allows a *satisficing* approach of selecting the first workable action, rather than concurrent evaluation of all actions to select the best action; and the assertion that decision-makers evaluate actions by using mental *simulations* rather than by weighing up the strengths and weaknesses of each action. While NDM, and the RPD model in particular, have been explored in several different areas, including decision making in fire-fighting, armed services, airline flight control, nursing, chess playing and hardware and software design, there has been little application of this theory as yet to management and business studies.

Given that IT projects have many of the features for which NDM applies, this study explored the utility of NDM and the RPD model for describing and understanding risk management decisions in IT projects. In particular, I compare and contrast the rational decision-making process illustrated in Figure 1 with the naturalistic RPD model shown in Figure 2, in order to test which of these models provides a better description and explanation of experienced IT project managers' decision-making processes with respect to their management of potential and materialized problems in their projects.

Method

The aim of this study was to gain an understanding of expert IT project managers' decision-making processes in the field. Since the ability to re-frame a problem in light of its context is a key distinction of expert problem-solving (Klein et al. 1989; Klemp et al. 1986; Scribner 1986), the research method employed had to aid in surfacing contextual clues that experts were observing when addressing decision points in particular situations. Thus, an interpretive approach was used in order to tease out the contextual information that could provide insight into subtle differences in the situations that the project managers faced. The critical decision method was used to guide the semi-structured interviews because this method has been used extensively in research for eliciting expert knowledge and has been demonstrated to be particularly effective in focusing respondents on what *actually* happened in a given situation, rather than on reporting what they thought *ought* to have happened (DuBois 2002; Klein et al. 1989).

Sample

Since my goal was to examine the decision-making practices of *expert* project managers, I chose to focus on project managers working for software vendor firms. These firms specialize in software project implementation and hence might be expected to seek the highest levels of expertise in their project managers. The aim of the sampling approach was to obtain replicate and contrast cases in order to build an "information-rich" set of data (Miles et al. 1994 pg 28; Patton 2002 pg 40) that could provide key insights into the areas of interest. Thus, I used a purposeful sampling approach to identify a range of packaged software implementation firms, in order to ensure that respondents were working for organizations significantly involved in IT project management. Data were collected in Hong Kong. Once an initial contact had been made with a senior executive within a firm, I sought recommendations from these superiors of IT project management 'experts' who had demonstrated a high level of project and risk management expertise on at least five major projects. In total, 25 experienced project managers, from 12 different organizations, were interviewed. Eight project managers were recommended specifically on the basis that they had proven themselves as 'rescuers' of troubled projects, i.e. they were typically called in to take over a project that had run into difficulties and were skilled at enabling these projects to be completed. By the completion of the 25 interviews, preliminary data analysis showed a convergence of themes, with no new themes emerging. Thus no further interviews were sought.

The respondents included 20 males and five females; 17 were Hong Kong Chinese, seven were 'Western' (including HK born European, African-American, Australian, British, Scottish and South African), and one was Canadian Chinese. Ages ranged from 20 through to over 60, with the majority, 88%, falling between 30 and 49 years of age. Four of the respondents finished their formal education at the high school level, ten had bachelors' degrees, and ten had postgraduate qualifications. All of the respondents had trained or worked abroad for part of their careers, and all had experience working with team members from a wide variety of cultures.

Data collection

A set of core procedures based on the critical decision method (DuBois 2002; Klein et al. 1989) were used to develop a semi-structured interview protocol (key probe questions shown in Table 1). The critical decision method has been developed specifically for expert judgment or decision-making investigations, where the aim is to reveal aspects of expertise such as the critical cues used in making perceptual and conceptual discriminations, and the underlying basis for judgment decisions. It differs from the more general critical incident interviewing technique (Flanagan 1954) in that it allows more cognitive probing to encourage respondents to reflect on their own strategies and bases for decisions. In the interviews, I asked the respondents to focus on a specific project they had implemented recently, and to describe the course of the project and discuss specific incidents during the course of the project that were risky and challenging. I used a structured series of decision point probe questions to elicit information about the situational cues surrounding each incident, the strategies and options considered, the factors or triggers that determined one response rather than another, detail about the action taken and the consequences of the action. The critical decision method's focus on cue usage and reflection by respondents on their strategies and possible alternatives, helps to elaborate the basis for selecting one option rather than another in a given situation. As Klein et al. note (1989 pg 467), focusing the respondent on why other choices were rejected can illuminate the real reasons for taking a particular action.

Table 1: Critical decision probe questions (adapted from Klein et al. 1989)

Area	Questions
Problem description	Describe the situation?
	What happened leading up to the situation? (Context, environment)
	What did you do?
	What was the outcome?
Planning	Had you anticipated the possibility of this problem at the planning stage?
	Did your plans include contingency measures for a problem like this?
	Did the contingency measures work?
	Did you deviate from the plan – how, what factors caused the deviation?
Cues	What key points alerted you to ...? How did you know that ...?
Options	What alternatives did you consider ...?
	What limitations did you face regarding possible actions?
Interactions	Did you have direct control?
	Who were the key players?
Analogues	Were you reminded of any previous experience ...?
Goals	What were your specific goals at this point?
Basis	How did you decide on your choice of action/reject other options?
Knowledge	What information did you use for deciding ...? What training or experience was useful in making this decision? How did you learn about ...?
Hypotheticals	With hind-sight, what would you have done differently ...? What training or experience would have helped? What do you think a novice might have done in this situation?
Exceptions	Can you think of another situation where you would have done things differently?
Results of actions	Did your action work as expected? If not, why do you think that was? If so, what might have caused it not to work? What would have happened if your action hadn't worked?
	What would you have done?

Once respondents had exhausted their recall of key decision points for the specific project chosen, I asked whether those incidents and the actions and consequences were typical of other projects in their experience. I used follow-up questions to identify any key differences between projects identified. Respondents typically chose to discuss another one or two projects to provide contrasting information that in their view helped to explain possible differences in context and project structure that may have influenced their decision-making processes in the first project. In total, the 25 respondents discussed 60 projects, but some of these were only mentioned briefly to illustrate a particular issue or to contrast with a previous project discussed by that respondent. Generally, those projects that were only described briefly went relatively smoothly, and so they revealed little in the way of major problems. In total, 39 of the projects were discussed in depth, and these 39 projects were used for the analysis that follows.

Data analysis

The analysis process was managed with a qualitative data analysis software package (NVivo version 2.0). The general analysis process followed three key stages (Miles et al. 1994; Wolcott 1994): *description* (i.e. summarizing what happens); *coding and analysis* (i.e. systematically identifying key factors and relationships); and *interpretation* (i.e. drawing my conclusions as a researcher from the data). Projects were classified according to whether they were 'routine' projects that the respondents had managed from the beginning, or troubled projects that the respondents had been asked to take over and bring back on track. Each project was split into two stages, the start-up stage in which the managers made their initial assessments, and the execution stage, during which managers were addressing problem-arising situations. Within each stage, passages describing specific potential or actual problem situations that the respondent had to address were examined in order to extract the details and sequence of the decision process.

I first examined the decision processes described by respondents during the specific problem situations to determine the extent of fit with the rational risk management process, which proposes that the decision-maker should evaluate all possible options for the decision concurrently and choose the best one. Under the rational approach, although a situation assessment is important, there is greater focus on the consideration of all possible options for the decision. Thus, in initial assessment situations, I looked for evidence showing that the managers progressed through the risk

identification, risk assessment, and risk response planning stages illustrated in figure 1, and for problem-arising situations, I looked for indications that managers considered several different alternative strategies to address a problem and evaluated these before choosing one option. I then examined each problem situation from the perspective of the RPD model described in figure 2. In order to investigate the extent of the applicability of the RPD model, I scrutinized the specific incidents described by interviewees for evidence of goals, cues, expectancies and courses of action, and I assessed the decision points described in these incidents to determine whether concurrent or serial evaluation was primarily used, and whether the deliberation was about the situation (situation assessment) or about the action (option evaluation).

Results

Sixty-seven of the 90 problem situations described by respondents occurred in routine projects, as shown in Table 2. Sixty percent of these 67 situations in routine projects involved problems that arose during the course of the project, while 40 percent were initial assessment situations at the start of the projects. In contrast, of the 23 decision point situations described by managers of troubled projects, 39 percent arose during the course of the project, with 61 percent relating to the initial assessments the managers made when taking over the project. While the key decision described in all the situations related to choice of a suitable strategy to address the situation, the examination of these situations revealed contrasting views of managers' decision-making approaches for different types of situation. In the following sub-sections, I first describe the decision-making processes in the situation, and then examine these processes from the rational and naturalistic perspectives.

Table 2: Number of problem situations discussed in routine and troubled projects

	Initial assessment situations	Problem arising situations	TOTALS
Routine projects (29)	27 (40%)	40 (60%)	67
Troubled projects (10)	14 (61%)	9 (39%)	23
TOTALS	41	49	90

Decision-making processes in initial assessment situations of routine projects

The respondents began their involvement in the projects at the implementation stage, after the vendor firm had won the contract for the project. Key inputs into the start-up stage were the plans, schedules, budgets and risk assessments handed over from the pre-sales team. The typical decision-making strategy applied by managers at this stage in routine projects was to use a detailed analysis of the work breakdown structure (WBS) to develop an in-depth understanding of the project situation. This process had an implicit consequence of allowing the managers to develop control of potential risk areas without actually assessing risks explicitly. Two types of situation triggered an immediate, explicit decision. First, if managers identified unfamiliar issues such as new technology or unclear requirements, they initiated research to clarify the situation, and, second, if they considered the schedule or budget to be inadequate they immediately began internal negotiations with senior executives to obtain extra resources. Otherwise, there was no evidence that managers explicitly evaluated the project for possible risks or made decisions about any specific risk prevention or mitigation actions. Rather, they relied on the risk assessment and contingencies already built into the schedule by the presales team to insure against possible problems arising during the project.

Rational perspective

As shown in Figure 3, managers' processes at the start-up stage of routine projects conform, in part and mainly implicitly, to rational risk management prescriptions, but there are gaps particularly in the risk assessment and risk response planning stages. Risk identification occurred implicitly through the detailed scrutiny of the WBS. However, since any such implicitly recognized risks were never explicitly acknowledged, the explicit analysis of likelihood and impact of risks was not carried out, although the immediate actions taken on schedule and budget, technology, and requirements issues suggest that these three risks were implicitly highly prioritized. For the third stage of risk response planning, managers relied on the contingent action planning already carried out at the pre-sales stage, and only attempted risk mitigation in the circumstances noted above – new technology or unclear

requirements, and inadequate budget or schedule. The fourth stage of risk monitoring does not apply at this start-up stage of the project.

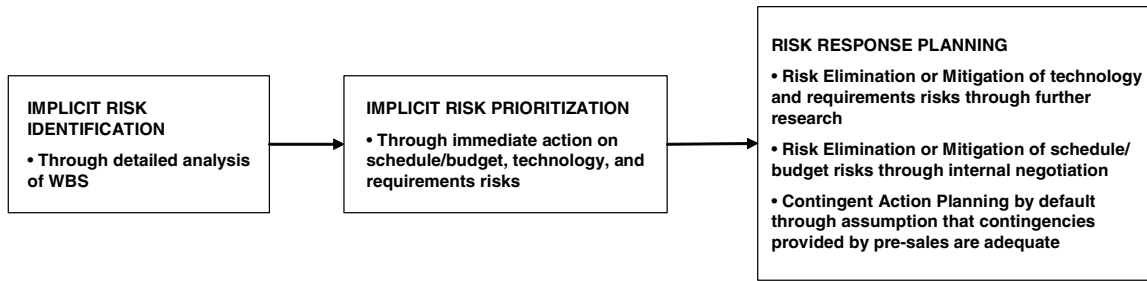


Figure 3: Partial rational risk management processes during initial assessment of routine projects

Naturalistic perspective

The modified RPD model in Figure 4 provides a descriptive model of the processes described by managers at the start of their routine projects. The RPD model’s primary emphasis on situation assessment corresponds very closely to the managers’ focus on developing a detailed WBS, and as the RPD model suggests, managers who faced unfamiliar situations (new technology or unclear requirements) initiated research to seek more information.

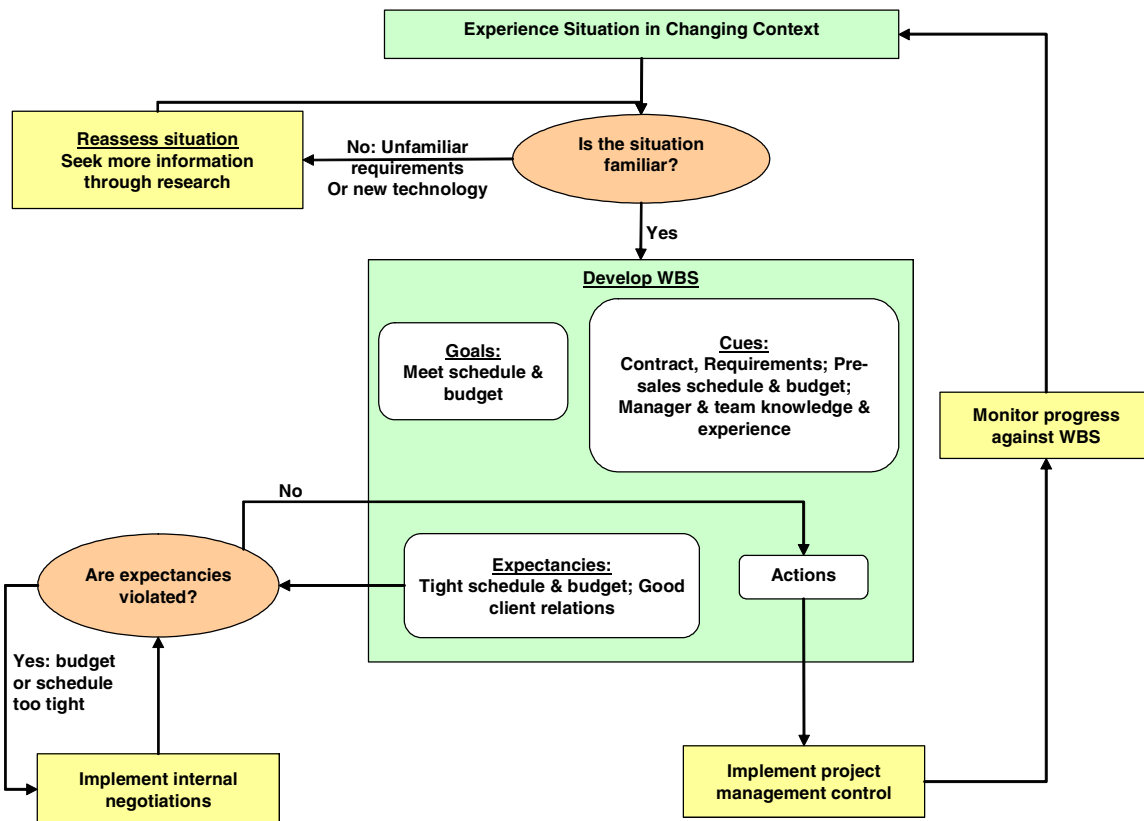


Figure 4: Descriptive RPD model of processes at start of routine projects

The primary goal at this start-up stage in routine projects was straightforward, to deliver the project requirements on time and within budget. The cues being drawn on for the situation assessment were the contract and pre-sales specifications of requirements, schedule and resources, together with the manager’s own knowledge and experience and the knowledge and experience of the project team.

Managers' expectancies were also straightforward. Typically, they expected that the targets would be tight, but achievable, although an expectation of working overtime was the norm. Respondents also commented that, even if no specific requirements or technology issues had been identified at this stage, they expected that some requirements would change, and that some technology issues would arise, but that both of these would occur within manageable limits that could be accommodated by the contingencies built into the budget and schedule:

[V2] *"There must be changes and we need to accommodate that"*

[E] *"There's always technical risk areas ... that's actually the stuff that staff find interesting. Technically they like doing all that sort of work. So we don't see that as big risk area ..."*

However, if the detailed analysis of WBS revealed a gap between the managers' expectancies about time or resources and the amount allocated by the pre-sales team, then the manager began internal negotiations with senior executives for more resources. Finally, managers' expectations about risks related to their client relationships were more implicit, but I deduced from the surprise they expressed when client-related problems did arise later in their projects that, at the start of their projects, they expected client relationships to run smoothly, and hence such risks did not figure highly in their initial assessments.

The actions resulting from the situation assessment are the routine application of project management controls, and additional internal negotiation if resources or schedule are inadequate. There was no evidence of the 'imagine action' step of the RPD model even when a specific strategy was chosen. Rather, if the assessment revealed a need to apply a strategy then it was immediately implemented.

Decision-making processes in initial assessment situations of troubled projects

Sixty percent of the decision point situations in troubled projects occurred during the respondents' initial assessment of the status of the project. The managers of the ten troubled projects, with one exception, all described carrying out a very careful and detailed analysis when they took over the projects they were asked to 'rescue'. The one exception was a troubled project taken over by a manager at an early stage in her career. She had been asked to rescue the project because of her technical expertise in the package being implemented. Because she was aware of this expectation about her technical knowledge and because of her lack of more general project management experience, she immediately made the assumption that the cause of the project's difficulties was technical, and began to work on rescuing the project on that basis without making any further investigations. She later learned that her assumption was misguided, and in fact the project was being sabotaged by a contract worker seeking to prolong his contract on the project. As she said, somewhat ruefully, on reflection:

[S2] *"If I were doing it now, I'd do things differently. I would interview all the stakeholders first and ask them why they thought it was going wrong ... Back then, I simply assumed the problem was technical and that sent me on the wrong track."*

More typically when faced with a troubled project, just as with the routine projects, managers focused intensively on understanding the situation, using the WBS, the contract, and the details of the tasks already completed as a starting point. In addition, however, they described a very careful process of evaluating and prioritizing the remaining tasks on the project in order to find the key problem areas and identify the most important issues to focus on. This quotation from a 'troubled' project manager exemplifies this approach:

[P1] *"When I took up the project, I first understood the business requirements from the functional specifications because the project team was mid way already and they've produced the functional specification. I look at the contract, I look at my contractual commitments, I look at the existing project plan and I look at their requirements. And then I started to look into the project plan, the WBS, and my existing team members' profile to identify which are the tasks where my existing skill profile is not likely to live up to... And after going through the WBS I was able to identify which are the likely tasks that I could potentially fail, then I will after assessing their likelihood of occurrence and the impact, I probably just feature those that are likely to happen in the near future, and become my top 5 or top 3 or top 10 that I need to deal with."*

Although this initial assessment differed from the routine projects in terms of the identification and prioritization of the critical potential problem tasks, managers still applied the same project management techniques to get the project back on track. I had expected to find more evidence that managers considered negotiation options, both with the client to reduce the scope, and internally within the vendor firm in order to gain more resources. However, when

these managers were given the mandate by the vendor firm to rescue a troubled project, they assumed that their executives accepted that this project would run with a smaller profit margin, or even at a loss. The over-riding goal for the vendor firms in these circumstances was to find a way to salvage the project in order to minimize the damage to the firm's reputation. Thus, managers did not consider the issue of meeting budget constraints and there was little need for them to use internal negotiation to get the support they needed. As for external negotiation with the client, these managers typically felt they were in a very weak negotiating position because of the project history, and hence they made little attempt to negotiate for a more limited scope:

[N1] *"From a negotiating point of view, I was in a very weak position, because we had twice delivered the system for acceptance and it was rejected."*

The key decision made by these managers when they took over their projects was a prioritization of the problematic outstanding tasks. As with managers of routine projects, these managers did not consider a variety of alternatives for addressing the high priority problems. Rather, once the key issues had been established, the most typical decisions involved application of strategies to re-establish control of progress. In particular, efforts were made to isolate the difficult problems, and to bring on additional staff, where a staffing or skills shortfall had been identified. Where necessary, tasks were rescheduled to work around bottlenecks so that overall progress could still be made. In addition, managers took immediate action to address confidence and morale, typically using team-building strategies to boost their internal project team morale, and identifying a few 'quick wins' in order to restore client confidence:

[U3] *"What we need to do is have a quick scan, what are the top three issues of the customer, which one you can resolve, which one you cannot? Those you can resolve make it happen immediately, don't look at the contract..."*

Rational perspective

The rational aspects of the risk management process during initial assessment of troubled projects are illustrated in Figure 5. In contrast to the initial assessment of routine projects, the initial assessment situations for troubled projects, with their greater degree of uncertainty and higher stakes, showed much clearer demonstrations of the application of rational decision making processes. Managers taking over troubled projects carefully evaluated and prioritized the remaining tasks on the project in order to identify the most important issues to focus on. Once this prioritization was done, however, there was no explicit process, corresponding to the third stage of risk response planning, of considering and evaluating different alternative approaches for addressing the problems. Managers' actions to restore client confidence and boost team morale are examples of implicit risk response planning by mitigation, and their assumption that original budget constraints no longer applied may be considered to be default contingent action planning of allowing for increased costs to be incurred by the vendor.

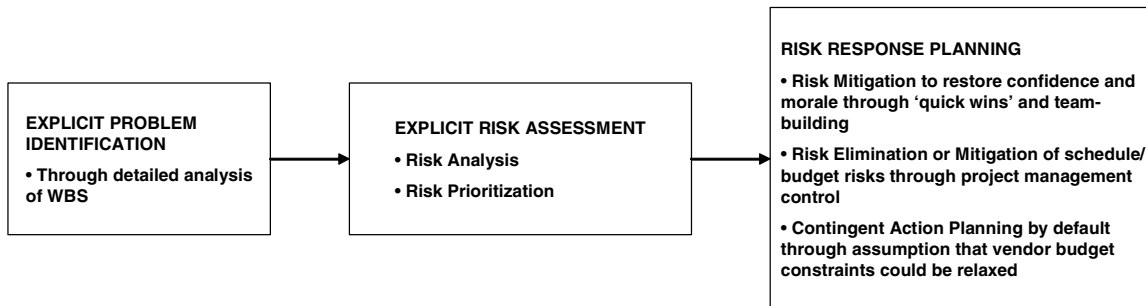


Figure 5: Rational risk management processes during initial assessment of troubled projects

Naturalist perspective

Viewing these situations from the NDM perspective, respondents still placed a heavy emphasis on situation assessment but incorporated a rational prioritization of the key problems, as shown in figure 6. Managers' primary goals were to protect the firm's reputation by completing the project and to establish an in-depth understanding of what was going on in the project. The cues were drawn from the contract and details of the project documentation to date, particularly the existing project plans and WBS. The expectancies were that problems would be inter-related

and most likely be schedule/budget or vendor staffing related, that team morale would be low, and that client trust and confidence would also be low. There was no evidence of evaluation of different options to address the problems. Instead, immediate steps were taken to boost morale and restore confidence, and once the detailed situation assessment had been completed, normal project management techniques were applied to bring the project back on track. Once again, there was no evidence of the 'imagine action' step.

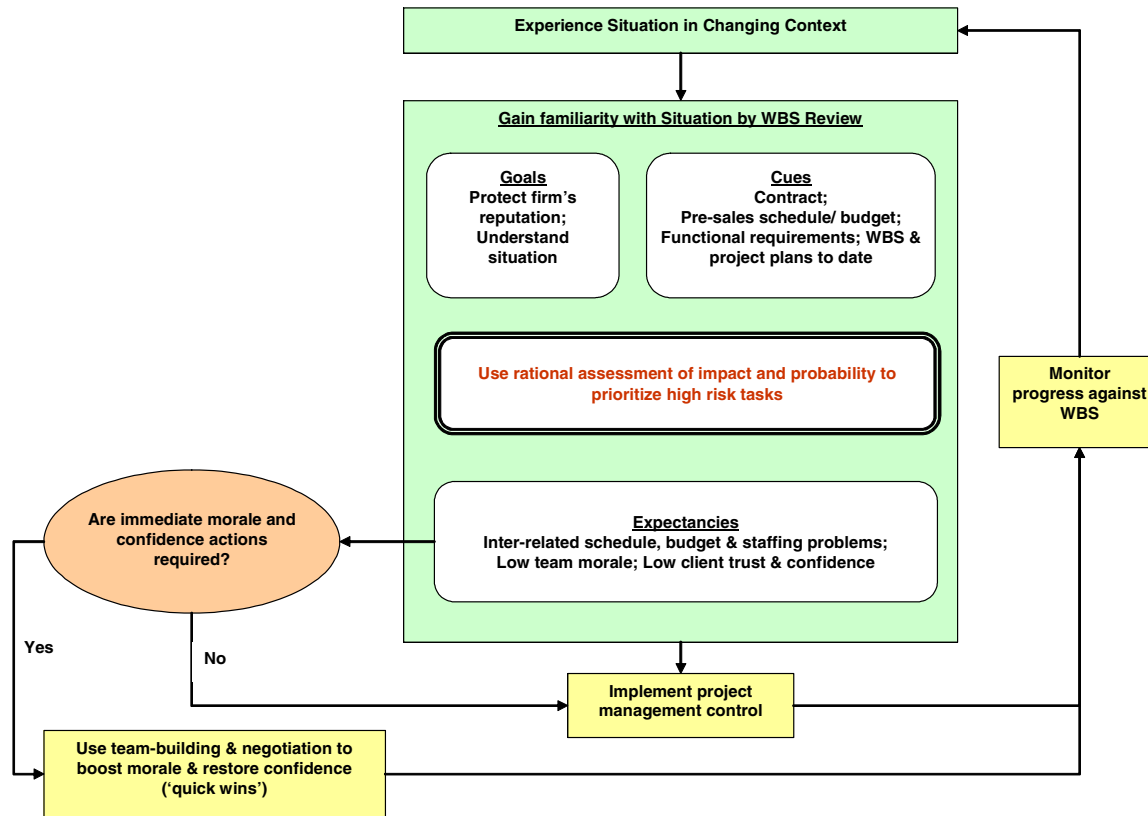


Figure 6: Hybrid RPD model incorporating rational and naturalistic situation assessment during initial assessment of troubled projects

Decision-making processes in problem-arising situations of routine and troubled projects

Problem-arising situations accounted for sixty percent of the decision points in routine projects and forty percent of the decision points in troubled projects. The approach described to address these problems arising during the project was consistent across both troubled and routine projects. Managers maintained constant situation awareness, relying on explicit cues derived from monitoring progress against the WBS and implicit cues from their general awareness of the relationship with their clients and their own team to alert them to problems. When a problem was identified they used the same sequential application of strategies to attempt to resolve the issue, both when the problem had previously been anticipated and when it was unexpected. When problems arose, managers first used their normal project management techniques to keep the project on track. However, if these project management techniques did not work, managers tried to redefine the project, either by negotiating internally for more resources, or by negotiating with the client to redefine the schedule or scope. If the initial negotiation approach was unsuccessful, managers would iterate through a number of cycles of various negotiation tactics before moving on to escalate the problem to a senior executive for resolution:

[E1] "Oh, no, we didn't have a battery of choices, I think we were as surprised as anyone else. So our first response, was, whoa, [the client's] expectation was wrong. OK, that lesson learned was our expectation was different, [the client's] not wrong. And, then try another tack, try another tack, what can we do next?"

Escalation was typically the last resort, and while an exit option was always built in to the contracts the managers operated under, they displayed a very high reluctance to take the exit path, even when it was the most obvious and logical answer to a very difficult situation.

[X] “[We] typically do not want to damage reputation by walking away from a contract, so we will aim to find a way to complete it. Again this relates to reputation - references from previous customers, particularly from firms that are well established and respected in the marketplace, are very important for securing future business.”

Rational perspective

From the rational perspective, these situations occurred during the risk monitoring stage of risk management, and clearly the close attention paid by managers to their progress against the WBS shows a high level of conformance to rational risk monitoring processes. However two aspects vary from rational prescriptions. Firstly, when anticipated risks materialized as problems, managers made no reference to drawing on any contingencies that had been planned at the start of the project to address these risks if they arose. Secondly, under the rational approach, when considering corrective actions for problems which fall outside previously planned contingencies, a number of alternative solutions should be considered and evaluated. However, as noted above, managers described a process of sequential application of strategies, and did not use any option evaluation to decide which strategy to apply.

Naturalistic perspective

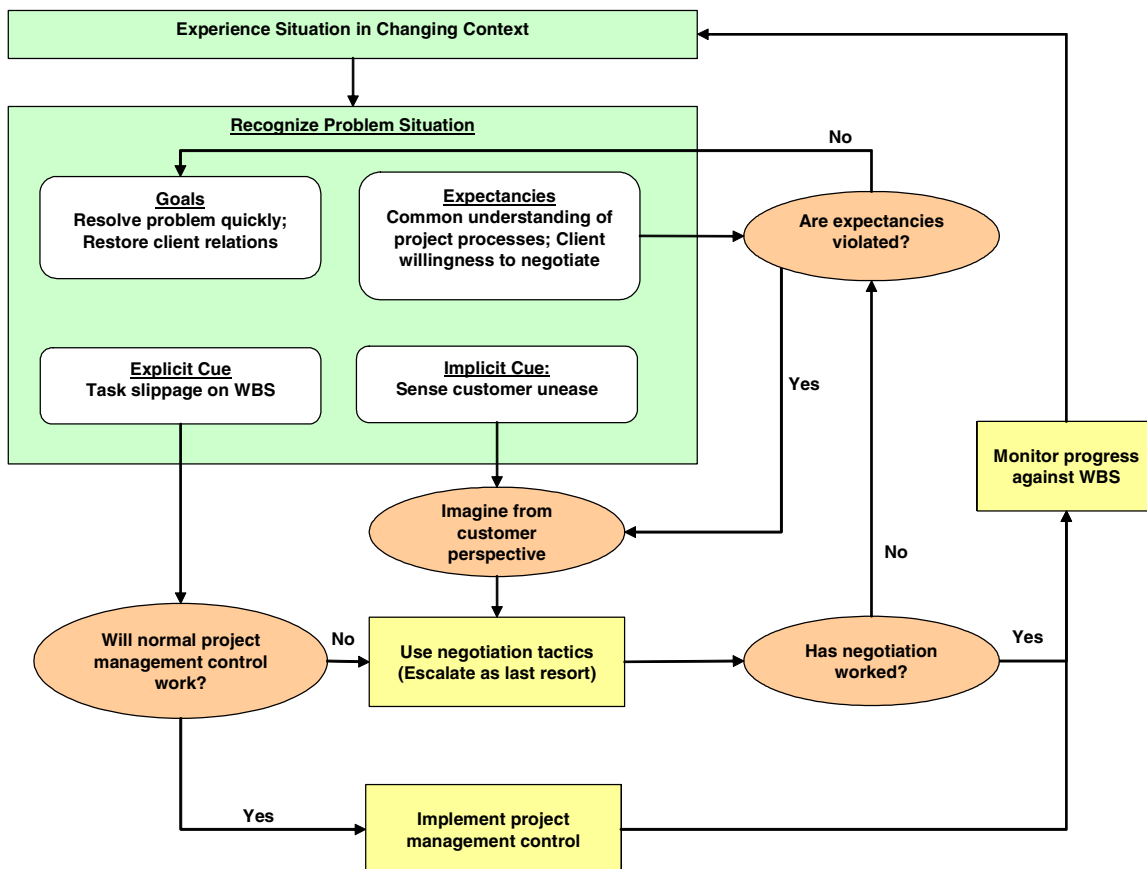


Figure 7: RPD model for problem arising situations in all projects

Once again, the close attention paid by managers to progress against the WBS is evidence of strong emphasis on situation assessment. Managers' goals in these problem-arising situations were generally to resolve the problem as quickly as possible, and since most of the problem-arising situations involved client-related problems they had an additional goal of maintaining or restoring good client relations. When client-related problems arose, managers appeared to expect that their clients would understand that unexpected problems usually arise in projects and that the resolution of such problems requires some give-and-take on both sides. Respondents reported that they were surprised to discover that this view of the project process was often not shared by the clients, who were often very reluctant to negotiate in order to solve an unexpected situation.

As shown in the modified RPD model shown in Figure 7, managers used two key cues for recognizing problem situations, the explicit cue of task slippage and the implicit cue of sensing customer unease. If the explicit cue of task slippage was observed, managers first identified the cause of the slippage and then, depending on the problem, either moved sequentially through normal project management controls or entered into a negotiation to resolve the problem. If the implicit customer unease cue was sensed, managers searched for better understanding of the situation by imagining from the customer perspective:

[UI] "You have to put yourself in the shoes of the customer."

Once they felt they had fully understood the situation, they moved directly through several iterations of negotiation tactics before finally escalating the problem if they were unable to resolve it. Again, there was no evidence of the 'imagine action' step of the RPD model, but 'imagining' did take place earlier, as managers tried to view the situation from the customer's perspective.

Discussion

Tables 3 and 4 summarize the decision processes as viewed from the rational and naturalistic perspectives, respectively. All the problem situations showed an intertwining of rational and naturalistic modes of decision-making, with managers showing the greatest reliance on prescriptive rational approaches when making initial assessments of troubled projects. The differences in approach between routine and troubled project initial assessment, with managers of troubled projects emphasizing a more rational assessment of risks, provides support for Sutcliffe and McNamara's finding (2001) that decision makers are more likely to use prescribed practices when faced with important decisions involving high levels of resources and uncertainty. Managers of troubled projects saw their actions as critically important for protecting their firms' reputations in the marketplace. They also referred to their uncertainties about what might have caused the project difficulties, and hence they were particularly cautious about making any assumptions about what had gone wrong. Thus, in such conditions of uncertainty with high stakes, particularly for the firm's reputation, these managers fell back on prescribed practices in order to determine the best way to proceed.

Table 3: Summary of decision processes viewed from rational perspective

	Routine projects	Troubled projects
Initial assessment decisions	<p>Implicit risk identification through WBS analysis</p> <p>No explicit risk assessment: no analysis of likelihood/impact, but some implicit risk prioritization for technology, requirements, schedule/budget risks</p> <p>Default risk response planning through use of pre-sales contingencies and immediate actions taken on technology, requirements, and schedule/budget risks</p>	<p>Explicit risk identification through analysis of WBS and progress to date</p> <p>Explicit risk assessment and prioritization with analysis of likelihood and impact</p> <p>Some risk response planning of mitigation for client confidence, team morale, and schedule issues. Contingencies by default through assumption that budget constraints are relaxed.</p>
Decisions during project execution	<p>Explicit risk monitoring through managing progress against WBS</p> <p>No explicit use of planned schedule/budget contingencies</p> <p>No option evaluation for unanticipated problems</p>	

The problem-arising situations also revealed close adherence to rational prescriptions for monitoring risks through attention to the explicit cue of task slippage against the WBS. However, when problems actually became apparent, managers varied from the rational prescriptions for risk response in that they did not refer to drawing on planned contingencies to address anticipated problems, which they would be expected to do, if they had followed rational prescriptions and explicitly distinguished between expected time/budget and additional contingency for a given task. Given that most of the problem-arising situations related to routine projects, a possible explanation of the failure to draw on contingencies arises from the lack of explicit acknowledgement of risks and risk response plans during the initial assessment situations in routine projects. If there is no explicit separation between the expected allocation for a high-risk task and any contingency allowance made for that task, then there is a danger that the contingency allowance will simply ‘disappear’ into the overall expected time and budget for the task, so that the warning of task slippage will only come after all the planned contingency has already been used. If this is so, it would be a serious consequence of the failure to explicitly adhere to the rational risk management process, since part of the purpose of distinguishing between expected time/budget and additional contingency is to ensure that the manager is alerted to a potentially problematic task early, when there is still time to take further corrective action if necessary.

Table 4: Summary of decision processes viewed from naturalistic perspective

	Routine projects	Troubled projects
Initial assessment decisions	High emphasis on situation assessment through WBS analysis, drawing on range of cues about the project Goals are to meet schedule/budget Unfamiliar situations (new technology, unclear requirements) trigger further research Actions on schedule/budget taken immediately when expectations violated Project management actions implemented when situation fully understood No ‘imagine action’ step	High emphasis on situation assessment through WBS analysis, drawing on range of cues about the project progress to date Goals are to protect firm’s reputation and understand situation Explicit rational assessment of impact and probability of risks; high risk tasks prioritized Expectancies of low team morale and low client confidence engender immediate corrective actions Project management actions implemented when situation fully understood No ‘imagine action’ step
Decisions during project execution	High emphasis on situation assessment through managing progress against WBS Explicit and implicit cues used for problem recognition Expectancy that clients share understanding that unexpected problems will arise Serial application of actions to address problems until resolution is achieved No ‘imagine action’ step, but implicit cue of customer unease triggers ‘imagine from customer perspective’ step	

Managers’ expectancies in problem-arising situations may throw some light on why unanticipated problems were most often client-related and also why these client problems were so difficult to anticipate. As Drummond (2001, pg 5) cautions, “expectations may determine what we see and hear.” Managers assumed that the clients would share the vendors’ overall expectations of how a typical project should run and would understand that problems would inevitably arise, which would need a willingness to negotiate in order to arrive at a mutually acceptable solution. It seemed that unanticipated problems often arose in projects because these expectations were not met: clients’ expectations and understanding of the project process itself were different from those of the vendor project managers. Typically the managers’ initial decisions about solutions for the problems were based on their expectancies about the clients and so these initial solutions were often unsuccessful. This resulted in sequential application of strategies to fix the problem, with managers trying alternative approaches, one after another, until they found one that worked.

Contributions and Implications for Practice

The modified RPD models shown in Figures 4, 6, and 7 encapsulate the hybrid nature of the practices described by respondents, showing the rational explicit aspects of their decision-making, embedded in a naturalistic decision-making framework that captures the implicit features of their approach. These models also help to highlight possible aspects of current practice that may undermine the effectiveness of risk and project management practices. In particular, two areas are identified where the greater reliance on naturalistic, rather than strictly rational approaches, may contribute to poor project performance. Both of these areas could be addressed in training for new project managers. First, in contrast to the troubled projects where managers recognized the high levels of uncertainty that they were facing and fell back on a 'by-the-book' approach, at the start-up stage of routine projects, managers relied heavily on situation assessment and their expert judgment. As a result, there were gaps in their risk response planning, and particularly in the management of any contingency allowances for high risk tasks made by the pre-sales team. The failure to explicitly recognize these contingency allowances meant that their power as an early warning trigger of a task in trouble was lost. Thus, the importance of understanding the purpose and use of contingency planning should be emphasized in project management training.

Second, the examination of managers' decision processes through the lens of the RPD model shows that the expectancies of managers about their client relations can lead to a blind spot in terms of risk identification. A more rational approach of explicitly acknowledging the potential problem of difficult client relations might result in earlier recognition of the materialization of this problem, and hence more timely actions to address the issue should it arise. In particular, new managers should be wary of assuming that their clients will share their perspectives on project process, and instead should take steps to educate the client from the start on the likelihood of unexpected problems arising, so that these issues do not come as a surprise to the client.

Conclusion, Limitations and Future Research

This research was motivated by the poor track record of IT projects, and by claims in the literature that problems with IT projects can be attributed, at least in part, to failure to apply rational risk management techniques that have for some time now been considered to be 'best practice' in project management decision-making. The research reported provides some support for these claims by revealing variances from the prescribed rational approach that may well contribute to poorer outcomes, but further research is needed to investigate these areas. First, further exploration is needed of managers' handling of allotted contingencies, since failure to handle them according to rational prescriptions would provide support for the contention that lack of adequate risk management processes contributes to on-going problems with IT projects. Another fruitful area of future research would be the exploration of alignment of client and vendor expectations about project *processes* rather than outcomes, and particularly whether taking steps to educate the client about these processes would reduce the incidence of unanticipated client-related problems. Finally, the possibility of a link between project managers' decision-making practices at the start of the project and the number of problems that arise later needs more investigation. In particular, managers of troubled projects, who conducted a rigorous rational initial assessment, described fewer decision points about problems arising during the course of the project than managers of routine projects, whose initial assessments were more naturalistic.

The exploratory nature of the study and small set of respondents preclude conclusions about the relative effectiveness, in general, of rational and naturalistic approaches. However, these findings do provide support for those researchers (for example, Charette 1996b; Powell et al. 1996) who contend that failure to follow rational risk management processes is a factor in poor IT project performance, and provide a basis for further survey-based research that could include a larger sample.

This study reports an exploratory, qualitative investigation, and as such reflects my own perspective as researcher. However, examining the findings from the two contrasting perspectives of rational and naturalistic decision-making theory provides a balanced view through theoretical triangulation (Patton 2002). The semi-structured interviews, based on the critical decision method, have the limitation of relying on managers' self-reports and recollections of their actions, and carry the assumption that these self-reports will provide an accurate picture of respondents' decision-making processes. While these limitations are acknowledged, previous use of critical incident and critical decision methods ((Klein et al. 1989; Sternberg et al. 2000) have demonstrated that these techniques can effectively tease out the key aspects of the situations faced by respondents and the decisions they made in these situations.

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