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UNDERSTANDING PREPAREDNESS FOR INFORMATION SYSTEM (IS) DISASTERS IN AUSTRALIAN PUBLIC SECTOR ORGANIZATIONS: A COMPARATIVE CASE STUDY APPROACH

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Abstract

Organisational preparedness for information system (IS) disasters has been under-researched in Australia (notably for public sector organisations). IS related failures in organisations come in many forms like people, processes, technology or computer data centre facilities. However, the way in which managers’ deal with risk has been largely overlooked by most of the public sector literature, and the emphasis remains with the details of accountability and control. Many management approaches have evolved since the industrial revolution which focussed on the major issue facing organisations in different eras, but over time organisational environments have become more complex, such that no single management approach could be described as ideal. Activities such as, project management, software development and risk management require some form of structure and discipline. While structured methods (rational, normative or prescriptive) remain popular, there is growing evidence that practitioners are not using them. This adds weight to the argument that the normative view of decision-making while being idealist is unrealistic and is not what happens in practice. This paper describes the research to be undertaken which will contribute to the discussion on decision-making frameworks in public sector organisations in developing risk management strategies to address possible disasters arising from IS failures.

Keywords: Information Systems, Public Sector, Risk, Disaster.
1 THE RESEARCH QUESTION

What are the key factors that shape the decision-making frameworks of Australian public sector organizations in developing risk management strategies to address possible disasters arising from Information System (IS) failures? Subsidiary questions arising from this, and which will help further focus the study, are:

- Do these factors vary across organizational and industry contexts?
- How is preparedness to deal with possible IS-related disasters interpreted by key decision-makers within public sector organizations?

2 BACKGROUND TO THE RESEARCH QUESTION

Businesses and communities are not immune to disasters which could occur at any time, often, without warning. Disasters can be categorised as either natural or “man-made”. Different organisations use different terms for the same events like incident, problem, crisis, disaster, and state of emergency. For example, the term used by the Civil Contingencies Secretariat in the UK Cabinet Office is major emergency that is used to represent disaster, crisis and major incident.

Disaster management is about both, the pre-disaster preparation and dealing with consequences once it has occurred (Rao et al. 2007). IT contingency planning refers to a coordinated strategy involving plans, procedures, and technical measures that enable the recovery of IT systems, operations, and data after a disruption (NIST 2002). Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters, in order to predict and where possible prevent them, mitigate their impact, and respond to and effectively cope with their consequences (Red Cross 2000).

The existing literature provides no single definition of “disaster”, as what constitutes a disaster is seen in terms of its implication for the particular organisation or service sector (e.g., aviation). A general definition of the term is:

“…. any event or circumstance (happening with or without warning) that causes or threatens death or injury, disruption to the community, or damage to property or to the environment on such a scale that the effects cannot be dealt with by the emergency services, local authorities and other organisations as part of their normal day-to-day activities”. (UK Cabinet Office 2003, p.5)

Organisations increasingly depend on information technology (IT) and information systems (IS) as a key enabler for its business. As such, an IS risk is not only a technology risk but is a business risk and requires input from both the IT/IS and business areas to manage that risk. IS failures in organisations come in many forms and can be categorised as deriving from people, processes, technology or computer facilities, within both a production/operation and a project development environment. Within a production environment, people can be a single point of failure (e.g. if they have expert knowledge, are unavailable or resign) and/or people can make a human error in the programming or operation of the IT system.

The research question this study addresses is important because, firstly, while there are systems and procedures prescribed for IS risk management very little is known about what organisations actually
do. As Georgiadou (2003, p.139) has observed, while the practical disciplines of computer science, information systems, and software engineering have created a “number of lifecycle models, methodologies and metrics designed for solving problems of software quality, unfortunately, there is limited empirical evidence of their correctness or effectiveness”. Thus, there is little systematic research knowledge (but some anecdotal knowledge) about what organisations actually do to address IS risks.

While risk management approaches have embedded mathematical or quantitative methods, such as assigning dollar values to risks using methodologies like annual loss expectancy (ALE), in practice in IS the risk assessment is undertaken qualitatively using methods like scenario analysis or questionnaires where risk can be expressed in terms of descriptive variables rather than dollar values (Rainer et al. 1991). General literature research on organisational decision-making (for example, Katz & Kahn 1978, Simon 1960, Gilligan et al 1983, and Lin 2004) indicates that focus has been on qualitative and behavioural dimensions of the decision process involving individuals, groups and organisations. This is in contrast to the rational behaviour theories (rule-based).

Secondly, there is some evidence that enterprise level decision-making and risk management frameworks either do not exist or are not complied with in many service organisations. Thirdly, some organisations that have developed disaster recovery plans which have not been tested or maintained have found that they are either unable to recover or take longer to resume normality from a disaster situation (Taback 1991).

Clearly, organisational preparedness for IS-related disasters is an important topic, but one which has been under-researched in Australia (most notably for public sector organizations). While in the private sector, firms are accountable to their shareholders who have invested their capital on a voluntary basis, within the public sector, departments are accountable to the general public who have entrusted them with their funds on a non-voluntary basis. This puts managers in the public sector under more scrutiny than their private sector counterparts (Oughton 1994). However, the way in which managers’ deal with risk has been largely overlooked by most of the public sector literature, and the emphasis remains with the details of accountability and control (Vincent 1996).

3 REVIEW OF EXISTING LITERATURE ON THE TOPIC AREA

Many management approaches have evolved since the industrial revolution which focussed on the major issue facing organisations in different eras, but over time organisational environments have become more complex, such that no single management approach could be described as ideal. There are many different activities that take place in organisations. Activities such as, project management, software development and risk management require some form of structure and discipline (Barry 2005). However, literature has shown that while structured methods (rational, normative or prescriptive) remain popular, there is growing evidence that practitioners are not using them (Bansler & Bodker 1993). This adds weight to the argument that the normative view of IS development is inconsistent with the way in which it is carried out in practice” (Barry 2005).

The gap in the literature reviewed, shows a lack of discussion in the area of empirical study on decision-making processes despite there being numerous study in the theoretical construct of decision-making. There are overlaps between methodologies and frameworks just as there are overlaps between
definitions of crisis and disasters. In particular, my research will contribute to the discussion on decision-making frameworks in public sector organisations in Australia in developing risk management strategies to address possible disasters arising from information system failures. The rest of this chapter will examine different management approaches, decision-making and risk management frameworks with a focus on IS.

4 APPROACHES TO MANAGEMENT AND DECISION-MAKING IN ORGANIZATIONS

Organisation, structure and strategy are all key elements that determine the nature of decision making framework (Watson 2001, p.215). Management practice about what managers do and what constitutes good management have evolved over time. Classical Approach of management can be described as mechanistic because the dominant feature is control leading to efficiency and greater utilisation of resources (Simon 1976, Weber 1947). This was followed by the Behavioural Approach which focussed on workers’ needs (Mullins 2002, p.68). Next, the Systems Approach which focussed on the interaction between the technical, social and organisational variables (Jenkins & Youle 1968). The Contingency Approach focussed on structure (Mullins 2002, p.53) to present day team building approach, involving a wider group of people at all levels in the decision-making process (Belbin 1993).

While each of the above approaches has focussed on the major issues facing organisations in a particular period (era), over time, organisational environments have become more complex, such that no single management approach could be described as ideal.

Strategic decisions occur at different levels of organisations for the different business functions for example, financial, marketing; human resources and decisions made at each level are governed by decisions made at the higher level (Lee et al. 1999, p.164). There are two schools of thought on how strategies are developed: Emergent and analytical approach. Emergent approach could be described as “the pattern to be seen emerging over time as actions are taken to enable the organisation to continue into the future” (Watson 2001, p.87). One might correctly conclude that this “pattern” follows what the management intended, that is, intended strategy, but “given the complexity and unpredictability of the world, there is unlikely to be a close match between this and the realised strategy” (Watson 2001, p.88).

It is also called “purposive evolution” (Peters and Waterman 1982), while further research described this as “crafted emergent strategy” (Mintzberg 1987), and later on the strategy of an organisation was viewed as “a pattern in a stream of actions” (Mintzberg 1988, p.14). Strategies don’t have to be deliberate, they can also emerge, more or less, from the actions undertaken, (Peugeot-Petitmengin 1996). It is argued that strategy evolves simultaneously from both top-down and bottom-up approaches through dialogues (Hamel and Prahalad 1989).

The analytical approach is structured and is based on four stages as follows: determine the organisation’s current standing, how it got there, where it would like to go, and how it will get there (Lee et al. 1999, p.165). It demonstrates that with this approach, because it is based on judgements of what may occur in the future, the judgement can be flawed and inaccurate often leading to poor decision making (Lee et al. 1999). Another criticism of the analytical approach to decision making is
that the environment can change quickly and frequently and in an unpredictable manner, making technical analysis inaccurate such that strategies may simply emerge (Mintzberg and Waters 1985).

In contrast, research found that organisations were more successful if they followed a “logical incrementalist” style of strategy-making than ones that didn’t (Quinn 1980). Here the author was talking about successful strategies that were the outcome of incremental development through various management processes which allow an open-minded approach to solving specific problems as they occur. Strategic decision-making affects the whole organisation and as such, any problem analysis and development of solutions will be impacted by the structure and culture that exists within the organisation. Structure should not come in the way of effective decision making, just as, Peters and Waterman (1982) found that “excellent companies have a very fluid structure”.

Private sector management work to maintain their organisation’s competitive position by thinking laterally and willing to be innovative. In contrast, public sector managers need to provide “stability and maintain the status quo consistent with contemporary societal norms and values” (Lindblom 1959). Thus incrementalism approach put forward by Lindblom where the planning is bottom up with managers responding to their department needs and acting within long-standing practices and assumptions is a sound approach for public sector organisations but potentially unsuitable for the private sector (Lindblom 1959).

In describing decisions, Simon (1960) proposed that this could be classified as either programmed or non-programmed. Programmed decisions in organisations referred to day-to-day decisions that involved straightforward, routine or repetitive activities while non-programmed meant activities that were complex, infrequent, unstructured and consequential making it more difficult to deal with. In fact, programmed or non-programmed decisions should be regarded as being at opposite ends of a continuum, thus making a lot of the decisions as being a combination of the two types.

During the fifties, Simon developed his bounded rationality theory, where he stated that a decision maker facing a choice behaves on the basis of a local satisfaction criterion, and will choose the first solution which he subjectively considers as satisfactory without trying to attain an unrealistic optimal solution (Tsoukiás 2007, Halpern and Stern 1998, and March and Simon 1958). General literature research on organisational decision-making indicates that focus has been on qualitative and behavioural dimensions of the decision process involving individuals, groups and organisations (Katz & Kahn 1978; Simon 1960; Gilligan et al. 1983; and Lin 2004).

Normative decision theory deals with the question of how people ought to make decisions in different types of situations, if they wish to be regarded as rational. Rational behaviour follows stable, consistent, and coherent beliefs, as well as, rules that allow individuals to understand what they are doing and why (Velleman 1989). In the same way, descriptive decision theory describes how people actually make decisions in a number of different situations. A major distinction between the two approaches is that the normative decision theory is mathematically based and does not need to relate to anything in the real or observable world and may look at ideal situation. It is described as being deductive like mathematics (Rapport 1989).

While decision analysis process can be either qualitative or quantitative, prior experience with real-life crisis, scenario rehearsals, documented framework & procedures and management style and commitment are important factors that would impact the situation outcome. Qualitative analysis is
based on the decision maker’s judgement and experience. Hence, it becomes important when faced with a difficult or complex problem that either the problem is decomposed into several sub-problems or resorted to quantitative analysis. In the same way, describe that in quantitative analysis, the focus is on facts and data connected with the problem, such that mathematical expressions and relationships are able to be established and recommendations can be offered to decision makers (Anderson, Sweeney, and Williams 2000, p.4-8).

In contrast, descriptive decision theory deals with real life situations so is able to take cognitive and social factors into account. However, this approach is often unable to make predictions of people’s decisions because it does not take into account things in real life that may be obscured by complex details and ambiguities. This theory is described as being inductive, because it deals with real world human’s preferences and shortcomings (Rapport 1989).

Increasingly, it is being realised that a rational model rarely conforms to real behaviour because “it can’t be expected for anyone to be able to collect, assimilate and pass balanced judgement on all the potentially valuable information relevant to one decision” (March and Shapira 1987). Humans are incapable of such mental processes and time and attention are scarce resources (March 1992).

A shortfall with classical normative decision models was in the area of constraints which included a lack of time and people, as well as, a lack of resources for search, evaluation and selection of alternatives (Abelson and Levi 1985 and Bazerman 2005). Decision making has been described as the science of choosing the best alternative (Page Jr, Tootoonchi, and Rahman 2006). In contrast, normative theorists (McCarthy 2003) argues that during natural disasters, decision making in the public sector organisations, should be more rational due to fewer constraints as “governments have immense resources, foreseeable problems and highly-motivated decision makers”.

To avoid surprises, leaders must strive to identify the weakest links in their organisations and “work to strengthen systems for recognising emerging problems, setting appropriate priorities, and mobilising available resources to mount an effective preventative response” (Bazerman et al. 2004, p.153-155). In the event of an IS disaster where only few systems could be made operational, can the rational decision making process be followed? The research will investigate what decision making processes are used in public sector organisations and whether this forms part of a contingency plan.

So it would be important to find out some of the factors that shape the culture, behaviour, leadership styles and decision making within the organisation. Further, to find out how and why some of these concepts have evolved in organisations and more importantly in public sector organisations. This would then distinguish between theoretical approaches and reality (empirical evidence). The rational model is the basis of much decision making in the private sector but little is known about the public sector.

5 GAPS IN THE LITERATURE REVIEW

While there are many well-developed prescriptive systems for decision-making and risk management framework in organizations (based on a rational management technico-scientific perspective), we know little about what organizations actually do; the few studies that have been conducted indicate that the “rational” perspective does not seem to be followed by managers in practice.
While there is an abundance of literature on management, decision-making, risk management, and development of IS in organisations, there is a void in the area of empirical knowledge of IS decision-making frameworks and there is little empirical evidence of the practical usefulness of risk management.

The literature review identified that there is a gap in the academic research on Australian public sector organisations. Literature review suggests that very few studies have been undertaken in the area of decision making and risk management for IS in Australia, as the major studies (prescriptive) have been undertaken in the United States, Great Britain and Europe.

A limitation in the literature review on management approaches is the lack of empirical discussion on information technology as an influencing factor. Technology in the context of this paper refers to major areas of information systems in organisations, such as, the operations, software development and project management. The technology used in these areas often dictates the organisation structure, roles and responsibilities, processes, procedures and policies.

Organisational preparedness for IS-related disasters is an important topic, but one which has been under-researched in Australia (most notably for public sector organizations). Little literature has been written on IT governance in the public sector despite this being different to the private sector.

What are the factors that shape the culture, behaviour, leadership styles and decision making within the organisation. How and why some of these concepts have evolved in organisations and more importantly in public sector organisations. This would then distinguish between theoretical approaches and reality (empirical evidence). The rational model is the basis of much decision making in the private sector but little is known about the public sector.

How much of personal knowledge and experience is used in the decision-making within the public sector organisations. Is the organisation aware of this intuitive knowledge? If so, will they make any attempts to convert this to an analytic or deductive process?

6 PROPOSED RESEARCH DESIGN

It appears that the comparative case study method would be appropriate to study the phenomenon of interest (Yin 2003a, Yin 2003b, Yin 1994, Miles and Huberman 1994) with multiple cases from the transport, health and higher education industries. A case here is defined as an organizational decision-making framework, which can consist of the organisation strategy, structure, roles and responsibilities of the actors, methodologies in use (e.g., Risk Management, Project Management, and Software Development), policies, processes and procedures. Comparative case study has been chosen as part of this research strategy because very little is known about this issue and theoretical frameworks that help understand this area of organizational behaviour are poorly developed.
A comparative case study method would be appropriate (seeking to describe and understand what is going on in organizations, so theory-generating rather than theory-testing), with organizational cases selected from the tertiary education, transport and health care public sector within Australia.

The rationale for the selection of each of the case study organisations is that each of these has a different type of business impact as a result of an IS failure or disaster. All of the organisations within this research are significantly large in size, have a complex IS environment and are extremely dependent on the use and availability of its information technology infrastructure. Without attempting to pre-empt the research, the last factor is becomes critical depending on the timing of key business events. For example, in the transport industry unavailability of IS during peak hour travel would cause chaos; for health, if patient records were accidentally made public or mixed up; and in the higher education example if the IS were unavailable during enrolment time would cause major embarrassment plus potential loss of revenue.

To ensure the reliability and validity of my findings and adapting from Lincoln and Guba (1985), first is to ensure credibility that will be achieved through prolonged engagement within the organisations, persistent observation and triangulation (e.g., interview data could be judged by reference to observational data). Credibility can also be established by showing transcripts of interviews and reports collated, to the members of the organisation who assisted in the process so that they could verify the accuracy of how the author (the researcher) have represented them. Second is called transferability and is achieved by providing a detailed and rich description of the organisation setting.

7 PROPOSED DATA COLLECTION METHODS

It is proposed to collect data on each case using three methods: in-depth semi-structured interviews with key decision-makers, participant observation e.g. through attendance at significant project board, program board, steering committee decision-making meetings) (Yin, 2004), and the analysis of secondary data sources, including relevant organization files. Each of the complementary method will provide a cross-check of the data and reports collected and observation at meetings will confirm what actually happens thus providing the required knowledge to be able to address the research question.

A qualitative approach to data collection and analysis is more appropriate for the proposed research topic, i.e. more open-ended with no a priori framework, seeking, understanding, and developing rather than testing a theoretical framework (Denzin and Lincoln 1998).

The proposed data collection methods will consist of:

- **Primary Data:**
  - Semi-structured interviews.
  - Participant observation.

- **Secondary Data:** Collect as much paper as the organisation will allow me typically consisting of documents, policies, agendas, meeting minutes.
Decision-making frameworks, which are to be the focus of this research, consist of structures (e.g. organizational hierarchies, committees and working parties), actors and roles, inputs (e.g. of information and resources), processes (e.g. prescribed procedures, meetings, formal and informal communication, etc.) and outputs (e.g. minutes of meetings, policies and procedures, reports, etc.). These frameworks operate within, and are shaped by, specific organizational contexts.

Prior to commencement of fieldwork, organisation literature and documents (e.g., annual reports, information about organisation structure and linkages and development of contact list) will be sourced to provide both historical and background information. Each member of the IS executive (starting with the Chief Information Officer) will be interviewed along with other key players/stakeholders (e.g., Chief Operations Officer, Risk Manager and IS Project Office staff).

8 EXPECTED OUTCOMES FROM THE CASE STUDY ANALYSIS

While there is much supporting evidence there appears to have been little direct research into the impact of risk on managerial implementation of strategy (Smallman, 1996). Based on the nature of the primary research objective of this study, the requirement is for a method that will enable the development of a theory or model from the research. What I am seeking to find out is: how do these organizations develop and validate information systems (IS) risk management (RM) strategies? And why do they do, what they do, to achieve the observable outcomes?

Decision making processes can be explored through a series of simple questions finding out information about who? what? how? when? where? why? So this research will be able to answer questions like: why are the observable processes & strategies like they are?

What are the important factors that shape the nature of the observable decision-making processes and resulting strategies (e.g. actors playing key roles, access to particular types of knowledge, the experience of key actors, management attitudes, risk perceptions, the perceived seriousness of disaster impacts)? Do processes and strategies vary across different organization types, and if so why? How is the preparedness to deal with possible IS-related disasters interpreted by key decision-makers within public sector organisations? Are the observable strategies likely to be effective?

9 EXPECTED OUTPUTS AND SHAPING HYPOTHESES

As the findings from the case studies are analysed, the main output will be the development of a theoretical model which will help to understand the factors that determine the level of organizational preparedness to deal with an IS-based disaster, and a set of propositions about this phenomenon derived from this model (e.g. the more that the senior management are actively involved with organizational risk management strategy the higher will be the level of preparedness).

This theoretical model, and formal hypotheses derived from it, could be tested through subsequent quantitative research. The literature review has shown a lack of empirical studies in this area, so there
is a strong expectation that the findings will make a contribution both to theory (i.e., decision-making frameworks in public sector organisations in Australia) and to management practice (i.e., developing risk management strategies to address possible disasters arising from information system failures).

References


