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UNDERSTANDING DECISION PROBLEM STRUCTURING BY EXECUTIVES

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ABSTRACT

This thesis reports on an investigation undertaken to determine the nature of the decision problem structuring behaviour of executives and the determinants of that behaviour.

Decision problem structuring is concerned with those activities that translate an identified decision problem into a form suitable for the making of a choice. Activities commonly associated with the structuring of decision problems include the defining of objectives, the generation of alternatives, and the collection of relevant supporting information.

Utilising a multiple case study approach, sixteen Chief Executive Officers or General Managers of medium to large (largest had 2800 employees) organisations, operating within a confined geographical region of New Zealand, were questioned on their decision problem structuring behaviour. Participants were asked to describe, in detail, the processes they followed in structuring decision problems, along with what they felt caused them to act as they did. In addition to the direct communication between the researcher and the participant, each executive completed a supplementary questionnaire and undertook a computer based cognitive style analysis test (the latter two for purposes of triangulation). Raw interview data was integrated with that from the other data sources (such as the questionnaire) through use of an adaptation of the data analysis aspects of the grounded theory approach.

Within the context of the study, described decision structuring behaviour was found to be more closely aligned with that of wider descriptive theory than any of the existing prescribed problem structuring methods. Described behaviour regularly exhibited the use of prior decision-making experiences, decision situations where an identified solution initiated the decision, and the existence of Satisficing behaviour.

The most evident structuring process comprised the defining of objectives and the generating of alternatives, occurring in an iterative and cyclical manner. These activities were supported, where required, by the gathering of information.

It was observed that the contextual effects of time, limited finance, level of information and political interference played a significant part in not just the problem structuring activities, but they were also found to affect the decision-maker's perception of the problem before any structuring occurred. As a result, the actual decision problem state and the perceived problem state often differed. Similarly, the executive decision-maker was also found to influence the perception of the problem and the subsequent activities that were carried out in structuring it. The executive's experience, their understanding of decision problem structuring, and their overall confidence were found to be influential.

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1 INTRODUCTION

Decisions! How should they be structured? Ask this question of a decision-maker and expect to get a blank look as a response. “What do you mean by structuring?” they might ask. “I mean the part of the decision process that comes before you actually make a choice”, another blank look. Present the same question to somebody versed in the decision sciences and you are likely to be referred to the latest mathematically-based problem structuring method or alternatively a relevant decision-making text.

The above generalisation illustrates two problems. Firstly, decision-makers are generally unaware of the fact that they have structured their decision problems, let alone how that structuring has occurred. Secondly decision academics generally view problem structuring¹ as a formal, structured process; a process that has been described as being narrow in scope (Taket and White, 1997) and moreover, infrequently used in practice (Arbel and Tong, 1982). In essence, what we have is a theory versus practice gap. Taket and White (1997) provide a summary of criticism of formal problem structuring methods in terms of their application to ‘real life’ decision-making people and problems. This criticism includes their inability to accommodate intuition, emotion and feelings. Furthermore, Taket and White also argue that use of these formal methods inhibits creativity and spontaneity and assumes an unachievable level of rationality on the part of the decision-maker. Not helping this however, is the general lack of understanding of the processes employed in unaided problem structuring. While numerous studies have focused on how choices are made in practice (e.g. Dillon, 1998; Klein, 1989; Lipshitz, 1994) or the overall decision-making process (e.g. Nutt, 1984, 1993a; Svenson, 1979; Mintzberg *et al*, 1976), no study has endeavoured to understand the specific actions employed in the structuring of decisions and the reasons behind those actions.

¹ Considered, in this Thesis, as those activities that occur before a final decision choice is made.

In addressing these problems, it is first necessary to gain an in-depth understanding of both the untrained decision-maker and also the formal problem structuring methods so as to be in the position to identify ways in which this gap might be narrowed. This research seeks to take the first step in this process.

It is worthwhile at this stage to outline the significance of decision problem structuring and therefore the value of this research. Not only does the structuring phase of a decision process involve considerable effort on the part of the decision-maker(s) (Farquhar and Pratkanis, 1993), in many respects, it is the most important (von Winterfeldt, 1980; Mintzberg *et al.*, 1976; Abualsamh *et al.*, 1990; Perry and Moffat, 1997). Unless a decision problem is adequately structured, the subsequent act of choosing is likely to occur based on limited alternatives, limited knowledge of the decision problem itself, a poor understanding of the required decision objectives, or any combination of these.

This thesis presents the results and analysis of an in-depth investigation into problem structuring within naturalistic settings. Naturalistic settings are those in which the decision-maker has no external advice or information source to guide him or her in making decisions; he/she is operating in unaided isolation. This research aims not only to identify the way in which decisions are being structured within their naturalistic environments, but also to assess the likely reasons for this; i.e. the ‘why’ behind the ‘how’. Previous work (Dillon, 1998) has found both the environment within which the decision is being made (context) and the intuition and cognition of the decision-maker has a significant influence on the choice behaviour of managers. This study places special attention on these aspects of problem structuring in an attempt to uncover some of the underlying reasons for the observed behaviour. Recognising why a decision is structured in the manner that it is enhances the prospects for successfully improving prescription and the resulting levels of usage of that prescription.

While there is a significant amount of published work on how people make unaided choices, the literature is almost completely devoid of research that has focused on the pre-choice activity, or what is commonly termed problem structuring. In 1982 it was noted, “a search of the decision sciences literature indicates an almost complete lack of interest in problem specification (structuring)” (Arbel and Tong, 1982, p.377). Nothing significant has changed with respect to the frequency of problem structuring research and such comments and calls for research are still being made (e.g. Wright and Goodwin, 1999; Taket and White, 1997; Keller and Ho, 1988; Power *et al.*, 1994 etc.) One of the major problems encountered when reviewing the existing literature on decision problem structuring is the dearth of recent publications; the greatest output occurred during the early to mid 1980’s. While research focusing on the theoretical side of problem structuring has continued, albeit at a reduced rate, it is difficult to ascertain the likely reasons for the decline in observation-based studies focusing on naturalistic decision-making, including that of problem structuring. Given that no statements as to the state of the field have been made, it must therefore be assumed that this state has not changed dramatically since the mid-1980’s.

Because of this apparent lack of research, the manner in which decision-makers structure their decision problems is generally poorly understood (Jungermann *et al.*, 1983). Moreover, the vast majority of existing decision-making models² focus on the choice phase of the decision process and assume that problem structuring has already occurred (Winkler, 1982; Humphreys and Berkerley, 1983). These assumptions include the existence of objectives, measurable alternatives and criteria by which the alternatives can be assessed. Not only are such assumptions likely to be without foundation, one only has to think of day-to-day personal decisions to know that such decisions don’t always involve that level of structure; many business decisions are also like that (Dillon 1998).

A number of methods exist that prescribe ways in which decision problems can be structured in preparation for subsequent choice. However neither decision-

² Comprising descriptions of existing behaviour and prescription of suggested behaviour.

makers nor decision scientists report on any significant use of these existing, formal problem structuring strategies (Mintzberg, *et al.*, 1976; Winkler, 1982; Bell, 1982; Hogarth, 1980). Part of the challenge of this study is to understand why this level of usage is so low (in addition to those outlined in the literature), and then suggest a way forward such that the wider issue of improving decision-making may be addressed.

In its most abstract form, the two-part research question this research addresses is:

How do decision-makers structure their decision problems?

And most importantly,

Why do they do it that way?

The “why” question is considered important as it (hopefully) provides evidence for and justification of the identified structuring behaviour. Understanding what individuals do is most valuable when that behaviour is contextualised in terms of the causes of that behaviour.

All of the sub-research questions (see Section 4.4) this study addresses are intended to shed light on these important questions.

It is common within many of the management science fields for researchers to attempt to integrate the practical observations of managerial behaviour with the theoretical methods that have been prescribed (but seldom used) for many years; problem structuring research is one of those fields (Schwenk and Thomas, 1983). However, before this can reasonably occur, we must first gain an understanding as to how decisions are structured within an unaided environment, the reasons for such behaviour, and the likely inhibitors to the use of existing and new prescriptive methods.

In general, the decision-making literature gives little consideration to the activities of structuring. One reason for this is that in conventional decision-making experiments at least, the representation of the decision-making task

arrives pre-structured at the start of the experiment (Humphreys and Berkeley, 1983). This experimental perspective does not accurately represent the true nature of decision-making in naturalistic settings, which is probably a reflection of the difficulty associated with replicating typical business environments under experimental conditions.

In order to avoid confusion, it is useful at this early point in the thesis to outline some assumptions that guide this work. It is assumed that:

1. All decision problems have an inherent structure that is formed in the early stages of the decision process. This structure incorporates information about the problem, as well as any structuring that might have been done on that problem. Irrespective of the nature or type of the decision problem, some structure needs to be incorporated before a choice can be made. This could range from an unconscious process of limiting the number of choice alternatives to one that is a more deliberate step-by-step activity of identifying decision objectives, developing criteria, and searching for alternatives.
2. Related to this, it is assumed that structuring occurs before a choice is made, not afterwards. This is discussed further in Chapter Two.
3. More, rather than less, structure makes for a better³ overall decision process and while obviously dependent on the particular decision, the addition of structure usually implies a greater understanding of the problem and a more comprehensive search for alternatives.
4. Rarely do decisions come pre-structured and so a suitable structure must first be developed such that the decision can be made effectively. Much of the effort in making a decision is involved in the structuring process. For that reason, if a person is to make a decision then it is highly likely that he or she will be involved in the entire process, and not just the making of a choice in a decision that has been structured elsewhere.

³ Greater consideration of pertinent issues.

Simon (1960) describes the attainment of suitable decision structure “as the process of finding possible courses of action” (p.40). Clearly unless these courses of action can be identified, the subsequent activity of choosing will be based upon a limited range of alternatives.

This research investigates the level of both understanding and usage of decision structuring processes among executive level decision-makers. The focus on the executive level is for several reasons. Firstly, executive level managers generally operate in an environment devoid of any decision-making guidance or mentoring. Of all decision-makers, this group is probably the most unaided, as we shall see. Secondly it is generally regarded that executives are in their roles due to (amongst other things) their ability to make (and defend) significant decisions. So it is assumed that executives are effective decision-makers, and most likely the “best” we can expect to find operating in business.

While research output is sparse, there is no doubt that research in this area is required. “There is growing interest in the problem structuring elements of decision behaviour, although the quantity of such research is relatively small” (Payne, *et al.*, 1993, p.251). Existing research, while unquestionably valuable, has only achieved placement of random pieces of the problem structuring puzzle. Gaining an understanding of unaided structuring processes might provide greater context and value to earlier studies and hopefully suggest a purposeful guide to prescription. Above all this however, is the fact that the field of decision problem structuring has been left in an unfinished state. Its rate of publication has diminished to little less than the occasional publication. While not a problem in itself, this reduction in research output has been exacerbated by the ad-hoc nature of some of the most recent efforts caused by the diverseness of the associated research areas. There appears to be little consistency in approach and direction in terms of a common research goal.

In summary, the purpose of this research is to assist with the understanding of the unaided decision problem structuring of executives in the anticipation that this will contribute to the greater issue of improving decision-making in general. Because of the complexity of decision-making and the vastness of the research

field, this can only be achieved in a piecemeal, but hopefully organised, manner. This study contributes to this goal in three ways. Firstly, it endeavours to understand the manner in which unaided high-level business decisions are structured in terms of observed decision-making behaviour. Secondly it seeks to identify the causes of that behaviour in terms of the decision-making influences present, and finally, it contrasts this behaviour with the likely behaviour of decision-makers utilising existing prescriptive methods.

1.1 METHODOLOGY

This research investigates the manner in which executive level manager's structure decision problems within their naturalistic unaided decision-making environments. A multiple case study strategy is employed to elicit not only the processes being employed, but also the contextual and cognitive factors that influence this behaviour. Of the approximately 100 executive level managers who received unsolicited invitations to participate, sixteen were interviewed in depth about the manner in which they structure decision problems. These included specific, significant previously identified decisions, in addition to their decisions in general. Participants were provided with an analysis of their decision structuring for feedback if they felt they had something to add or clarify.

The data gathered from the interviews in this study has been processed and analysed using an adaptation of the data analysis aspects of the grounded theory approach. The approach used is based upon the method proposed by Strauss and Corbin (1990) while still adhering to the general principles outlined by Glaser and Strauss (1967) and Glaser (1992). The grounded theory approach builds theory that is faithful to and which illuminates the area under investigation and is often used in the development of prescription (Turner, 1981). The approach used was 'adapted' to include the more practical approach of Strauss and Corbin (1990) taking advantage of the experimentation and testing that their approach has incorporated into its development.

The grounded theory approach is an effective and transparent tool for identifying trends, and subsequent theory, from verbal data.

This is an exploratory study. It addresses an obvious lack of understanding of both the processes contained within the structuring of decision problems and the reasons behind those processes – on the parts of both decision-makers and the researcher. The outcome is an understanding of the processes employed by executive level decisions makers when structuring non-trivial decisions, the obvious (and less obvious) reasons behind those processes, how these processes differ from the formal approaches and most importantly, suggestions as to how that theory vs. practice gap might be narrowed.

1.2 THESIS OUTLINE

The remainder of this thesis is structured as follows. The relevant literature is reviewed in Chapter Two. It focuses on the context of problem structuring, i.e. the decision problem itself. It looks at what constitutes ill and well-structured decision problems and also positions problem structuring within the overall decision-making process. It includes discussion of the three types of decision-making models, descriptive – what people actually do, or have done, prescriptive – what people should and can do and, normative – what people should do. Having formulated a useable definition of problem structuring, Chapter Two concludes with a general discussion of problem structuring, taking a mostly descriptive view of the process. Issues discussed include problem structuring influences such as context and cognition, and the relationship between decision frames and the decision structuring process.

Based on the review of the literature presented in Chapter Two, Chapter Three outlines the research gap to be addressed in this study.

The research design associated with this work is contained within Chapter Four. This begins with a discussion of the theoretical perspective that guides this work along with any relevant philosophical assumptions made. Guidance in this area is taken principally from Creswell (1994). Having clearly outlined the research

position, the research gap is outlined progressing into the seven principal research questions that the study addresses. Having outlined the research questions (formulated also into a generalised research purpose) the case study research strategy is outlined. Along with the description of the process followed, measures taken to counter validity and reliability threats are also outlined. These measures are presented in terms of Auditability, Credibility, Fittingness and Confirmability. An explanation of the data collection process is also provided, as is a discussion of the manner in which data was processed and coded to produce analysable results.

Chapter Five contains synthesised results and discussion. This is the most effective manner in which to make sense of the vast amount of data that emerged from the interviews and was subsequently coded via the adaptation of the data analysis aspects of the grounded theory approach. The results/discussion is presented in a format/order based upon the research questions being addressed. Other significant, important and interesting observations are then discussed.

As the purpose of this research is to build theory, the major output of this research is a series of influence models. Much of what is found to be significant in executive decision problem structuring is based upon influences and so these models are representative of that.

The final chapter, Chapter Six provides a summary of the study results. It then presents the research conclusions along with the implications of these both in terms of implications for theory and also implications for practice.

2 LITERATURE REVIEW

2.1 INTRODUCTION

In its simplest form, human behaviour might be considered nothing more than a collection of linked, trivial, day-to-day decisions. Almost everything thing you do is the result of a decision. What you wear, how you style your hair, the route by which you drive to work are all examples of the day-to-day decisions we make as human beings. However there are many decisions which are even much less obvious than these; every movement your body makes whether it be to blink, raise your arm, take a step when walking, has occurred as a result of a decision – although such decisions are a result of unconscious, automatic decision processes; they are likely to occur automatically. This study is concerned with conscious decision-making involving non-trivial decisions[†]. Neurological research is probably better equipped for describing the automation of human action characterised above.

Research into decision-making has considerable value. “Decisions are the core transactions of organisations. Successful [organisations] ‘outdecide’ their competitors in at least three ways: they make better decisions; they make decisions faster; and they implement decisions more” (McLaughlin, 1995, p. 443). For a manager, irrespective of the organisation’s size and his or her position within it, decision-making is the single most important activity they will undertake (e.g. Cornell, 1980; Drucker, 1967; Harrison, 1999).

While decision-making is recognised as being central to successful management, some aspects of the decision-making process are poorly understood. Part of this is due to the relative immaturity of decision research, which has only been in

[†] Section 2.2 clarifies a non trivial decision in the context of this study

existence (formally) since the end of the Second World War. More significantly however, decision research has focused more on the quantitative elements of normative “textbook” decision theory rather than gaining an understanding of actual decision behaviour. In much of the existing research “The decision-maker is assumed to have: (1) a fixed objective, (2) unlimited time and money to spend on search and evaluation activities, (3) virtually perfect information regarding the probability of alternative outcomes and (4) inexhaustible cognitive powers for comprehending, assimilating, and retaining an infinite number of variables” (Harrison, 1999, p. 10).

The chapter begins with a general discussion as to what constitutes a decision and decision-making. This is followed by an outline of what differentiates a well-structured decision from an ill-structured decision. It next describes decision-making in terms of the three principal perspectives: Descriptive, Prescriptive and Normative, specifically in terms of problem structuring, and attempts to synthesise these. Following this, individual and group decision-making is contrasted. Next, the specific focus of this study, individuals operating at the executive level, is discussed. Having outlined what problem structuring is and why it is necessary, the next section presents an analysis of existing empirical problem structuring research. This is followed by a synthesis of the problem structuring process, and an identification of the various structuring activities that commonly make-up the process. The activities are then compared with a range of common, prescriptive, problem structuring methods. Chapter Two concludes with a discussion of problem structuring influences and decision framing.

2.2 UNDERSTANDING DECISION-MAKING

It is pertinent at this stage to understand the context within which decision problem structuring is placed, that being the wider activity of decision-making.

To begin, let us understand what a decision is. The Chambers Dictionary (1998, p. 429) defines a decision as: “the act or product of deciding; settlement; judgement”. While a basic dictionary should not be expected to provide the

most comprehensive academic commentary of a decision, the above definition is typical of many which take a simplistic, possibly naïve view of an act that contains much more than the making of a final choice. Many (e.g. Emory and Niland, 1968; Fishburn, 1964; Ofstad, 1961) describe a decision with little or no inclusion of the decision-making activities that occur before such a final choice is made. Churchman (1968) in his description of the role of the manager is typical. He states: “the manager is the man who decides among alternative choices. He must decide which choice he believes will lead to a certain desired objective or set of objectives” (p. 17).

A number of authors however recognise that there is much more to a decision than simply the making of a choice. Dearlove (1998) states “A decision is the point in time at which a choice is made between alternate – and usually competing – options” (p. 14). He then goes on to recognise that the choice is simply the culmination of a much larger and often-complex decision-making process.

To aid our understanding of problem structuring, let us first look at the entire decision-making process, and where problem structuring fits into it. Simon (1960) proposed a three-phase trichotomy of the entire decision process. These three phases he termed Intelligence, Design and Choice (see Figure 2-1).

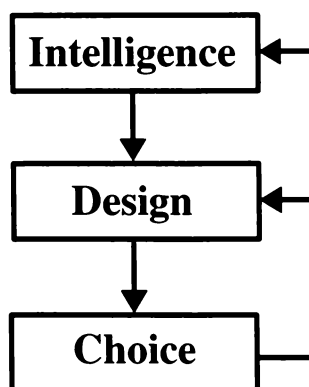


Figure 2-1 Simon's Model of the Decision Process

Intelligence (which was borrowed from and based upon the military meaning of the same word) involves identifying the need for a design, or as Simon put it, “searching the environment”. This does not imply that one looks around for a decision that might need solving; rather it means to determine if a problem that has emerged, actually requires a decision. Intelligence might be initiated by someone informing you of the need to make a decision. Once the environment has been searched and a decision identified, the design phase commences. This comprises investigating and developing the problem domain and alternatives. Weick (1979) conceptualises the design phase as moving from an unworkable version of reality to a workable version of reality. In essence it is the activity that begins once a decision need has been identified and concludes once a choice can be made. Simon’s final phase is that of choice, which describes the activity of selecting the most appropriate course of action from the alternatives previously generated.

Simon’s three-stage model remains relevant. Simon (1977) added a fourth phase, ‘Review’, which describes the evaluation of the three earlier stages. Others have developed similar process styled models (e.g. Mintzberg (1976), Nutt (1984)).

To summarise this, Simon’s model posits that a decision, or decision process, begins at the point in which the need for a decision to be made has been recognised. Following on from this, the decision is structured (the focus of this thesis) such that a suitably informed choice might be made. The point at which the decision process concludes might be debated. Some (e.g. Simon, 1960) might argue that as soon as the final choice has been made, the decision has ended. More recently however, it has become recognised that a decision does not conclude until it has been successfully implemented and then perhaps evaluated (e.g. Simon, 1977; Mintzberg *et al.*, 1976). It is only when this successful implementation has occurred that the decision can be deemed as being concluded.

Later sections describe a decision in terms of its components and process, however as a useful companion to this, Hammond *et al.*, (1998) describe an effective decision-making process as containing six attributes. He believes it should:

- Focus on what's important
- Be logical and consistent
- Acknowledges both subjective and objective factors and blends analytical with intuitive thinking
- Requires only as much information and analysis as is necessary to resolve a particular dilemma
- Encourage and guide that gathering of relevant information and informed opinion
- Be straightforward, reliable, easy to use, and flexible

The above description acts as a realistic reminder of what we are trying to achieve in making a decision.

In Section 2.1 the focus of the study was outlined, and included the exclusion of trivial decisions. Differentiation between trivial and non-trivial decisions is subjective and is not aided by any existing literature. In the investigative component of this study, participants were asked to describe the processes involved in a recent non-trivial decision based on the following general definition: **“a non-trivial decision is one that you would not make on a regular basis, is not completely familiar to you, and has significant consequences.”**

2.3 WHAT IS DECISION STRUCTURE?

Before analysing the process of problem structuring and what might be contained within that process, it is necessary to clearly understand what we are trying to achieve from performing any structuring process. We must first familiarise ourselves with structure (noun) itself; we then (in Section 2.12) describe current understanding of the process (verb) of decision problem structuring.

Smith (1988) states that a scientifically acceptable and practically useful definition of “problem structure” must satisfy five criteria. It must:

1. Conform with, or at least be sensitive to, the meaning of the term “structure.”
2. Be consistent with established usage of the term “problem structure.”
3. Be internally coherent and consistent with the meanings of related terms.
4. Permit one to determine whether or not, to what rough extent, or in what respects a particular problem is structured.
5. Be useful in the analysis and solutions of problems.

An appreciation of the “states of nature” (Keller and Ho, 1988) that exist before and after a structuring process should provide a preliminary understanding of the intention and characteristics of the activity widely termed, problem structuring. For the sake of argument, let us presume that these before and after “states of nature” can be alternatively described as ill-structured (the state before structuring occurs) and well-structured (post structuring). It is acknowledged however, that some decisions might never have an ill-structured state of nature, thus not requiring any significant structuring to become better prepared for the subsequent phases of the decision-making process. Furthermore, some problems have more definite structure than others (Greeno, 1976). Conversely, others might remain ill-structured either by accident, intention or through the existence

of limiting constraints such as time or limited finance. Sections 2.3.1 and 2.3.2 provide complete descriptions of ill and well-structured decision problems.

Taylor (1974) offers a different perspective (see Figure 2-2) in ascertaining the level of structure associated with a given decision problem as being one of four types. What differentiates these decision types (and determines the associated level of structure) is the familiarity the decision-maker has with (1) the initial state of the decision; (2) the terminal state of the decision and; (3) the transformation between the two states.

Problem Type	Initial State	Terminal State	Transformation
Type I, Resource Specification Problems	Unfamiliar	Varies	Varies
Type II, Goal Specification Problems	Varies	Unfamiliar	Varies
Type III, Creative Problems	Varies	Varies	Unfamiliar
Type IV, Well-Structured Problems	Familiar	Familiar	Familiar

Figure 2-2 Types of Problem Structure (Taylor 1974)

Decisions in which the decision-maker is unfamiliar with at the outset (i.e. upon receiving the decision does not recognise it as being familiar) are classified as being Type I – Resource Specific Problems. Type II problems (Goal Specific Problems) are those characterised by a lack of understanding or familiarity with the desired end point of a decision. Type III problems (Creative Problems) are those in which the decision-maker is uncertain as to how to proceed toward the terminal state. The final type, Type IV (Well-structured Problems), where the decision-maker is familiar with the initial problem (i.e. has encountered such a problem before), recognises the process required in order to transform the problem from its initial state, and knows the form in which the terminal state must be. Taylor’s framework is not dissimilar to the basic ill-structured – well-structured continuum with the exception that it introduces specific graduations or intermediate points of measures within it. It suggests that a decision problem

with an unfamiliar initial state is less structured than one with an unfamiliar terminal state.

Jungermann *et al.*, (1983) present a useful description of what the structure of a decision problem contains.

A structure is a set of components of a complex whole and their interrelations; developing a structure, then, implies the generating of the components of the problem, and relating these components to each other. Both processes are closely intertwined and can be distinguished only analytically: The generating process is mostly guided by some implicit assumptions about the relations among the elements (e.g., their similarity or their mutual influences), and the structuring process often leads to a redefinition of the element set (e.g., adding or eliminating elements). In decision problems, the components might be possible actions, relevant events or states, potential outcomes, or goals and objectives; relations might be of a categorical or means-end sort (e.g., in goal hierarchies) or of a casual sort (e.g., in decision trees). (p.224).

Power *et al.*, (1994) describe four components of a structuring process and how they might be used to differentiate between structured and ill-structured problems. These are: Objectives and Criteria; Variables affecting outcomes; Causal relationships and; Alternatives. How these components might feature in ill-structured and well-structured decision problems is presented in Figure 2-3.

Component	Ill-Structured Decision Problem	Well-Structured Decision Problem
Objectives and Criteria	None are known at the outset and the trade-offs or relative utilities are largely unknown.	All are known, as are the trade-offs or relative utilities.
Variables affecting Outcomes	Knowledge of all important controllable and uncontrollable variables is incomplete.	Complete knowledge of all variables exists.
Causal relationships	Relations are not well understood in advance or might vary according to different plausible assumptions.	All assumptions and underlying assumptions are known.
Alternatives	Alternatives are generally unknown and/or have not been specified.	A complete, comprehensive list of alternatives has been developed.

Figure 2-3 Ill-Structured vs. Well-Structured Decision Problems

It is important to recognise however that what is contained within Figure 2-3 are the two extremes, which are likely to be placed at opposing ends of the “structuredness” continuum, and is therefore theoretical only. It is unlikely, if not impossible, that naturalistic decisions could contain no structure i.e., completely ill-structured. Equally infeasible is the existence of a decision situation containing maximum structure, (i.e. truly well-structured).

It is assumed in this thesis that all decisions have structure, even those that have only just been identified and have yet to have been exposed to any decision-making processes. Decision structure is anything related to the decision that contributes to the progressing of the overall decision process. Understanding the existence of the decision is the first step in this. While structure is best recognised (academically) in terms of objectives, attributes, and alternatives, even those which do not have these components have limited structure. Furthermore, decision structure is likely to be largely a socially constructed state, i.e. determined and augmented by the decision-maker in association with that particular decision, given certain organisational and other contextual characteristics. This could be interpreted as a systems view.

Smith (1988) finds that in current usage, no clear distinction between the defining of a problem and the structuring of a problem exists. These are clearly two different aspects of the decision-making/problem solving process; a decision cannot be structured without it first being defined. However problems are equally described as being “ill-structured” or “ill-defined” which confusingly causes less of a problem. The use of the verb “unprogrammed” is also reported. Clearly differing conceptualisations of problem structuring exists. Smith (1988) identifies four such “notions” of problem structure in the literature. These he terms:

1. Goal State Conceptualisations

The clarity of a decision goal is often associated with the decision’s level of structuredness. For example, Greeno (1976) identifies ill-defined goals as “an important factor in producing the weakness of structure in many ill-structured problems” (p. 480). This is the narrowest of the four identified

conceptualisations (Smith, 1988), and does not directly attribute any other condition to the cause of ill-structuredness.

2. Problem Space Conceptualisations

This is a generalised version of the goal state conceptualisation. A problem space is an explicit, usually formal, representation of a problem (Smith, 1988). The degree of structure present in a problem space conceptualised view is measured by the state or completeness of the problem space representation. Simon (1973) includes problem space as part of his six criteria for a well-structured problem.

3. Knowledge Conceptualisations

This ‘notion’ relates ill-structuredness with a decision-maker who lacks knowledge compared with a knowledgeable decision-maker who has formulated a well-structured decision. This conceptualisation clearly views the decision-maker as a major determinant of the decision’s structure (Smith, 1988). It is assumed that for the decision-maker to attain a level of knowledge, he or she must have carried out a degree of structuring. Such a conceptualisation, if accurate, might be a useful tool in empirically evaluating the level of structure present.

4. Process Conceptualisations

This conceptualisation measures structure in terms of the effectiveness of the structuring process. “A problem is ill-structured when the solver lacks an effective solution procedure” (Smith, 1988 p. 1495). Conversely, the decision is seen as being well-structured when the decision-maker has adequate procedures in place for addressing it.

Several assumptions are made concerning problem structuring within this thesis. Some of these are present in the Introduction; others are: that optimal⁵ structure in a decision problem is desirable, although rarely achievable; and the problem structuring process only increases the amount of structure within a decision

⁵ Optimal is measured by the decision-maker given his or her particular situation, but is likely to relate to the definition of a well-structured decision as outlined in section 2.3.2.

problem. Structured decisions provide a better basis for choice, and therefore provide superior outcomes than do equivalent unstructured decisions.

2.3.1 ILL-STRUCTURED DECISIONS

Simon (1973) describes an ill-structured decision as one whose structure lacks definition in some respect. Specifically, elements that might be poorly composed or defined include: a clear goal, operators (the “causal levers” or control variables that can be used to create change in the direction of the goal (Gettys *et al.*, 1987, p. 26)) that might be used to reach that goal; and a definition of the most relevant information that must be collected to advance the decision (Gettys *et al.*, 1987). One could suppose that the non-existence of any of these elements would also (certainly) contribute to the cause of an ill-structured decision. Incomplete knowledge of the problem domain and unknown ramifications⁶ of potential solutions are also likely to be features of an ill-structured decision process; however as stated in the previous section, some amount of structure is always present. An ill-structured decision is simply one that has (substantially) less structure than a well-structured one.

The difficulty that exists with the identification of ill-structuredness is that the level of structure present is not usually considered until the latter stages of the decision-making process have been reached. It is generally assumed that a decision begins with a low level of structure and ends (at the point in which a choice is made) with a greater level; a point at which remedying insufficient structure can often only be achieved by repeating the entire process. Insufficient structure might become apparent when it is found that none of the alternatives achieve the given objectives, or when there is difficulty in evaluating the alternatives (i.e. insufficient measurable objectives). Describing ill-structuredness in decision problems is not straightforward, a problem which is nicely summed up by Simon (1973) when he states that “a problem is an ill-structured problem if it is not a well-structured problem” (p.181).

⁶ Which is in essence, uncertainty, and can never be completely eliminated through structuring.

An ill-structured decision has been viewed as being a decision process that has not been encountered before in quite the same form, and for which no predetermined and explicit set of ordered responses exists in the organisation (Mintzberg *et al.*, 1976). Simply, this view associates ill-structuredness with unfamiliarity. For a decision to be classed as being ‘familiar’, the decision-maker must recognise that it has been solved previously (MacCrimmon and Taylor, 1976). Becoming familiar with a decision problem is likely to involve the collection and manipulation of data much in the same way as the activities contained are undertaken when structuring a decision problem.

Taking a more cynical view, Newell (1969) describes ill-structured problems as those that only suit weak problem solving methods; although it is difficult to comprehend how this might be the case. In most cases, a decision’s level of structure increases over time. It is most likely those ill-structured problems, which are unable to have further structure added, are the result of a heavily constrained environment that does not allow for further structuring. Such decisions are likely to be the result of unstructured ‘intuitive’ decision-making processes rather than a more formal, normative problem structuring method.

In Section 2.9 a generic definition of problem structuring is sought. This will help in the understanding of ill-structuredness in decisions.

2.3.2 WELL-STRUCTURED DECISIONS

Clearly, certain elements that make up the structure of a decision are likely to be of more relevance and value than others. However these are often determined by the nature and context of the decision itself (and of course the decision-maker). For example, a risky investment decision is likely to involve a substantially greater degree of numerical data than a decision concerning what colour to paint the house, and as a result, more emphasis within the structuring is likely to be placed on the identification and assessment of important criteria. Such a decision is also likely to have greater ramifications. Complex, information intensive decisions are likely to involve more visible structuring than those decisions reliant on human judgement and intuition.

We must assume that the purpose of any structuring activity is to attempt to attain maximum, relevant structure in the decision problem (although as previously stated, achieving it is unlikely to occur). While Greeno (1976) does not believe a single definition of a well-structured decision problem is feasible, he outlines three characteristics we could expect to be present in a well-structured decision problem:

1. The problem occurs in an environment containing a specified set of elements and a set of rules for combining these elements to form objects.
2. A set of operators is given, each of which can transform one problem state into another.
3. The problem goal is specified as a simple conjunction of features that must be present for the goal to be achieved.

As a summary, the following elements are presented in the literature as being characteristics or requirements of a well-structured decision problem:

- Goal or objective (Greeno, 1976)
- Familiarity by the decision-maker (Taylor, 1974)
- A set of operators (Greeno, 1976)
- A defined problem state (Greeno, 1976; Gettys *et al.*, 1987; Simon, 1973)
- The relevant variables of the problem situation (Abualsamh *et al.*, 1990)
- Potential solutions (Simon, 1973)
- Relationships between variables (Abualsamh *et al.*, 1990)
- A criteria for testing proposed solutions (Simon, 1973)

With respect to Decision Analysis⁷ (see section 2.13 for a brief description), Keller and Ho (1988) state that the point at which a decision has attained the necessary structure (i.e. become well-structured), is such that the structured problem can be represented on a decision tree. (N.B. decision trees themselves are commonly referred to as problem structuring tools or methods). Decision Trees are a commonly used tool of decision analysis; used before the final analysis takes place. Therefore a definition of a well-structured decision when conducting decision analysis is that it contains the necessary elements required for the subsequent analysis. Decision Analysis, being normative⁸, and the fact that little consideration is given to the constraints inherent in naturalistic decision-making, presents a false sense of simplicity to the structuring process.

Weick's (1979) conceptualisation (moving from an unworkable version of reality to a workable version of reality) might give the impression of an ill-structured problem as having no value until some increased level of structure is achieved. This is not necessarily the case. It might be the case if that "unworkable version of reality" is perceived by the decision-maker and is seen from his or her perspective of reality.

To determine whether a decision contains the necessary structure for subsequent choice, the decision-maker must have an understanding of what form the decision must be for the subsequent analyses that are going to lead to a completed decision. Subjectively orientated decisions (decisions which do not use formal models or methods and are reliant almost exclusively on the judgement of the decision-maker) are unlikely to be structured further given that the additional structure is only likely to add confusion or take up time that might not be readily available.

Schwenk (1983) raises an interesting point in this debate concerning what constitutes a well-structured decision problem. His comments relate to whether a problem's structure lies in the problem itself, or in the decision-maker's perception of it. Research has generally focused on the decision-maker's

⁷ One of many statistically based decision-modelling techniques.

⁸ Being theoretically based (see section 2.5.2)

perspective of the decision structuredness, perhaps because data collection is more straightforward. Like the definition presented earlier by Mintzberg *et al.*, (1976), others such as Reitman (1964), MacCrimmon and Taylor (1976) and Taylor (1974) all define/describe decision structure in terms of the decision-maker's perspective and describe it as the decision-maker's familiarity with three characteristics of the problem:

1. The initial state or gap between preference and expectation
2. The terminal state or goal of the decision-making process
3. The transformation required to move from the initial state to the terminal state

The perspectives just offered (well-structured and ill-structured) are clearly at opposing ends of a structuring continuum. In naturalistic decision settings, decisions are neither completely ill-structured nor completely well-structured, they lie somewhere in between. In this study we are concerned with the development of a decision from one that is initially relatively ill-structured to one that is relatively well-structured.

2.4 RESEARCH PERSPECTIVES ON PROBLEM STRUCTURING

The literature offers little guidance in developing a clear understanding of all facets of problem structuring. This is due, in part, to the general lack of research in this area. “The OR community’s lack of knowledge about such topics as problem structuring has been publicly aired and deplored for many years” (Woolley and Pidd, 1981, p.198). It appears that little has changed since the publication of Woolley and Pidds’ review; in fact, publications in this area appear to have diminished in recent times and what has appeared recently appears to have become less theoretically focused. So one of the issues this research must deal with is the inherent lack of (recent) problem structuring research. As a result of this, a significant assumption that this research makes is that the

published research of the 1970’s and early 80’s is still relevant. Nothing has appeared within the literature to suggest that this might not be case.

Possibly the most significant issue that restricts the understanding and development of problem structuring is the multi-disciplined nature of problem structuring research as demonstrated in Figure 2-4. As a result, the existing research lacks cohesion given the conflicting objectives of the various disciplines.

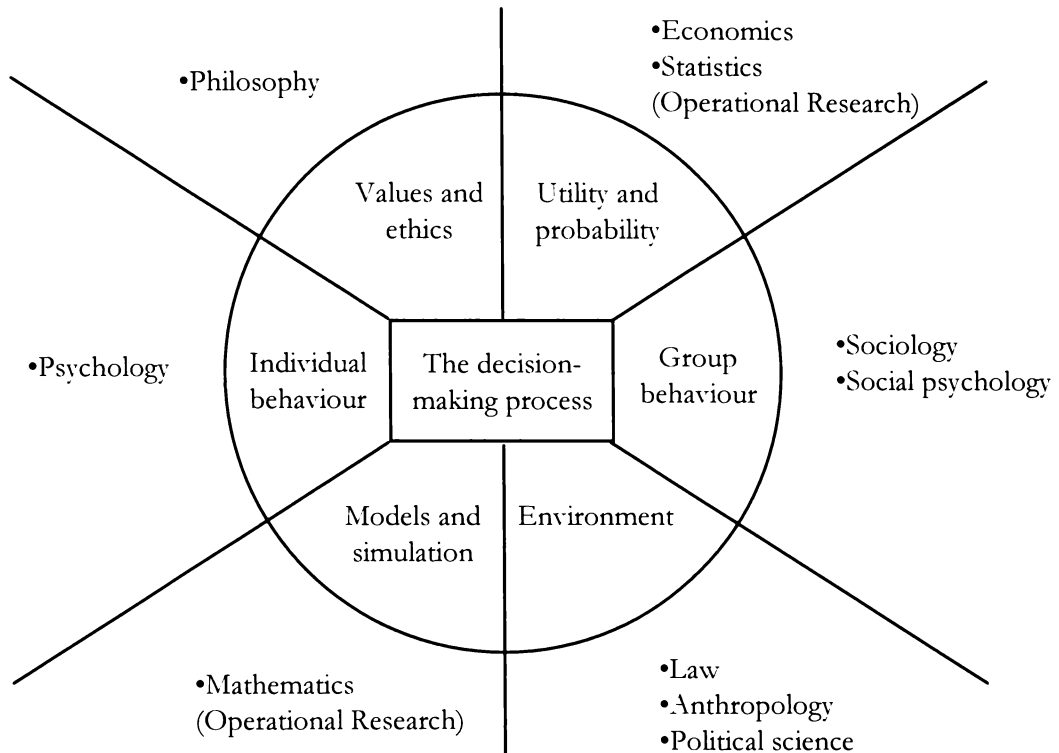


Figure 2-4 The Interdisciplinary Framework of Decision-making (Harrison, 1999)

This research considers two major disciplines that have given most attention to decision-making research those being psychology (descriptive decision-making) and operational research⁹ (normative decision-making) which encompasses the disciplines of economics, statistics and mathematics in Figure 2-4. Arbel and Tong (1982), Pidd (1988), Pidd and Woolley (1980a) and Smith (1989) along with many others approach problem structuring research strictly from an Operational Research perspective. This approach typically views problem structuring as a mathematical approach to formulating a problem. There are a

⁹ This thesis deals with OR at the meta level and does not look OR methods in any detail.

variety of techniques/tools that are associated with the OR perspective on problem structuring. While opinion varies as to what constitutes problem structuring in OR, however methods often discussed include the likes of Soft Systems Methodology (SSM), Theory of Constraints (TOC) etc. In general OR founded problem structuring tools assume the decision-maker to be more rational than what does the descriptive perspective. Rational behaviour is typified by a decision-maker who has a “well-organised and stable set of preferences, and a skill in computation that enables him or her to calculate, for the alternative courses of action that are open to him, which of these will permit him to reach the highest attainable point on his preference scale” (Simon, 1955, p.99).

While other research areas such as problem solving and creativity give minor consideration to problem structuring (Woolley and Pidd, 1981), the other principal problem structuring research discipline is that which is based in the social sciences, or more specifically, psychology. Psychological research into problem structuring includes work by Adelman *et al.*, (1986), Greeno (1976), Gettys *et al.*, (1987) and Mintzberg *et al.*, (1976) etc. Research in this area typically focuses on the human aspect of problem structuring, observing how problem structuring occurs in practice while attempting to recognise and understand the underlying cognitive processes involved. As an example, Arbel and Tong (1982) state: “The psychology literature is replete with studies which show that, even in the most favourable circumstances, human decision-makers exhibit sub optimal behaviour and are prone to focus on a narrow range of alternatives” (p.377). The literature on human behaviour is vast. In this thesis a conscious and intended effort is made to consider only those aspects of human behaviour (and the associated literatures) that pertain to the human actions involving or influencing the structuring of decision problems while also being aware of alternative psychological literature.

2.5 DECISION–MAKING IN THREE MODES

Decision-making is widely classified as being one of three types:

Descriptive: What people actually do, or have done – Psychology

Normative: What people should do (in theory) – OR

Prescriptive: What people should and can do – Combination of both

Bell *et al.*, (1988) suggest a useful way of evaluating descriptive, normative and prescriptive models. Descriptive models are evaluated by their empirical validity, that is, the extent to which they correspond to observed choices. Prescriptive models are evaluated by their pragmatic value, that is, their ability to help people make better decisions. Normative models are evaluated by their theoretical adequacy, that is, the degree to which they provide acceptable idealisations of rational choice.

The following subsections are a summary of the definitions of the three modes of decision models as found in the decision-making literature. To understand the relevance of descriptive decision-making research and its associated theories, it is necessary to first grasp how descriptive decision-making fits into the field of decision-making generally.

2.5.1 DESCRIPTIVE DECISION–MAKING

A descriptive decision model is simply one that describes actual decision-making behaviour. This is, at times, clouded by what is perceived to actually be descriptive decision-making. Many researchers (e.g., Billings and Marcus, 1983; Bouwman *et al.*, 1987; Korhonen *et al.*, 1997) have set up experiment-like conditions and observed the decision-making behaviour of a number of participants. Conversely, others have observed the behaviour of real decision-makers making real decisions in real situations (e.g. Berl *et al.*, 1976; Dio International Research Team, 1983; Kunreuther and Bowman, 1997; Klein, 1989).

Weber & Conskunoglu (1990) outline four aspects of human behaviour that can be included in descriptive decision-making theories:

Cognitive Limitations of Human Information Processing

This incorporates humans' limited processing capabilities such as speed of dissemination, and also humans' limited memory capacity. Bias might also be considered such a limitation.

Restructuring of the Problem Representation by the Decision-maker

Normative models process information about alternatives, in relation to their effect on final assets. For a human to mentally do this a considerable amount of memory and cognitive effort is required, therefore the problem is restructured such that it requires minimal human computation.

Use of Heuristics

Rules or approximations are regularly employed in simplifying a process or situation. These ...”provide time-pressured managers and other professionals with a simple way of dealing with a complex world, usually producing correct or partially correct judgements” Bazerman, 2002, p. 6. However, Bazerman also notes that the unconscious, involuntary use of heuristics may, in fact, have a negative effect. The availability heuristic describes when people rely on information that is readily available in their memory (Tversky and Kahneman, 1973), the representative heuristic describes when comparisons are sought between the present situation and past situations (Bazerman, 2002). Finally, people are found to anchor their decisions and then make adjustments to it; thereby be continually influenced by the chosen anchor (Bazerman, 2002).

Instability of Preference Structures

Evidence suggests that decision-makers might have unstable and ill-defined preferences (Weber & Conskunoglu 1990). In such situations, judged or revealed preference is not necessarily a reflection of the “true” internal preference structure, but is actually constructed during the elicitation process.

This is just one of many descriptive perspectives on decision-making. What is more commonly presented in the literature is so called “descriptive models of

choice” (see Dillon, 1998 for a summary of the most popular of these) which vary considerably in terms of their “descriptiveness”. Many of these models are simply “softened” approaches based on the traditional rational, economic model of decision-making. Others are more descriptive (e.g. Klein’s Recognition Primed Decisions, 1989) and are based on actual observed decision-making behaviour. Others (e.g. Nutt, 1984, 1993a, 1998a, 1998b; Svenson, 1979; Mintzberg *et al*, 1976) have taken a more process view of actual decision behaviour and have attempted to describe the entire decision-making process.

Descriptive decision theory is generally thought of as characterising behaviour that is intuitive, i.e., its use is automatic and unaided. Research into descriptive decision-making is concerned with observing and understanding how and why people think and behave as they do when making decisions.

Possibly the earliest recognised descriptive theory is the Satisficing model, which emerged around the same time, and is linked to the concept of Bounded Rationality. First reported by Simon (1957), this theory posits that decision-makers choose the first alternative that exceeds some criterion or standard. Behaviour of organisations in learning and choice situations fall far short of the idea of “maximising” postulated in economic theory, “...organisations adapt well enough to satisfice, they do not, in general, optimise” (Simon, 1957). Simon’s argument is centred around the fact that decision-makers do not and cannot maximise in most situations and while this theory is now dated, it has yet to be superseded or proved incorrect.

Cohen *et al*, (1972) developed the Garbage Can model in response to what they termed organised anarchies. Organised anarchies, also referred to as decision situations and observed within group or organisational contexts, are characterised by three general properties: Problematic Preferences, Unclear Technology and Fluid Participation. Within an organised anarchy, it is difficult to assign preferences to a specific decision problem. This is due, in part, to the fact that the organisation consists of a loose, ill-defined group of ideas rather than a clear set of preferences. The organised anarchy is characterised by its ambiguous operating procedures and a “learn from our mistakes” philosophy.

The Garbage Can model is fundamentally distinct from other published descriptive theories. Traditionally when a decision problem arises, conventional practice is to determine the most appropriate action, by whatever means, such that a suitable solution may be found that remedies the identified problem. The Garbage Can theory views this differently and posits that such solutions continually exist rather than being formulated on demand. It states that the organised anarchy is faced with a number of choices, for which compatible problems are sought. “To understand processes within an organisation, one can view a choice opportunity as a Garbage Can into which various kinds of problems and solutions are dumped by participants as they are generated. The mix of garbage in a single can depends on the mix of cans available, on the labels attached to the alternative cans, and on the speed with which garbage is collected and removed from the scene” (Cohen *et al.*, 1972, p. 2).

A Garbage Can decision is described as one that forms an interpretation of a number of streams from within the organisation. These streams include: problems, solutions, participants and choice opportunities. Within the Garbage Can model, these streams or variables are observed as: a stream of choices, a stream of problems, a rate of flow of solutions and, a stream of energy from participants.

One particular axiom of the Garbage Can model is the idea of loose coupling. Loose coupling is a significant feature of many organisational anarchies and implies that coupled events are responsive to one another, although this does not necessarily imply that they are linked. These events may be decisions; they may however be any type of organisational activity. Each event preserves its own identity and some evidence of its physical or logical separateness (Weick, 1976). The interaction of these events contribute to the existence of problematic preferences, unclear technology and fluid participation.

Garbage Can theory is not restricted to the application within loosely coupled systems. There exists an array of Garbage Can models (see March & Olsen, 1986, for examples) allowing its use in often highly structured systems containing distinct hierarchies and divisions of labour. Temporal context effects in such

organisations require variations in the model that simply involves varying features of that model

The Garbage Can model has been found to accurately and successfully describe a range of organised anarchies, organisations, or industries that contain organised anarchies. Examples include naval warfare (Weissinger-Bayton, 1986) and educational organisations (Weick, 1976).

A relatively modern theory is that of Image Theory developed by Beach and Mitchell over a period of 12 years. Based around the Lexicographic model (Tversky, 1972) and the Strategy Selection model (Beach and Mitchell, 1978), Image Theory (Beach and Mitchell, 1990) is a refinement and synthesis of existing ideas applied to real world decision problems. Image Theory attempts to describe two types to decision-making: Progress Decisions, about whether past decisions are being adequately carried out and, Adoption Decisions, making decisions to replace incorrect or unachievable decisions made previously. While Image Theory is based (in part) on actual decision-making behaviour, it does include a level of proposition, thereby making it more prescriptive (see Section 2.5.3) than purely descriptive.

Einhorn (1970) describes the Conjunctive/Disjunctive model as a combination model in that it works by combining information. The Conjunctive/Disjunctive model has been proposed by a number of authors e.g. Coombs and Kao (1955), Dawes (1964) and Einhorn (1970). The Conjunctive model looks to select a solution or a group of potential solutions from a list of alternatives. All alternatives which exceed some threshold or aspiration level become part of this group. Those alternatives which do not exceed this level are eliminated. The Disjunctive model evaluates each alternative with respect to its best attribute rather than all of them. The Conjunctive/Disjunctive models have a similar philosophy to that of Simon's (1957) Satisficing model. Rather than try to get the optimal solution, it searches for an adequate solution or solutions. This is achieved by installing either a minimum evaluation function (in the case of the Conjunctive model) or a maximum evaluation function (Disjunctive model).

The naming of the Lexicographic model (Tversky, 1969) is derived from the word Lexicon and refers to the ordering of the dimensions of alternatives. The premise for the use of this model is that the decision-maker must know of the dimensions (attributes) which make up the alternatives, and must be able to rank them in terms of their importance. This is because each pair of alternatives is compared in terms of each attribute beginning with that deemed as most important, until dominance of one over the other occurs.

Tversky (1972), presents a probabilistic model of choice, the Elimination By Aspects (EBA) model which is related to the Lexicographic model in that they both follow intradimensional evaluation strategies (Hogarth, 1980; Payne., *et al.* 1993). Its principal activity is a covert elimination process. Each alternative is viewed as a set of aspects that are sequentially evaluated.

More recently, Klein (1989) has proposed the Recognition Primed Decisions (RPD) model as a descriptive model of decision-making in natural settings; a natural setting being within some organisational or real life context. The RPD model was developed based on the observation and questioning of 150 professional decision-makers. The RPD model contains four major components: Recognising cases as typical, Situational understanding, Serial evaluation and, Mental simulation. The four parts of the RPD model are typically employed in a sequential manner and involve revisiting and comparing previous decisions along with simulating how various options might be carried out and what their outcomes might be.

To better portray the interrelationships between the components of the RPD model a graphical representation of the Recognition Primed Decisions model is displayed in Figure 2-5.

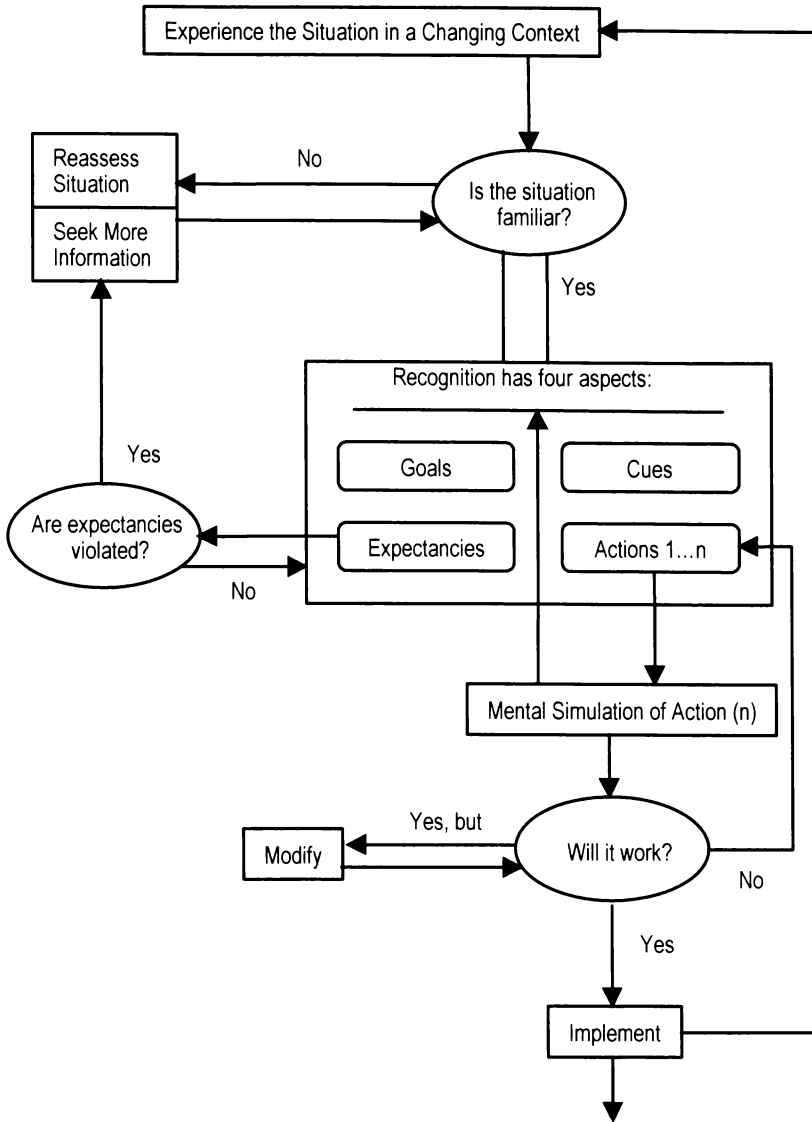


Figure 2-5 Recognition Primed Decision (RPD) Model

The Recognition Primed Decisions model is one of a number of more recent developments that have sought to amalgamate existing ideas or theories into a meta theory which adequately describes all aspects of decision-making. In terms of decision problem structuring, the most significant component of the model is the situation understanding stage as this contains those decision activities that prepare the decision for eventual choice.

Two models regularly mentioned in the descriptive literature also warrant attention. The Additive and Additive Difference models are considered by many to be descriptive e.g., Schoemaker (1980). These models are thought to be good approximations of multiattribute decision behaviour in risk-free situations

(Schoemaker, 1980), yet have been more commonly used by researchers as tools to predict judgements of various experts such as clinical diagnosticians and stockbrokers (Dawes and Corrigan, 1974; Slovic, 1972). The Additive Model of choice independently and individually evaluates multidimensional alternatives. It considers each alternative, one at a time, and determines, by whatever means, its rating or performance before going on to the next alternative. The alternatives can then be holistically compared to determine the best. The Additive Difference Model (Tversky, 1969), is “based on comparisons of component-wise differences between the alternatives”. These comparisons are pair-wise, i.e., they only involve two alternatives at a time. Simply, alternatives are compared over one dimension at a time. Each comparison is multiplied by the difference function (weighting) which determines the advantage or disadvantage for that alternative on that dimension. These advantages and disadvantages are finally summed for both alternatives over every dimension in order to get the final subjective value for that alternative with respect to the one with which it has been compared.

Several authors have attempted to develop classifications or frameworks encompassing these descriptive models. The most common of these have been produced by Schoemaker (1980) and Lipshitz (1994). Schoemaker’s “schematic overview of the various classes of descriptive models” (Schoemaker, 1980, p.28) classifies the models as being either holistic or non-holistic. Based upon Schoemaker’s definition of these two types, examples of holistic models are the Satisficing model, the Garbage Can model, Image Theory and Recognition Primed Decisions. Non-holistic models are typified by the likes of the Conjunctive/Disjunction models, the Lexicographic model and the Eliminations by Aspects model. Lipshitz’ framework is based on three decision-making activities: consequential choice, matching and reassessment. The Additive and Additive Difference models are examples of those representing consequential choice. All others are examples of matching models. The Recognition Primed Decision model and Image Theory given their multi-faceted nature contain all of these behaviours. The models that have most relevance to problem structuring are Image Theory and the Recognition Primed Decisions model. Both contain multiple steps that don’t just describe choice based activities but also

acknowledge the processing and structuring that occurs prior to the making of the choice. The general principles of bounded rationality and Satisficing (Simon, 1957) are also relevant.

While descriptive studies into decision-making offer the prospect of substantial improvement in understanding and development of decision-making behaviour, their focus on the choice phase of the decision-making process is limiting. What most authors fail to consider within their studies is the context within which that choice is made. Little consideration is given to what processing might (or might not) have gone on in preparing the decision for choice. Neither are other contextual issues, such as the influence of the decision-maker and the environment in which the decision is being made, considered. The issue of decision context will be discussed at several points later in this dissertation. Of relevance to the preceding discussion, Section 2.12 describes various interpretations of the overall decision process, with specific emphasis on the problem structuring components.

2.5.2 NORMATIVE DECISION-MAKING

Normative decision-making is part of the wider field of Operations Research O(R) which had its origins in the military during World War Two. A traditional definition of OR is “...the application of scientific methods to build mathematical models and derive optimal solutions for decision problems in government, industry, and agriculture.” (Daellenbach, 2002).

This mode of decision-making, characterises ideal inference or decision processes, without assurance that the ideal conditions are met by the humans who must implement them (Brown & Vari, 1992). Kleindorfer *et al.* (1993: 177) describe normative theories as those “...based on abstract models and axioms that serve as theoretical benchmarks”. Normative theories are often associated with how idealised, rational, super-intelligent people should think and should act. Furthermore, normative decision theory assumes the decision-maker to be perfectly informed, infinitely sensitive and who follows procedures exactly (Barclay *et al.*, 1971). These theories have little consideration for the ‘known’ cognitive limitations of real people, their internal turmoil, shifting values,

anxieties and lingering post-decisional disappointments and regrets. Neither do they account for the decision-maker's repugnance (or zest) for ambiguity or danger, their inability to do intricate calculations, nor their 'limited attention span. (Bell *et al.*, 1988).

The most widely known normative theory is the Expected Utility theory (von Neumann and Morgenstern, 1947). In brief, expected utility theory assumes that an individual chooses alternative A_1 from a set of possible alternatives A_i ($i = 1 \dots m$), which maximises the expected value of his or her utility function (U). The utility function is defined over a set of outcomes for the relevant attributes in the problem (Kleindorfer *et al.*, 1993). Normative theory generally assumed a degree of structure is present and focuses on choice situations of complete information.

2.5.3 PRESCRIPTIVE DECISION-MAKING

Whereas descriptive and normative decision-making modes are at opposing ends of the decision-making continuum, prescriptive decision-making covers the ground in between. Bell, *et al.* (1988, p.9) proposed the 'Prescriptive' component to the decision-making framework in response to the question "How can real people - as opposed to imaginary, idealised, super-rational people without psyches - make better choices in a way that does not do violence to their deep cognitive concerns?" Kleindorfer *et al.* (1993; p.177) describe prescriptive decision-making from another angle, stating, "...these theories and associated experimental evidence and field studies are concerned with helping decision-makers improve their performance in problem finding and problem solving, given the complexity and constraints of real life". Simply, models of prescriptive decision-making contain the relaxed axioms of normative theory such that they can be applied to real decision situations.

Existing prescriptive models of decision-making are generally those that have begun as normative, but through recognition of human limitations, have been softened in terms of their strict economic axioms (also called "normative models with descriptive adjustments (Dillon, 1998)). Such models include: Prospect Theory (Kahneman and Tversky, 1979) and the Advantage Model (Shafir *et al.*,

1993). These again are all models of choice. Given the definition of prescriptive decision-making outlined in Section 2.5 (What people should and can do), prescriptive models could also be established through the identification of human behaviour followed by the inclusion of workable normative axioms.

2.6 JUSTIFICATION FOR DECISION RESEARCH

There is little doubt that many of the normative developments in decision research are not being adopted by the decision-making practitioner and this is widely supported empirically (e.g. Berl *et al*, 1976; Nutt, 1984, 1993a, 1993b; Dillon, 1998 and others). Similarly, descriptive research continually questions the ability of these same decision-makers. Clearly there is a need for the improvement in real decision-making processes, however the gap between what we do and what normative researchs suggest we must do is great. This research is intended to help bridge this gap. Moreover, some of the developed descriptive theory appears to differ from the observed decision-making behaviour (Dillon, 1998).

Most problems (of which decision problems are just one type) whether operational or strategic, objective or subjective, trivial or non-trivial, require some form of structuring before the problem can be solved. As previously outlined, the form of this structuring might vary from a detailed process of choice preparation to a short, informal task of the decision-maker simply familiarising themselves with the decision problem. Much of the existing research into problem structuring does not differentiate between these problem types; it assumes that all problems are alike and can be compared and approached in the same way. While this might be true in some situations, this research recognises that decisions are a unique form of problem. What makes a decision unique is that need for human input in the process. Uncertainty in the decision process due to limitations in understanding of the problem domain or decision process necessitate a decision-maker to become involved in the problem solving process whether to facilitate the process or to make judgements based on the uncertainty present.

In almost all cases, a decision requires the judgement, knowledge and preferences of the decision-maker, often coupled with the rationality and structure of a formal decision process. Essentially the decision-maker is required to ‘fill in the gaps’; provide answers to problems where answers cannot be found elsewhere. Often what appears to be a broad but well-defined problem might contain decision problems within that are less well defined, and vice-versa. Because of this variety in levels of structure present and also the variety in the level of formality associated with the employed decision-making processes, both OR and psychological research contribute to the understanding and advancement of decision problem structuring. In recent times, greater recognition has emerged of the combined roles these disciplines play in the development and understanding of decision problem structuring although OR has tended to continue to ignore the human aspect of decision-making. In acknowledgement of this, this thesis will not attempt to differentiate between the psychological and OR research streams but recognise the contribution made by both fields. Recently, Dillon (1998) has argued that developments in all aspects of decision-making research could only be advanced with the inclusion of all perspectives from all relevant disciplines. The OR discipline clearly offers rational and efficient approaches to decision-making yet their introduction to everyday decision-making environments would require significant changes to human behaviour. Attempts to change such behaviour have tried and failed so the logical solution is to try and develop some form of cohesion or synthesis between the two disciplines. This study contributes to this by gaining a better descriptive understanding of problem structuring processes.

2.7 INDIVIDUAL VERSUS GROUP DECISION-MAKING

So far no differentiation has been made with respect to the different decision types. Decision-making occurs either at the individual, group, or organisational level. Furthermore, no consideration has been given to the person(s) involved in the decision. This and the following section (2.8) outline and justify the specific focus of this study in relation to these issues.

This study intentionally focuses on decision problem structuring at the individual level. Individual decision processes are quite unique, and while on the surface might not appear to be significantly dissimilar to that of a group decision, minimal association between them can be assumed. Group decision-making research appears to focus more on the group interaction of the participants than the detailed processes they follow and this focus de-emphasises the importance of this process. Also, group decisions in their unaided form are often the juxtaposition or aggregation¹⁰ of the decisions made by each of the individual participants.

While problem structuring has not appeared specifically in the debate between individual versus group decision-making, many of the issues discussed relate directly to the activities of problem structuring. Focusing on the individual permits the exclusion of the many group issues (discussed below) that are only likely to obscure the problem structuring behaviour under investigation. There is increasing agreement that decision-makers are more effective when operating collectively (e.g. Piper, 1974; Kleindorfer *et al.*, 1993 etc.). In terms of knowledge, skills and experience, a group is usually going to outperform an individual in the same situation. However the many social effects common to group based activities might negate the benefits of these combined capabilities. Such effects can significantly hinder the process and eventual outcome of a decision.

¹⁰ Also known as “Paradoxes of Aggregation” (Dalkey, 1976)

There are a number of psychological features of an individual that are integrated into their decision process. These can include the decision-maker's personality, their mental images, their willingness to accept varying degrees of uncertainty (Harrison, 1999) and their cognitive style (Riding, e.g. 1991). Within the group situations, often these inherent individual characteristics must be compromised in order to adhere to the group processes or norms.

Another of the difficulties associated with studying group processes is that there is often little similarity between the studied groups in terms of group size, process and the dynamics of the group. Also what one organisation might term a group decision might vary considerably with that of another organisation. For example, it could be expected that few conclusions could be reached when comparing the processes employed by a group of twenty individuals making a decision regarding whether to buy out a competing company, with one containing three members deciding upon whom to appoint to a vacant position. Both are group decisions, however they are clearly quite different and one would expect the decision process to be so as well. At the individual level, although there are different environmental characteristics (industry, constraints etc.), there is a single actor in the decision process and so the process is not exposed to such a number of potential influences. With group decision-making, there are a greater number of uncontrollable influences that might influence the process employed in structuring.

In terms of data availability, studying group decision-making is a significantly more difficult task than that of individual decision-making. Although lacking in supporting evidence, the ratio of individual to group decisions made within the unaided business environment is likely to be high, i.e., the vast majority of managerial decisions (especially those made at the executive level) are likely to be made by a single person. Where more than one decision-maker is involved, it is likely that they would still operate as individuals; e.g. delegating some of the formative aspects of the decision process. There is still likely to be a single individual assigned the duty of making the final choice; especially at the executive level of an organisation.

Group decision-making is a research field in its own right. It is in effect a synthesis of the fields of decision-making and team dynamics. It is the involvement of the latter that makes the study of group decision processes a difficult task in the domain of problem structuring. Issues such as conflict, participation, norms and conformity, groupthink (Janis, 1972), gender and cultural differences make understanding group decision processes difficult.

Conflict is one element of group decision-making that has received significant attention. While conflict has been reported to have a positive influence on the outcome of a decision (e.g. Harrison, 1999) it might also serve to suppress the intrinsic cognitive processes of the individuals involved. Conversely, in combination with other group-related issues such as groupthink, conflict might discourage participation and the eventual decision might be made without the involvement. While some of these issues (e.g. gender and cultural issues) are important to decision-making at the individual level, they play a less significant role. It has also been observed that individuals behave differently when operating under group conditions. In particular, it has been found that the acceptance of risk is more likely when the responsibility for a decision is distributed amongst a group of decision-makers (Wallach, 1962).

An obvious extension of this study would be to compare the problem structuring processes identified at the individual level with those at the group level. This would identify those elements of individual behaviour that did not exist within the group situation and vice versa. Such work would be best undertaken via experimental means.

What differentiates the individual decision-making context from that of a group is the existence of culture within any group interaction. In addition to the cultural influences based upon the differences between nationalities and religions (external culture) there are also internal cultural influences (categorised as: behaviour, values and principles and, underlying assumptions (Schein, 1985)) that have a far greater influence with group decision-making.

Recognising cultural influences within an individual process is relatively easy; it is when many conflicting cultural influences are present that their impact on the decision-making process is difficult to assess.

2.8 EXECUTIVE DECISION-MAKING

Given that the focus of this study is the decision-maker operating at the executive level, it is important that the decision-making of an executive be defined and differentiated from that of a manager. The literature almost exclusively focuses on general managerial decision-making (or is non specific) and much of this literature forms the basis of this thesis. However given the focus of this study, being able to recognise those aspects of managerial decision-making that apply to executives (as well as those which do not) is therefore important.

The executive decision-maker is unique in that he or she is generally at the top of the decision-making “food chain”. While they are still accountable for their actions (boards, directors etc.) executives are not usually able to pass their decision to somebody higher in the organisation, i.e., the buck stops with them. They do however have a large number of experienced subordinates to whom decision-making activities can be delegated. Yukl (1994) offers a good description of delegation as often observed within organisational decision-making. Yukl describes delegation as a relative activity, in that the level of authority and responsibility associated with delegation can vary considerably. The most common and straightforward type of delegation involves the assignment of new and different tasks or responsibilities to a subordinate. However delegation might simply be the assignment of increased responsibility or additional tasks. Other aspects of delegation that can vary include the level of autonomy granted to the subordinate (does he or she need to check with their superior before implementing a decision?) and the level of reporting expected following the execution of the delegation. The executive also differs from the middle manager in terms of their access to information. Executives are often privy to the most sensitive or up-to-date information (Yukl, 1994) and unless

they are prepared to divulge this information to their managers, they are best placed within the organisation to make a decision.

One of the most significant differences between the executive decision-maker and the managerial decision-maker is the need of the executive to be in constant search for decision cues (Sanders, 1999). Given the overall responsibility of the executive, he or she must be continually scanning the environment, i.e. looking out for both opportunities and threats that might necessitate a decision. Failure to recognise such cues might be seen by stakeholders as an inability to carry out one of the most fundamental executive roles. The skills required of the executive proficient in the identification of problems include: mathematics, common sense, statistics, analysis and priority setting (Sanders, 1999). Furthermore, executives generally tend to operate more strategically than the average manager. They are generally not concerned with the often-repetitious day-to-day decision-making.

Much of the descriptive work on decision processes has focused on “the manager” (e.g. Dillon, 1998; Nutt, 1984; 1990, 1993a, 1993b etc.), where a manager “...controls, or administers, the technical suborganisation by deciding such matters as the broad technical task which is to be performed, the scale of operations, employment and purchasing policy, and so on” (Thompson, 1967; p.11). Section 2.7 offers justification for the exclusion of group-based decision processes; in this section some reasoning is presented for the focus on the executive level decision-maker, as opposed to the more generalised manager.

What typically differentiates an executive from a manager is their position within an organisation’s hierarchy and the impact of that position with respect to decision-making authority and accountability. Many organisations (e.g. Dillon, 1998) operate within a “delegative authority” decision-making framework in which senior staff set in place policies and procedures for the making of decisions to be carried out by their subordinates. Often this is an organisation-wide, formalised policy; often it is determined (often ad hoc) on a case by case basis. As a result, many lower level managers are, in effect, carrying out the decision process instructions of their superiors. Previous work (Dillon, 1998)

uncovered this phenomenon when a number of middle managers were unable to justify their decision processes beyond saying that they were operating in the manner requested by their supervisor (who was usually at the executive level of the company). It is anticipated that focusing on the executive level decision-maker might minimise the occurrence of such external process influences. The executive level decision-maker is generally a leader, has a wealth of decision-making experience, and has the confidence to rely on his or her judgement, both in terms of the decision process they employ when making a decision and the final choice they make based on that process. In this study, an executive has the following characteristics: he/she is at the top of an organisational or divisional hierarchy; they have the highest decision-making authority within their organisation or division and; in terms of decision-making process, they have the freedom to make decisions in the method of their choice. One of the more compelling reasons for studying decision-making at the executive level is that these decisions are often vital to the long-term strategy of the organisation. While executives make day-to-day decisions, even some of them are relatively non-trivial and their decision-making in general concerns significant actions with significant outcomes and the association ramifications – both good and bad.

One of the associated benefits from studying the processes of executive decision-makers is that lower level managers might learn from, and eventually, take over some the decision-making responsibilities of executives. Hierarchical decision-making (where the vast majority of decisions are made by the senior executives within the organisation) has come under increased pressure in recent times (Dearlove, 1998; Hammer and Champy, 1993). In addition to the calls for the decision-making to occur “closer to the action”, many knowledge workers have begun to demand greater responsibility and autonomy and less high level control.

Figure 2-6 (adapted from Sanders (1999)) summarises the difference between executives and other members of an organisation. He describes the differences in terms of how members interact with information.

Echelon	Most Common Activity	Least Common Activity
CEOs	Decision-making	Finding Information
Other Executives	Analysing	Arranging
Middle Management	Arranging	Analysing
Workforce	Finding Information	Decision-making

Figure 2-6 Hierarchical Dynamics of Information Inquiry

At the top of the hierarchy, CEO's are most involved with decision-making and least involved in the activity of finding the information supporting their decision-making. At the bottom of the hierarchy, the "workforce" is principally concerned with the sourcing of the information required for a decision and make few decisions themselves. It is the role of the middle and senior management to make sense of the often-vast quantities of information collected so that an efficient and effective decision can be made.

2.9 DEFINING PROBLEM STRUCTURING

One of the confusing aspects of problem structuring research is the vastness and diversity of its definition. Much of this is due to the number of research fields (see Section 2.4) of which problem structuring is part. Not surprisingly, each field has a collection of definitions that best serve that particular field. What appears to be missing however is a definition that has been developed to serve the problem structuring field itself. Section 2.12 presents a synthesis of existing definitions that seeks to better define the true essence of decision problem structuring. Examples of definitions this synthesis is based on include:

- "...the intellectual process by which a problem situation is translated into a specific problem", (Majone, 1980, p.10)
- "...the difference between some existing situation and some desired situation", (Pounds, 1969, p.5)

- “..the specification of options, attributes for evaluating options, and states of nature that might occur, with repeated cycling back in the process to revise or augment the structure”, (Keller and Ho, 1988, p.715)
- “..the process by which the initially presented set of conditions is translated into a set of problems, issues and questions sufficiently well defined to all specific research action”, (Woolley and Pidd, 1981, p.197)
- “..the process of arriving at a sufficient understanding of a particular problem so as to proceed to some sort of formal modelling” (Pidd and Woolley, 1980b, p.1063)
- “..an imaginative and creative process of translating an initially ill-defined problem into a set of well defined elements, relations, and operations”, (von Winterfeldt, 1980, p.72)
- “..the process of formulating the present set of conditions, symptoms, causes and triggering events into a problem or set of problems sufficiently well specified so that the risk of using analytic procedures to solve the wrong problem has been minimised” (Schwenk and Thomas, 1983, p.240)
- “..questioning or challenging of the current state of affairs in order to arrive at all or one of the following: well defined goals or objectives, a better understanding of the current situation, or an awareness of potential opportunities”, (Lyles and Mitroff, 1980, p.104)
- “..postulating what the elements or variables in a problem are and how these elements fit together and interact” (Pracht, 1990, p.13).
- “...activities conducted to arrive at measurement scales, a basic model structure, and data collection procedures for an analysis” (Kirkwood, 1987b, p. 1).
- “..an ongoing opportunistic process that includes the restructuring of initially presented problems” (Payne, *et al.*, 1993, p.251).

- “..the art part of decision analysis” (von Winterfeldt (1980, p.185)
- “the process, whether formal or informal, by which some initially presented conditions and requests become a set of issues for detailed research. Thus in some sense problem structuring is in some sense a preliminary to detailed data collection, interviews, modelling, computer programming, optimization, experimentation...etc.”(Pidd, 1988, p.115-116).
- “..the generating of the components of the problem, and relating these components to each other” (Jungermann, *et al.*, 1983).

Humphreys and Berkeley (1983) present one of the more comprehensive descriptions of the problem structuring process. They describe it as containing two parts: (1) the representation by the decision-maker of the knowledge that he/she believes to be relevant to the decision and, (2) based on this knowledge, the generation of a structure representing his or her view of the problem, through a linkage between key elements (acts, events, consequences) and by which content (beliefs, values, preferences) can be explored and manipulated in searching for a prescription for action.

Not only do the above descriptions differ with respect to their level of detail and abstraction, some are generally conceptual in nature, where as others specifically relate to the decomposition that occurs when problems are prescriptively structured. Often, however, this distinction is difficult to make.

2.10 ALTERNATIVE PERSPECTIVES OF PROBLEM STRUCTURING

To aid our understanding of what problem structuring is, let us briefly consider what problem structuring isn't. Problem structuring is just one of a number of terms used to describe the activities contained within Simon's (1960) design phase of the decision process. A number of terms are used to describe the process of problem structuring

Alternative descriptors such as Problem Formulation (Courtney and Paradice, 1993; Lyles and Mitroff, 1980; Schwenk and Thomas, 1983) and Act, Alternative or Option Generation (Gettys *et al.*, 1987; Arbel and Tong 1982) are also commonly used. For this study, in the name of simplicity, only the term problem structuring is used, while acknowledging the existence of alternative terms.

As mentioned, a variety of other descriptors are used when describing pre-choice decision activities. Although some of these activities incorporate elements of structuring, generally they describe behaviour of activities that occur before the structuring, i.e. gaining a better, clearer or more well defined understanding of the problem. These terms include:

- Problem Definition (Smith, 1989): Where the decision-maker attempts to specify the problem and represent it to him or herself and others. Smith describes this as being a conceptual process. Essentially it involves developing a clear understanding of the "true" problem, while making special effort to eliminate an interference by the symptoms of the problem.
- Problem Formulation (Schwenck and Thomas, 1983): The use of this term and that of problem structuring seem to be used interchangeably within the literature. Schwenck and Thomas (1983) use both terms, but without stating whether or not they believe them to be the same thing. Although it is assumed that these terms probably relate to the same thing,

formulation is listed here as it might be thought of as being just part of the structuring process (e.g. formulating alternatives).

- Action/ Option Generation (Abualsamh, *et al.*, 1990)
- Hypothesis Generation (Abualsamh, *et al.*, 1990)
- Problem Diagnosis ((Mintzberg *et al.*, 1976): One of the first activities to occur in problem structuring is the correct diagnosis of the problem. “Diagnosis is probably the single most important routine, since it determines in large part, however implicitly, the subsequent course of action. Yet researchers have paid almost no attention to diagnosis, preferring instead to focus on the selection routines...” (Mintzberg *et al.*, 1976, p.274).

It is likely at this point that some confusion might exist with respect to the dual usage of the terms “problem” and “decision”. The terms are often used interchangeably within the decision-making literature (as observed by Costello and Zalkind, 1963). It is important, however, that their difference should be understood. Kirkwood (1994) describes a problem as “...a deviation from desired performance” (p. 1). This implies knowledge of the “desired performance” does exist. While many decisions are made with the existence of such an endpoint, for other decisions the action is merely a reaction to an unacceptable state. Traditional “problems” are generally viewed in rational terms where an optimal solution exists by which potential solutions might be compared. Decisions and problems are, however, often related (Harrison, 1999; Braverman 1980); the need for a decision is often the result of an identified problem and a decision might require some problem solving as part of the process.

2.11 EMPIRICAL RESEARCH INTO PROBLEM STRUCTURING

Having now established at least a preliminary understanding of decision problem structuring, and its placement within the overall decision process, the extent of relevant empirical research that has been undertaken can be reviewed.

The nature of the structuring processes employed in practice is poorly understood and narrowly defined (Volkema, 1986). Volkema describes the formulation phase as often being depicted as “a fixed period of time during which a search was conducted for the ‘true’ cause or description of the problem” (p.268).

Much of the research that has sought to document the steps within the decision-making process has focused on the entire decision-making process as opposed to the steps only concerned with decision structuring.

Nutt (1984) identified five different types of organisational decision processes: historical, off-the-shelf, appraisal, search and nova. However whereas Mintzberg *et al.* (1976) (see Section 2.12) identified stages in decision process, i.e. longitudinal boundaries, Nutt was looking for different overall processes for categorizing decisions. In a subsequent paper, Nutt (1990) again reported on the use of case studies to investigate how managers carry out the formulation stage of organisational decision-making. This area of research has not received the attention that the models of choice have, which is peculiar, as it has been observed in the descriptive literature that often no distinct choice phase exists. Instead choice is made in a continuous fashion throughout the decision process (Klein, 1989).

Without doubt, Nutt has offered the greatest empirical contribution to the study of naturalistic decision processes (1984, 1990, 1993a, 1993b, 1993c, 1998a, 1998b, 1998c, 2000). In his first major effort in this area (1984), Nutt identified five different general process types:

- **Historical:** Similar to processes described by Klein's (1989) Recognition Primed Decisions model, Historical decisions make use of lessons learnt in previous decisions to guide the development of solutions. "When faced with ill-defined problems, the decision-maker will utilise past information stored in his/her memory to evaluate alternative representations of the problem" (Lyles, 1981, p.63). Taylor (1974) discusses the influence familiarity has on decision problem structuring. He posits that for decisions with which we are familiar, we action standard operating procedures for that particular problem and as such no additional formulation is required. At the other extreme, decisions with which we are not familiar, we must go through some form of formulation process. "The analysis of any decision problem begins with the structuring of the decision model" (Gettys and Fisher, 1979, p.93).
- **Off-the-Shelf:** This type of observed decision process involves the search for and competition between potential solutions. The assumption present in this type of decision process is that such competition will allow the most superior solution to be identified. As an example, Nutt (1984) described how Request for Proposal (RFP) documents were used to generate a number of competitive alternatives that closely matched the need/objective of the requesting organisation.
- **Appraisal:** Similar to the Garbage Can model (Cohen *et al*, 1972), this type of process is concerned with the justification for use of an already identified solution. It is very much of the form: have an idea; build strong motivation for development and use of that idea. This is likely to part of many decision processes, especially where decision approval is required. Having identified what looks to be the "best" alternative, evidence needs to be identified that supports it and persuades those who must approve of the decision that this is the case also.
- **Search:** Nutt describes such a decision process as "...when a sponsor sensed a need but lacked a workable idea." (Nutt, 1984, p.437). Where this differs from Historical and Off-the-Shelf processes is that the

decision-maker does not know where to look to find the idea. It is very much a slow and iterative process of developing an understanding of a particular problem domain.

- **Nova:** These types of decision processes involve innovation. New ideas are created. These are used when potential solutions might already exist, but the decision-maker(s) looks further for previously unconsidered options.

These five types of decision process are not intended to describe the entire decision-making process, however they do provide useful insight into how decision-makers might go about structuring their decisions. In fact the observations made by Nutt (1984) are likely to provide more information about the structuring phase of the decision-making process than other studies that have placed less emphasis on the importance of the pre-choice activity.

In a significantly more focused and relevant study (at least to this investigation), Nutt (1993a) carried out an investigation that sought to identify and characterise the formulation (structuring) stage of organisational decision processes. Nutt analysed one hundred and sixty three decisions and in doing so identified four types of structuring:

- **Idea Processes:** Possibly related to the appraisal decision-making process also identified by Nutt (1984). This mode of structuring follows that an idea is generated, whether it be by the decision-maker or another player in the process. The idea is then developed and refined until a satisfactory solution results. This can be viewed as an approach low in both risk and innovation. Given the time spent in the development of the idea, familiarity with it is maximised thereby allowing for the identification of risks. Furthermore, given that the solution set is typically limited to this single idea, then the process is most likely to result in a Satisficing type solution (Simon, 1957). It is also a process inherent in situations where time constraints are present thereby allowing the decision-maker(s) to focus their limited resources. So in effect, no choice (in the traditional form of choice making) is being made.

- **Issue Processes:** This structuring process characterises the activity of analysing a particular issue for the development of options where an issue is defined as “...a matter under dispute” (Nutt, 1993a, p. 242). One of the requirements of such a process is a sound analysis of the problem. Part of that analysis involves the extraction of “solution clues”. The structuring then becomes more of an act of problem solving translating those clues into realistic solution options. Issue processes have been found to be effective where a clear understanding of the true problem exists (Nutt, 1993a). However if this is not the case then solutions might be found to symptoms of the problem rather than the problem itself.
- **Objective-Directed Processes:** Processes of this type involve the predefining of goals, aims or objectives so that they can be used to guide the structuring process. An objective-directed process might be an expensive process in that often a large number or conflicting objectives exist thereby inhibiting the decision-makers ability to find a solution. It is likely that a result of such a process might be the formulation of an “acceptable” solution.
- **Reframing Processes:** This process type involves the decision-maker providing justification of the need for the decision by presenting solutions and/or problems in a way that provides the greatest evidence. Nutt’s study found that while this type of structuring was observed least, it was found to have the greatest level of success.

In relating the method of structuring to the success of a decision, Nutt was able to report that success decreases when preconceived ideas were used, i.e. Idea Processes. It was also found that success was negatively influenced by the existence of problem solving actions, i.e. Issue Processes. Conversely, those decisions that contained a level of reframing were found to be successful, as were those processes in which objectives were present to guide the identification of potential solutions. Interestingly, the relationship between the use of a particular mode of structuring and the observed success of that mode was an inverse relationship. In general those processes which were problem focused

were less effective than those that were objective or solution focused (Nutt, 1993a). The introduction of the objectives hierarchy (for early examples see Manheim and Hall, 1967; MacCrimmon, 1969; Raiffa, 1969) has been a development in this area.

The product of the work conducted by Nutt is the most significant in presenting the structuring behaviour within organisations. Not only does it classify generic types of behaviour, it provides an assessment of the relative effectiveness of each in terms of ensuring success of the implemented decision. Nutt provides suggestions of several ways in which the results of study might be incorporated into existing decision-making theory in order to provide better prescription (better prescription resulting in better decisions however that might be measured). An example of this might include placing greater emphasis on reframing (Section 2.17). This would allow a decision to be exposed to a greater variety of ideas in a form that stakeholders of the decision might appreciate (Nutt, 1993a). However, one obvious deficiency involves the identification of those influences that cause decision-makers to act, as observed by Nutt - or more importantly how those variables which produce the less optimal structuring behaviour might be dealt with so as to facilitate the development and use of additional decision-making techniques. The field of decision-making is replete with prescriptive decision-making methods of one sort or another -the literature which describes their significant level of non-use is almost as large. Given this low level of usage, any action, which might facilitate the use of prescriptive decision-making techniques, is of as much value as the technique itself.

In focusing on the problem structuring of planners and designers, Lewin (1951) and Hinton (1968) identified four factors that contribute to the amount of time a decision-maker can contribute to the structuring of the problem:

1. The complexity of the problem
2. Capabilities and or experience of the decision-maker
3. The environment of the decision

4. The structuring process used.

Pidd and Woolley (1980a) warn about the practice of attempting to “define and describe any part of an investigative process. (p.1063). Their warning relates to the over simplification and/or complication of processes which results in a description which is easy to understand, yet is not helpful as the basis for practice.

Pidd and Woolley (1980a) describe four “streams” of problem structuring based upon existing literature.

1. **The checklist stream:** this approach usually appears in the form of a list of questions which the decision-maker attempts to answer.
2. **The definition stream:** a process of identifying the elements of the problem e.g., objectives, alternatives etc.
3. **The science/research stream:** suggests that problem structuring involves gaining an understanding of the problem and its situation mainly by gathering quantitative data etc.
4. **The people stream:** the opposite to (3), this approach involves assessing the intangible, interpersonal, and organisational aspects of a problem situation.

However Pidd and Woolley (1980b) found that none of the methods presented in the literature accurately described what they later observed in practice. Their observations uncovered a process (the exploration approach) where elements of problem structure were continuously and iteratively explored and refined until an acceptable structure had emerged.

“Few attempts have been made to study the critical first stages of problem solving, that is, the process by which alternative views or definitions of a problem are generated or selected for further consideration in arriving at a formulation of the problem” (Lyles and Mitroff, 1980). Similarly, studies which have focused on unstructured organisational decision-making and in particular

the structuring processes employed, have been conspicuous by their absence (Pounds, 1969; Lyles and Mitroff, 1980; Witte, 1972).

In a study of the role the individual plays in the problem structuring process, Herden and Lyles (1979) found that the initial view of the problem and the decision style of the decision-maker affect the type of information they sought about the problem.

Lyles (1981) concluded, "...it appears that the individual's attitudes, values, cognitive style, and job characteristics will affect the way the individual defines the nature of the problem" (p.63). She analysed thirty three case histories of problem formulation and concluded that these processes often continue for a significant period of time. It was also found that in many cases, problem formulation activities had been ineffectual and have resulted in incorrect problem definitions. In other cases, problem formulation was often avoided.

The processes were found to be (out of necessity) cyclical in nature. Seventy five percent were identified as reaching conclusion but then being re-initiated as result of the problem being poorly defined.

Levin and Jasper (1995) present a problem structuring technique that "combines elements of traditional process tracing methods and methods designed to study the pre-screening of choice options and the formulation of consideration sets (p.1). Called Phased Narrowing, this technique being one of many designed to study the cognitive processes underlying multiattribute choice. Levin and Jasper (1995) used Phased Narrowing to examine the processes employed by 100 subjects in structuring the alternatives of a typical consumer choice decision.

Gettys *et al.*, (1987) conducted two experiments exploring the way decision-makers generated actions for ill-defined decision problems. The second experiment replicated the first, except that more directive instructions were given. It was found that the quality of generated actions (alternatives) was the same for the two experiments, and that overall the quality of actions was poor (compared to those of perceived experts). Gettys *et al.*, described the actions

produced as being “...less complete than would be desirable for decision analysis...” (p. 43).

One of the richest areas of problem structuring research is concerned with the decomposition and description of the steps contained within the structuring process. However, “Attempting to describe any part of an investigative process is fraught with danger. There is a great risk of over-simplification which produces a description that is easy to understand yet is not helpful as a basis for practice. At the other extreme there is a danger of over-complication in an attempt to capture the richness of the variety of what goes on in practice.” (Pidd and Woolley, 1980a, p.1063). Many in the field however, present rather simplistic views of what the problem structuring process contains, and what we should expect from it.

2.12 THE PROBLEM STRUCTURING PROCESS: A SYNTHESIS

In Section 2.9 the numerous definitions of decision problem structuring appearing in the literature were presented.

Sections 2.3.1 and 2.3.2 described the contrasting descriptions of ill and well-structured decision problems. This provides the basis of a new definition of problem structuring. To determine whether a decision contains the necessary structure, the decision-maker must have an understanding of the state the decision must be in before the subsequent analyses occur, which lead to a completed decision.

Problem structuring is concerned with the activities contained within the design phase of Simon’s model; the need for a decision has been identified and that need must be transformed into a form where a choice might be made. It is unlikely that the decision-maker will have determined the manner by which the choice will be made following the structuring process, so the methods employed are often determined by the nature of the decision problem and by the

structuring approach taken by the decision-maker. Davis and Cosenza (1993) present a more detailed but not dissimilar model of decision-making. Presented in Figure 2-7 this model emphasises the dominance of structuring activities within the decision process.

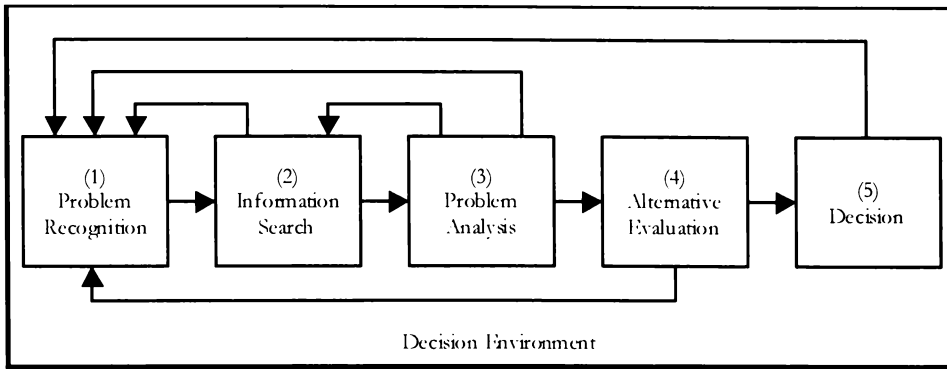


Figure 2-7 Davis and Cosenza's (1993) Model of the Decision Process

Stages two, three and four of Davis and Cosenza's model relate to this study. Information Search involves the collection of all necessary information and put "...into a format that is conducive to analysis of the problem at hand" (Davis and Cosenza, 1993, p.7). Problem Analysis is about identifying areas of concern and identifying any further information requirements. By the end of the analysis, the decision-maker should have a complete understanding of the problem. Possible courses of action are identified and evaluated with the Alternative Evaluation stage. It is essentially about preparing alternatives so that in the next stage, one of the alternatives might be chosen.

Figure 2-8 presents Arbel and Tong's (1982) representation of the entire decision-making process. Steps 2-4 focus on structuring.

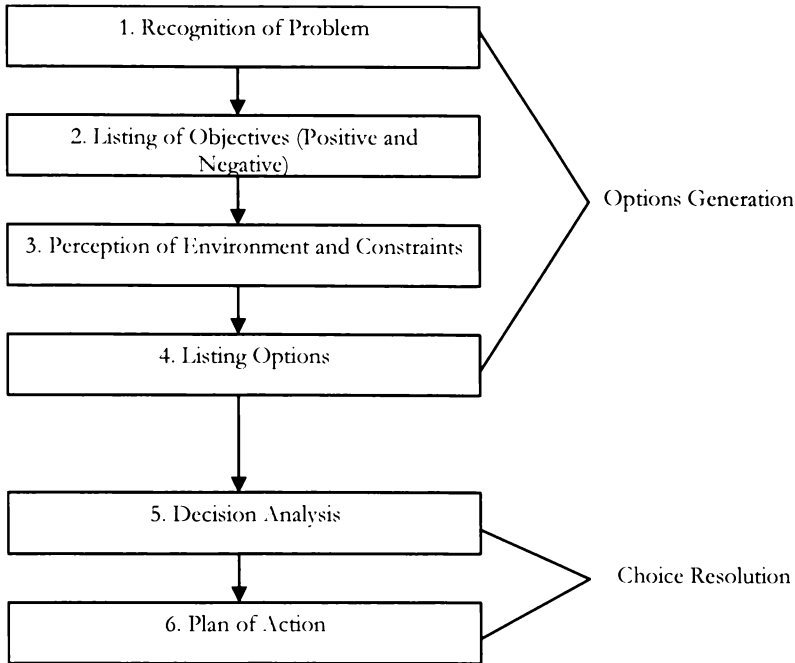


Figure 2-8 Arbel and Tong's (1982) description of the decision-making process with emphasis on the generation of option (alternatives).

Arbel and Tong's (1982) focus is on the generation of alternatives and subsequently the structuring process ends with that activity. However, like Churchman, *et al.*, (1960) this model also views the process as being sequential, which is intentional given that the intended application is Decision Analysis, which like the majority of prescriptive approaches, assumes sequentiality of process. It does however add value to the wider understanding of problem structuring.

Having recognised that a decision problem does indeed exist (step one) the structuring phase begins. The objectives of the decision are first outlined so as to outline the initial scope of the problem. This scope is further defined through the examination of the decision environment and likely decision constraints (step three). Finally the options (alternatives) are identified.

While only intended to provide a synopsis of the decision-making process, the expansive process of searching for and identifying suitable alternatives is made to appear overly straightforward. This process not only involves searching for potential alternatives, it also involves the evaluation of these in relation to the previously identified objectives and constraints.

The identification of the “real” decision problem is an activity given little attention in the descriptions of the structuring process. It is typically assumed that not only has the problem been identified, but is in a “choice ready” form. However, as stated earlier, “no decision comes preformatted” (Mintzberg, *et al.*, 1976, p.256). The general view taken in this research is that although problem structuring is not generally a sequential process, there are sequential elements within; activities that must be completed before the next stage might proceed. “The process of structuring a decision problem is dynamic and cyclical; as additional problem elements and their interactions continue to be discovered, the preliminary structure is repeatedly modified” (Keller and Ho, 1988). The accurate identification or “finding” of the decision problem is such an activity.

Mintzberg *et al.*, (1976) developed one of the first so called “process models”. Its overall design was based upon a refinement of Simon’s three phase trichotomy. This refinement began by giving the three phases new names, Identification, Development and Selection. Mintzberg *et al.* (1976) reduced these even further into a number of decision processes. The output of their work was a structure of “unstructured” decision processes that comprised 12 elements, three central phases, three sets of supporting routines, and six sets of dynamic factors. They developed a general model that is displayed in Figure 2-9.

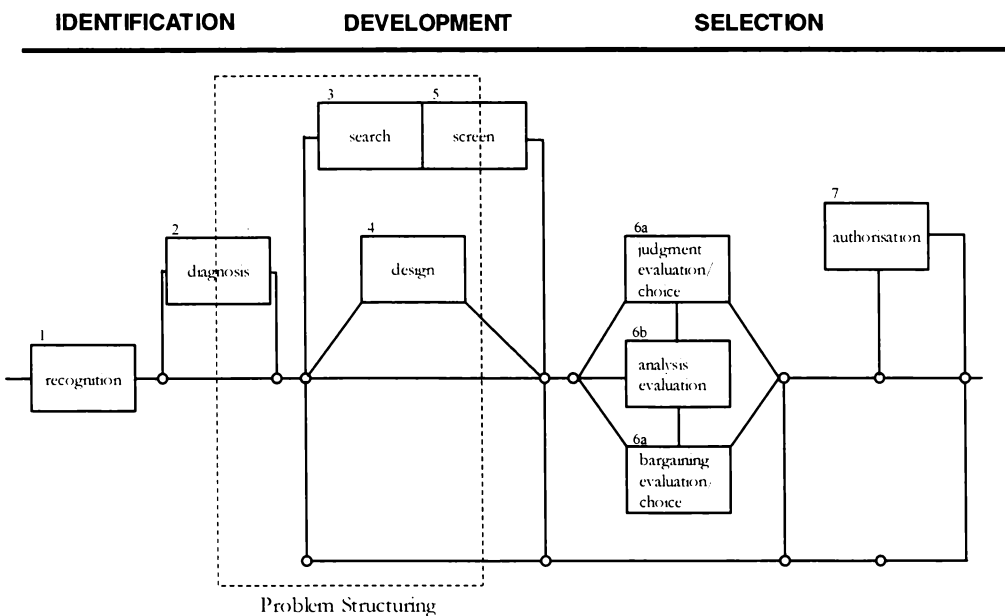


Figure 2-9 Model of decision processes (Mintzberg *et al.*, 1976)

Mintzberg *et al.*, (1976) present a process model of the entire decision-making process that contains a structuring element within it. The model contains three major phases and seven sub-routines. The three phases are generally similar to those proposed by Simon (1960). Phase one, named the identification phase contains two of the seven routines: decision recognition and diagnosis. Decision recognition involves the identification of opportunities, problems or crises, i.e. the cues that suggest the need for a decision, whereas diagnosis takes this a step further and involves the collection of relevant information and the more accurate definition of the problem. Phase two, the development phase, also contains two subroutines: search and design. The search subroutine looks for ready made solutions that might adequately solve the problem, while conversely, design involves the development of new alternatives. Phase three, the selection phase, can be compared with Simon's choice phase. In essence, phases one (apart from recognition) and two contain Mintzberg *et al.*'s, description of the structuring process. The screening¹¹ aspect of the selection phase might also be considered as contributing to the decision structuring. The major difference between the Mintzberg model and sequential structuring models, is its search routine. Up to this point, it has been assumed that the decision being structured is distinct from any other decision seen before. The search routine is invoked to find ready made solutions. If such a solution does exist, then the need for a complete design or structuring phase is often removed. This is similar to Klein's (1989) choice model where previous decisions are compared before new solutions are sought.

Pounds (1969) focused on the first major step in the decision structuring process, namely, Problem finding. It assumes that the true problem has not been found, but merely symptoms of it have been observed. He suggests that problem finding contains three stages:

1. A conceptual model of the operations significant to the problem domain is developed. This model is used as the basis for problem finding and the making of outcome predictions.

¹¹ Reducing alternatives (if required) such that a workable number exist.

2. The model developed in (1) and the associated outcome predictions are compared with reality.
3. Differences that emerge from (2) are transformed into a problem.

Lyles and Mitroff (1980) describe problem finding (which they term “formulation”) as one which occurs over a period of time involving the identification of a problem, identifying the factors which have contributed to that problem and finally reaching a definition of that problem. This description has parallels with that contained within Goldratt’s Theory of Constraints (TOC) thinking processes (Goldratt, 1994).

Schwenk and Thomas (1983) suggest two key parts of the decision structuring process are problem recognition and problem diagnosis. Problem recognition they state “can be facilitated by the identification of signals such as lost profit or by tracking a series of prior events in order to provide an insight as to how the problem arose” (p.239). They suggest problem diagnosis is achieved by the specification of the organisational context of the problem, by the identification of key uncertain variables and by the generation of feasible alternatives for problem solution. “Often these processes are missing links in the effective application of formal decision models” (Schwenk and Thomas, 1983, p.239).

In addition, Schwenk and Thomas (1983) also present a four-stage model of decision structuring. Although the model indicates a sequential process, the authors, unlike most others, state that at any stage the decisional activity might cycle back to a previous stage.

1. Gap identification/ problem recognition.
2. Problem diagnosis/ formulation.
3. Alternative generation.
4. Alternative selection.

Although not explicitly stated, one would presume that phase two would contain such activities as the identification of constraints, objectives, criteria, attributes, and the likely choice methodology employed as part of phase four. Clearly the effort required in completing phase two is likely to significantly exceed that in preceding or subsequent phases.

Smith (1989) proposes a process-based model of the decision-making or problem solving process (see Figure 2-10) where the structuring element is based upon a “process conceptualisation” (see Section 2.3) for explanation. He describes problem structuring as being the final phase of the problem formulation process. Interestingly, neither contains the alternative generation process.

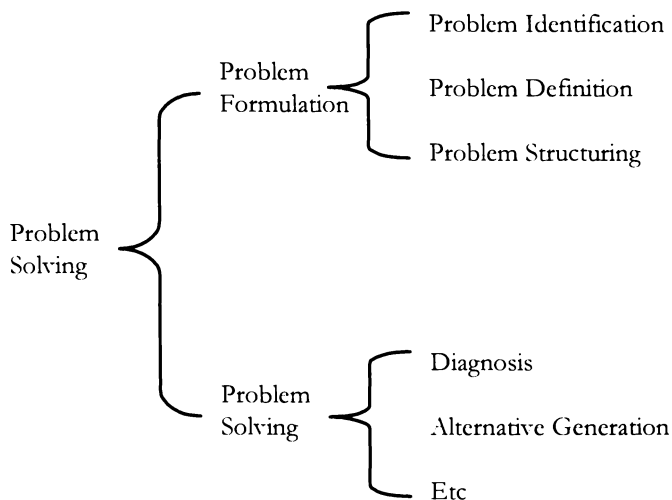


Figure 2-10 Smith's (1989) Model of the Decision-making Process

Smith (1989) describes the formulation phase as:

“Problem solving begins with the perception of stimuli, interpreted as evidence of a problem’s existence, which arouse concern. The identification phase cumulates with one’s belief that a problem exists, a belief leading naturally to the definition stage. Here one attempts to specify the problem, to represent it to oneself and others. This is a conceptual process, problems being constructs, largely underdetermined by available information. Once defined, a problem can be structured, readied for solution. The structuring phase has the solver address the problem of deciding how to go about solving the original problem. It involves instrumental, means-ends, reasoning, identifying major tasks toward solution and likely means of discharging these tasks” (p. 965)

This process as it is described, has the potential for being flawed, especially in developing type III errors¹², i.e. wrong definition and subsequently the solving of the wrong problem. It also undervalues the alternative generation process and fails to give consideration to the subsequent choice process (in decision-making). Thus it does not describe a process that is either generic, or flexible with respect to various evaluation strategies.

Typically, problem structuring is preceded by some form of problem situation. Lyles (1981) describes the problem situation as being “the point of problem sensing when a person first recognises that a problem exists” (p.62). The next stage described by Lyles involves the process of conceptualisation. This involves determining, in broad terms, what the variables of the problem are. Once the conceptual model has been developed, Lyles posits that the decision-maker develops a scientific model and subsequently uses that model to come about a solution.

Many in the field however, present rather simplistic views of what the problem structuring process contains, and what we should expect from it. This partly reflects their ‘frames’ of problem structuring as many such frames are based on limited understanding of the process and its importance in the overall decision-making process. It is often viewed as little more than the creation of a set of alternatives. Some, however, do recognise the scale of problem structuring:

- “The structuring of decision problems typically involves specifying the decision objectives, generating the set of decision options and identifying the consequences associated with these options” (Farquhar and Pratkanis, 1993, p. 1218).
- “In structuring a problem, the decision-maker constrains the problem space by identifying properties such as objectives, the problem context, and alternative options. The process of structuring proceeds in stages, such that constraints identified in the early stages influence the range of

¹² Also known as ‘errors of the third kind’, involves the incorrect identification of the problem and a subsequent treatment of the wrong problem (Clemen, 1990; Raiffa, 1968).

acceptable options that are identified later” (Butler and Scherer, 1997, p.185).

- Although decision-makers often begin to solve a problem by immediately identifying options, a common prescription is that objectives should be identified prior to options to ensure that the options are based on values (Keeney, 1992).

Dutton *et al.*, (1983) discuss the term: Strategic Issue Diagnosis (SID) as a means of describing the problem structuring process. “Strategic decision-makers in organisations are constantly bombarded by an array of ambiguities, data and vaguely felt stimuli which they must somehow order, explicate and imbue with meaning. SID refers to those activities and processes by which data and stimuli are translated into focused issues (i.e., attention getting acts) and the issues explored (i.e., acts of interpretation)” (Dutton *et al.*, 1983, p.307-308).

Lyles and Mitroff (1980) utilised Churchman’s (1971) concepts of systems and grounded theory to describe the problem formulation process. Four types were identified and are given the names used by Churchman.

Leibnizian: A single “believed-to-be ‘optimal’” formulation of the problem, followed by the collecting of data to support this single view.

Lockean: Data collected about the existence of a problem, followed by attempts to arrive at a single formulation of the problem based on the data and/or expert consensus.

Kantian: Several views held about the kind of problem, then efforts made to combine these views.

Hegelian: Has two diametrically opposing views held of the problem, but there is strong debate.

Corner *et al.*, (2001), through a synthesis of empirical descriptive observations and theory-based prescription, describe the process of problem structuring in terms of the interaction between criteria and alternatives. This is described as

being an iterative process of considering potential alternatives (alternative focused thinking) and criteria (value focused thinking – identifying some gap in criteria or values). This process progresses the decision from the state of problem recognition to one suitable for choice.

The purpose of this section has been to present a synthesised definition of decision problem structuring that uses the previous descriptions of ill and well-structured decisions as boundaries of the structuring process; i.e. an ill-structured decision problem is structured such that it becomes well-structured. Problem structuring can now be defined as:

The process by which a decision situation is transformed into a form enabling choice.

Based loosely on the development process described by Weick (1979), this definition characterizes problem structuring as a sub-part of Simon's design phase. The decision has been identified; its need has been verified and the true decision is recognised and understood. The clear problem definition is then processed, in whatever way the decision-maker deems suitable or necessary. The nature of this process might be influenced by the context of the decision including any constraints that might be present or the cognitive influence of the decision-maker. It might also be influenced by the way in which subsequent choice processing is required to occur. The structuring process is deemed to have ended once the decision is in a form such that all required information has been collected and that a choice can be made. Even when an informal and ad-hoc process is employed, such processing (albeit unconsciously) still occurs. The strength of this definition lies in its ease of understanding and wide application. It is also discipline independent. This ease of understanding, however, might also be perceived as a weakness, particularly by those who desire a step-by-step detailed process-based description. Attempting this would only succeed in reducing the application of the definition.

Based upon the various problem structuring process outlined within this section, and the empirical work presented in section 2.11, some common decision problem structuring activities can now be identified. The following activities form part of the decision problem structuring process:

Problem decomposition is often one of the first activities to occur and involves the breaking down of the problem into workable, perhaps measurable components. It also defines how and when other structuring activities might be carried out. For example, identifying the attributes of the problem will instigate the development of the decision objectives or the gathering of information. Problem decomposition may alternatively be referred to as: problem analysis (Davis and Consenza, 1993), diagnosis (Mintzberg, *et al.*, 1976; Schwenk and Thomas, 1983), problem definition (Smith, 1989), or conceptualisation (Lyles, 1981).

Information gathering occurs both consciously and unconsciously, and is likely to take place throughout the process, although is most present at the start of the process (e.g. Davis and Consenza, 1993). It can involve gathering information from external sources or from the decision-maker. It is also necessary in the development of objectives and alternatives.

Objectives definition is a preliminary step in the decision problem structuring process (e.g. Arbel and Tong, 1982) and is guided by the decomposition. The defining of decision objectives in effect, sets the scope of the decision, and is the principle guide in identifying relevant alternatives.

Alternatives definition is generally the final stage in the process of structuring the decision problem. It is based upon the defined objectives and is facilitated by the information gathered. This is probably the most recognised decision problem structuring activity, being included in most, if not all, of the conceptualisations presented in the literature. It is termed design, by Mintzberg *et al.*, 1976).

Identification of consequences is not an activity that is presented explicitly by any of the authors appearing in this section, but appears inherent in the iterations

that may exist between the defining of objectives and alternatives. Off-the-shelf process types (Nutt, 1984) and objective-directed processes (Nutt, 1993a) appear to have an underlying focus on the likely outcome (consequence) of the generated alternatives.

2.13 DECISION PROBLEM STRUCTURING AND PRESCRIPTION

The overriding goal of this research, as has been outlined on several occasions, is to make a contribution to the understanding of unaided decision problem structuring so that prescription may be enhanced. The literature is replete with offerings as to why prescriptive method usage is low; this study, through the understanding of unaided behaviour, is an attempt to add further light on this, and contribute to the enhanced understanding of decision problem structuring.

Given the dominance of prescription in the decision problem structuring literature, it is necessary to give consideration to the most relevant methods, when attempting to gain the understanding mentioned above. Given the descriptive, process, focus of this research, issues of prescription are not discussed in detail. It is, however, important to give consideration to the many prescriptive decision-making approaches that include the structuring of decision problems within their methodologies.

Sections 2.11 and 2.12 present what is most widely known about the decision problem structuring process; in particular unaided behaviour. Given the definition and description of problem structuring presented in section 2.12, we can assume that the process of problem structuring begins once the decision problem has been recognised; and it is the manner of this recognition that is likely to have the greatest influence on the structuring process. Furthermore, and again based on the material presented to date, it can be proposed that any decision problem structuring process, whether descriptive or prescriptive¹³, will

¹³ While normative decision making has been previously discussed, it is assumed that the normatively based methods presented, are, in fact, more characteristic of prescription.

include a variety of structuring activities. These activities, as summarised in section 2.12, are: problem decomposition, information gathering, objectives definition, alternatives definition and, identification of consequences.

Following a review of relevant prescriptive approaches, this list can be developed further. Prescriptive approaches often elicit information specifically from the decision-maker(s) in the form of preferences. This activity occurs in addition to the gathering of general information (not based upon the preferences of any decision-maker).

Table 2-1, Table 2-2 and, Table 2-3 present synopses of three groups of prescriptive approaches that address problem structuring. Although this is not a complete list, with only a brief explanation of the approaches; it contains many important and useful methods. Moreover, it is representative of prescription as a whole. The first collection of approaches (Table 2-1) focus solely on all or part of the problem structuring aspects of the decision-making process. The second group (Table 2-2) comprise several of the most widely used decision-making/problem solving approaches. The approaches also give consideration to the structuring of the decision process. The third group (Table 2-3) contains a collection of tools presented in the literature as problem structuring methods. The primary focus of this third cluster is the management of decision problems within a group setting. Moreover, they are primarily used for managing consensus building and negotiation.

Groups one and two are presented due to their popularity and obvious relevance to the context of individual decision problem structuring. The final group, being group-based, are unlikely to of any direct relevance to this study. However, they cannot be simply disregarded off-hand without first deconstructing them to identify the actual structuring processes they contain. Moreover, it is this latter group that is most widely presented in the literature as problem structuring prescription.

Each of the three tables is structured as follows. Within each group, the prescriptive approaches are briefly summarised. Many of these approaches are complex and so the reader is advised to consult relevant prescriptive literature

for a complete description. In the remainder of each table, the identified problem structuring activities, as summarised in section 2.12 and further developed in this section, are listed. Each approach is then subjectively assessed on it's inclusion of each of these activities.

Decision-making Tool	Synopsis	Problem Structuring Activities						
		Problem Decomposition	Information Gathering	Objectives Definition	Alternative Generation	Method Determination	Consequence Identification	Preference Elicitation
Cognitive Mapping	A diagrammatic model designed to represent the way in which a person defines an issue. It is presented as a network of statements, expressing ideas, means and ends, linked together by arrows indicating the directions of the connections between the statements. (Eden, 1989; Daellenbach and Flood, 2002).	✓	✓		✓			
Fishbone Diagrams	Also called <u>cause-and-effect</u> or <u>ishikawa</u> diagrams, these diagramming tools attempt to identify causes of certain effects or problems. The central spine or bone of the diagram has connected to it, several branches that represent the categories of causes. (Daellenbach and Flood, 2002)	✓	✓					
Rich Pictures	Cartoon like representations of a problem situation. Typically include: (1) elements of structure, things that are static or stable, (2) processes, things which are dynamic or changing, (3) relationships between these. Forms the “finding out” part of the Soft Systems Methodology (SSM) (Daellenbach and Flood, 2002, Checkland, 2001)	✓	✓					
Simulation	The process of carrying out an initial, trial, implementation of a system within an artificial environment so as to assess the likely effects, and make adjustments, as seen appropriate. Simulation is often carried out with the use of powerful computing technology (Harrison, 1999)	✓	✓	✓		✓	✓	
Theory of Constraints (TOC)	An approach to solving/structuring problems that focuses on addressing key performance inhibiting constraints. An important aspect of TOC is its thinking processes which comprise 5 tools that help the decision-maker manage change. They are: (1) the current reality tree, (2) the evaporating cloud, (3) the future reality tree, (4) a pre-requisite tree, (5) the transition tree. These tools can be used either collectively or individually. (Mabin and Balderstone, 2000; Daellenbach and Flood, 2002)	✓	✓	✓	✓	✓	✓	

Table 2-1 Prescriptive Problem Structuring Methods

Decision-making Tool	Synopsis	Problem Structuring Activities						
		Problem Decomposition	Information Gathering	Objectives Definition	Alternative Generation	Method Determination	Consequence Identification	Preference Elicitation
Analytic Hierarchy Process (AHP)	A multicriteria decision method for identifying the alternative that best addresses a series of conflicting objectives. Its 4 steps comprise: (1) structuring objectives and alternatives into a hierarchy, (2) objectives and attributes are compared, (3) objectives are weighted and alternatives scored based on those weights, (4) alternatives are ranked. (Saaty 1980)	✓	✓	✓	✓	✓	✓	✓
Decision Analysis (DA)	Is concerned with making a choice from a range of alternatives, based upon given criteria, for which uncertainly exists about the possible outcomes. In comprises 5 main steps: (1) problem identification, (2) objective and alternative identification, (3) model decomposition, (4) choice, (5) sensitivity analysis (Clemen, 1990). Tools often used in the structuring of DA decisions include: decision trees, objectives hierarchy, influence diagrams and, the strategy selection table (Corner and Corner, 1995).	✓	✓	✓	✓	✓	✓	✓
Linear Programming (LP)	Addresses linear optimization problems with constraints relating to, for example, available resources, output requirements, quality standards, relationships between variables etc.	✓	✓	✓	✓	✓	✓	✓
Multiattribute Utility Analysis (MAUA)	An extension of single-attribute utility analysis used in decision analysis (DA). Used to address problems involving more than one objective/attribute (Daellenbach and Flood, 2002).	✓	✓	✓	✓	✓	✓	✓

Table 2-2 Prescriptive Decision Methods Comprising Structuring Elements

Decision-making Tool	Synopsis	Problem Structuring Activities						
		Problem Decomposition	Information Gathering	Objectives Definition	Alternative Generation	Method Determination	Consequence Identification	Preference Elicitation
Drama Theory	An extension of game theory, this method attempts to make sense of the actions of multiple participants with different aspirations, motives, opportunities and alternatives. It focuses on the way in which the actors interact with others (Daellenbach and Flood, 2002).	✓	✓	✓	✓			✓
Game Theory	Based upon decision analysis (D.A), this method is concerned with conflict that may occur between two or more individuals. All strategies of all individuals are made known to others such that complete information is held by all. Each person can then choose between the alternative course of action where the final outcome depends on the actions taken by all (Owen, 1982; Daellenbach and Flood, 2002)	✓	✓	✓	✓			✓
Hypergame Analysis	For dealing with “wicked”, “complex” or “messy” decision problems involving multiple parties, each with some stake in the outcome and some power to affect what happens. Hypergame Analysis is often employed in situations of conflict (Bennett <i>et al.</i> , 1989; Rosenhead, 1996).	✓	✓	✓				✓
Interactive Planning	Attempts to develop a desirable future through the generation of scenarios and actions for achieving them. Includes 6 steps: (1) formulation of the mess, (2) ends planning, (3) means planning, (4) resource planning, (5) implementation, (6) controls (Rosenhead, 1996; Ackoff, 1979; Daellenbach and Flood, 2002)	✓	✓	✓		✓	✓	✓
Metagame Analysis	Is a rational approach based upon game theory and is used principally for analysing the processes of conflict or co-operation between multiple “actors”. It is not so much a tool for making a decision, but instead is used to collect the various decision options, as perceived by the multiple actors, such that a decisional framework can be presented to the entire group (Howard, 1989).	✓	✓	✓	✓			✓
Robustness Analysis	An interactive process that involves comparing current alternatives with likely future outcomes that enables the flexibility of the alternatives to be assessed. Comprises three stages: (1) identifying alternative environments, (2) generating configurations of future conditions based upon those environments, (3) evaluate the performance of each configuration in each future. (Rosenhead, 2001, Daellenbach and Flood, 2002)	✓	✓	✓	✓		✓	✓

Soft Systems Methodology (SSM)	Soft Systems Methodology is a process where participants develop idealised conceptual models for comparison with their perception of the present system in determining what might be both feasible and acceptable. It comprises 7 stages: (1) enter situation considered problematic, (2) express the problem situation, (3) formulate the root definitions of relevant systems of purposeful activity, (4) build conceptual models of the systems named in the root directory, (5) compare models with real world actions, (6) define possible changes which are feasible, (7) take action to improve situation. (Checkland, 1995)	✓	✓	✓	✓		✓	✓
Strategic Assumption Surfacing and Testing (SAST)	A multiple participant problem structuring method with four stages: (1) group formation, (2) assumption surfacing, (3) dialectic debate, (4) synthesis. The process involves forming smaller sub-groups in which the task of each sub-group is to produce a “desired strategy” including the assumptions on which it is based. The entire group then reforms and attempts to establish agreement based on these fewer strategies (Mason and Mitroff, 1979, 1981; Daellenbach and Flood, 2002)	✓	✓	✓	✓		✓	✓
Strategic Choice Approach	An organisational “planning approach” intended for use by multiple participants in face-to-face decision-making situations. It incorporates the four main “modes” of: (1) shaping, (2) designing, (3) comparing, (4) choosing. These modes are used iteratively, switching from one to another as the process progresses (Friend, 1989; Daellenbach and Flood, 2002).	✓	✓	✓	✓		✓	✓
Strategic Option Development and Analysis (SODA)	A group decision support tool used to structure the perceptions of each of the group members. This occurs initially, through a series of semi-structured interviews. Results of these interviews are then transformed into cognitive maps. Through comparison of these individual maps, clusters or groups of participants with similar perceptions are identified. The clusters of perceptions are then reported back to the entire decision-making group so that a broad understanding of all perceptions is achieved (Eden, 1989).	✓	✓	✓				✓

Table 2-3 Prescriptive, Group-Based, Problem Structuring Methods

2.13.1 ANALYSIS OF TABLE 2-1

The first three methods (cognitive mapping, fishbone diagrams and rich pictures) in Table 2-1 all attempt to establish an understanding of the decision problem. They all make use of simple diagrams to establish a visual representation of the problem. The primary activities therefore are the decomposition of the problem and the gathering of information. The decomposition involves identifying the relevant components of the decision problem, whereas the gathering of information is an implicate process (both conscious and unconscious) that assists with that decomposition. Cognitive mapping (at least) may help in the identification of possible course of action (alternatives).

It is likely that simulation contains all of the identified problem structuring activities, however only those highlighted in Table 2-1 are thought to be central to the approach, in terms of structuring. The most characteristic element of simulation is its ability to identify the likely consequences of a given course of action. This is particularly valuable in decisions with large degrees of risk.

Theory of Constraints (TOC) is more than just a problem structuring method; it is a complete problem solving/decision-making methodology. The TOC approach addresses inherent constraints in an organisation. These constraints can be of two forms: physical or non-physical. In the case of physical constraints, the five focusing steps (outlined below) are employed. When the constraint is of a non-physical nature, the thinking process tools (summarised in Table 2-1) are used. All of the decision problem structuring activities identified in 2.12 are incorporated into the TOC approach, in some form.

The five focusing steps of the TOC are also highly relevant to the structuring process. They are: (1) identify the constraints, (2) decide how to exploit the constraint, (3) subordinate and synchronise everything to the above decision, (4) elevate the performance of the constraint, (5) if the constraint is broken, or has shifted, return to step one (Burton-Houle, 2001).

Understanding the present situation or the decision problem is encapsulated by the current reality tree thereby carrying out the problem decomposition,

information gathering and preference elicitation activities. It also contributes to the determination of the method of problem solving/decision-making that will follow. The evaporating cloud or conflict resolution diagram deals with the defining of objectives and alternatives activities. The future reality tree carries out what-if analyses in identifying the consequences of a particular action or solution as a means of identifying the possible consequences of certain scenarios. The prerequisite tree allows the intermediate steps required in achieving a given solution to be decomposed and identified. Finally, the transition tree is concerned with the process required to achieve the stated objectives, based upon the present state.

2.13.2 ANALYSIS OF TABLE 2-2

The methods presented in Table 2-2 are conceptually similar, so are discussed collectively. All of the methods are intended for solving the entire decision problem, not just the structuring of it. A number of the techniques are commonly referred to as multicriteria decision-making (MCDM).

The common characteristic of all of these methods is that they attempt to achieve several, often conflicting, incommensurable objectives (Daellenbach and Flood, 2002). In terms of the previously identified problem structuring activities, these methods contain them all. The problem is decomposed so that objectives/alternatives can be individually addressed. Information is gathered to assist with the development of this. In choosing a particular method, the complete problem solving/decision-making approach has already been inherently determined – so this is not consciously considered. Part of the assessment/evaluation of each alternative is based upon the likely consequences of its implementation. Finally, in assigning weights to the objectives and assessing the alternatives against these, the preferences of the decision maker are obtained.

2.13.3 ANALYSIS OF TABLE 2–3

The problem structuring methods presented in Table 2-3 are a specific set, with a strong group focus. They are often described as being examples of “Soft OR”, (e.g. Connell, 2001). They are defined as “the broad group of problem handling approaches whose purpose is to assist in structuring problems rather than directly solving them” (Rosenhead, 1996, p.117), and many have been in existence since the mid 1960s.

In terms of the previously identified decision problem structuring activities (section 2.12), they all, in various forms, decompose the problem. Furthermore, they all take a specific, objectives focus. The uniqueness of these methods is demonstrated in the way that they collect information. Given their group nature, preferences or opinions are gathered and considered from a number of individuals. Most of the methods give consideration to alternatives, also some not explicitly. Some give specific attention to the consequences of these alternatives.

In the preface of his book “Rational Analysis for a Problematic World (1989), Rosenhead presents what this author believes to be an accurate summary of the most prominent methods presented in Table 2-3. He suggests that SODA and SSM focus on the identification of those factors and issues that should constitute the agenda for further discussion and analysis. He describes Strategic Choice and Robustness Analysis as tools for dealing with uncertainty, while Metagame and Hypergame Analysis are useful for managing the conflict that exists within group decision-making situations. All are described in the context of the group environment. This view is supported by Taket and White (1997).

2.13.4 SUMMARY

Based upon the problem structuring processes identified in section 2.12, the prescriptive methods do, on the face of it, support the structuring process. All of them contain the majority of the identified structuring activities. However, some differences do exist between these methods and the reported descriptive behaviour. Like decision making prescription in general, these methods all

impose a certain degree of structure on the decision process. Those which are multi-faceted (of which most are) are generally sequential in nature; and as such, are likely to be inflexible in response to changing decision conditions. Therefore, it is suggested at this preliminary stage, that the inherent structure of these prescriptive methods may limit their use by executives.

2.14 WHY STRUCTURE DECISION PROBLEMS?

An awareness of the activities that can be contained within a structuring process has now been achieved, along with the relationships between these activities, within both descriptive and prescriptive processes. Also, a reasonable understanding of the difference between a well-structured problem and an ill-structured problem should have been observed. It is now necessary to recognise the importance of this difference. Why should we be concerned with structuring decision problems?

One of the most important reasons for structuring decision problems is so that we can be sure that we are actually solving the real problem and not just the symptoms of it (or just the wrong problem altogether). Numerous authors have discussed the implications of solving the wrong problem along with prescribing methods to avoid such occurrences (e.g. Volkema, 1983, 1986; Pracht and Courtney, 1988; Mitroff, *et al.*, 1979; Schwenk and Cosier, 1980; Goldratt, 1990).

As previously noted, Mintzberg, *et al.*, (1976) suggests that “No decision comes preformatted” (p.254). Because of this, decision-makers must prepare the decision so that the “best¹⁴” decision can be made. The difficulty with this is that when faced with a decision, typically, we have little idea as to what form “best” might be and what process will contribute to the attainment of it. As a general rule however, “When faced with a decision problem, a person must create a structure for the problem prior to subsequent evaluation of different

¹⁴ Best, given the conditions imposed.

action options” (Keller and Ho, 1988, p.715). Simon’s (1960) model posits that structuring can only occur before the choice phase. It cannot be done in combination with choice based activities. One potential area for research might be in the development of structuring techniques that can be employed in conjunction or even simultaneously with methods of choice.

Ackoff (1979) demonstrates why problem structuring or formulation is important. He uses an example of problem structuring as a framing tool for a decision regarding an elevator. Users of a particular elevator are constantly waiting and thus becoming increasingly unhappy with the time they must spend in elevator foyers. If we view this problem in terms of the elevator itself, one structuring approach might involve developing objectives that contribute to decreasing the time users must spend waiting. This could be achieved by increasing the speed of the elevator, reducing the number of stops it makes (e.g. only on every second floor), or by introducing additional elevators (if possible). Alternatively, one could view the problem from a different perspective. Rather than focusing on the elevator itself, we could focus on the users of the elevator and attempt to take the users’ minds off their wait. Making the elevator foyer a more enjoyable place to be could be achieved by the installation of mirrors, artwork etc. This demonstrates the importance of developing clear objectives in the structuring process. The problem is that users are unhappy with the time they spend waiting for elevators. The logical solution would be to reduce that time, however this example shows how other solutions might exist. Clearly, the way we conceptualise the problem has a significant effect on the resulting solution to that problem (or perceived problem).

A number of authors have offered reasons as to why we should structure problems:

- So that “action alternatives” can be appropriately evaluated (Keller and Ho; 1988).
- “Structuring the attributes of a multiattribute hierarchy can have a profound impact on the outcome of the assessment process” (Adelman *et al.*, 1986, p.188).

- “When problems are less well defined, there are serious obstacles to overcome before a decision analysis can be used” (Pitz *et al.*, 1980, p.396).
- “Correctly posing a problem goes a long way toward solving it, yet solving has received more attention than posing” (Winkler, 1982, p.519).
- “Most situations do not possess a natural problem structure that readily characterises all the elements needed for a decision analysis” (Farquahar and Pratkanis, 1993, p.1214).
- “..in solving well-structured problems, the decision-maker is given a clear starting point, a clear finishing point, and appropriate rules or transformation for bridging the gap between these points. In ill-structured problems, most of the constraints are initially open; but, as the decision-maker proceeds to reformulate the problem, he begins to close the open constraints” (Taylor, 1974).
- Keeney (1988) describes the eliciting and structuring of decision objectives as a critical element of any problem. Not only does it define the output of any analysis, but is the explicit statement of “why anyone should care about the problem” (p.397).
- “Option generation is a critical link in the decision-making process, for the best decision cannot be made unless the best option is part of the option set” (Adelman *et al.*, 1995, p.54).

The difficulty in structuring, as described by Winkler (1982), “...is illustrated by the tendency of students in introductory to intermediate quantitative courses to have more trouble ‘setting-up’ a problem than solving the problem once it has been set up” (p. 519). This appears to be common in OR generally. The “setting up” of the problem is also considered the hard part since once this has been done the problem solution is generally straightforward. Gettys *et al.*, (1987) investigated the performance of decision-makers in the generation of actions in

an unaided environment. They concluded that “...unaided act¹⁵ generation performance resulted in substantially incomplete act structures” (p.43) and as a result, an increase in the emphasis placed on problem structuring was certainly warranted.

The justification for structuring decisions that is possibly the most representative of all is given by Schwenk and Thomas (1983). “The consultant or management scientist who concentrates only on the alternative selection phase of the process and does not help decision-makers to correctly formulate the problem and generate good alternatives for solving it might find himself helping them to solve the wrong problem or to choose the best from among several low quality alternatives” (p.242). Formal decision models typically begin with the assumption that the problem has been identified and stated (Schwenk and Thomas, 1983). They assume that the decision-maker has a good understanding of their values and preferences for the given problem and that objectives, criteria, alternatives and attributes have all been determined and that all the necessary information required for a simple choice exercise has been elicited. Methods however, that help in the preparation of such problems are few and their empirical support even less. Clearly guidance in this area is being asked for. Managers are interested in the correct specification of their decision problems and hence in highlighting the processes of problem recognition and diagnosis (Schwenk and Thomas, 1983). There are any number of decision methods that we can use given a completely structured decision problem, the challenge for researchers in this area, is the development of methods in which this structuring might successfully occur.

While many decision-makers claim to find decision-making to be an easy task, they often lack the ability to precisely identify the “true” problem and as a result end up treating the wrong problem (Clemen, 1990). One of the main results from developing a well-structured decision is the avoidance of type three errors. Not only do several problem structuring methods explicitly refer to the identification of the “true” problem as part of their process (e.g. Goldratt, 1994;

¹⁵ More commonly referred to as alternative

Arbel and Tong, 1982; von Winterfeldt, 1980; Pounds, 1969), but it is likely that the more structuring occurs, the greater the understanding of the decision problem and the greater likelihood of identifying type three errors.

2.15 INFLUENCES ON PROBLEM STRUCTURING

A key to understanding the decision problem structuring process of ‘real’ decision-makers is recognising those internal and external influences that cause decision-makers to behave as they do.

“Interesting real-world decision-making problems involve complexities associated with factors such as the number of uncertain events or variables, the number of attributes making up the outcomes, the number of available actions (including information purchasing actions), and the interrelationships among different decision-making problems (both in the static sense, at a given time, and in a dynamic sense, over time)” (Winkler, 1982, p.520).

“Problem structuring takes place within, and is constrained by, a problem-relevant field or ‘state-of-the-art’. Since problem structure depends on available knowledge of relevant domains, existing problem-solving techniques, and one’s basic cognitive capacities, structuring activities are limited by the present state-of-the-art. Over time, problems become structured, or structurable, through advances in the state-of-the-art” (Smith, 1988, p.1498).

Humphreys and Berkeley (1983) describe decision-making as occurring in an environment comprising both macro and micro level influences. At the macro level we must act within the social world we live in. This social world is made distinct by its combination of cultural and language characteristics. Family, the work environment, peers etc. typifies what are commonly described as micro level influences.

In terms of the choice phase of decision-making, four influences have been identified (Dillon, 1998). The size of the arrows shown in Figure 2-11 indicates the degree of influence each was found to have had on choice in local government decision-making.

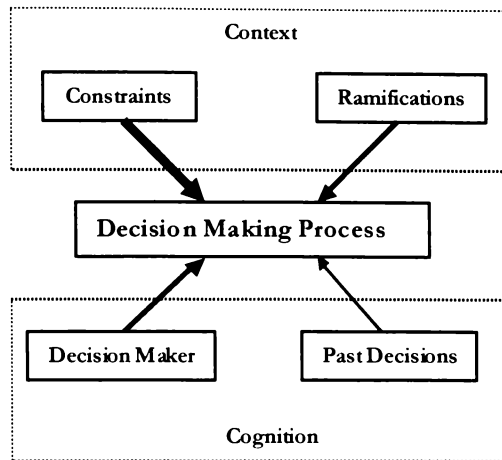


Figure 2-11 Decision Influences

There are, in general, two types of decision influence; those based on the context of the decision and those that are a by-product of the decision-maker’s cognitive abilities or limitations. Contextual influences encompass decision constraints, which are aspects of the environment that might limit the range of alternatives produced or the desired process to be employed. It also includes the ramifications or consequence of a decision; the effects (either good or bad) of the implementation of a chosen solution. Cognition relates to the involvement of the decision-maker and his or her cognitive abilities and experience.

The influence of past decisions is most probably a subset of the decision-maker influence. So from this, we can posit that decision-making influences (there is no reason to suggest that the problem structuring phase of decision-making attract differing influences) are of two types, and we term them here as the “Two C’s”, Context and Cognition.

2.15.1 CONTEXT

Constraints and ramifications are part of, and contribute to, the context of a decision. In an analysis of unaided choice processes, Dillon (1998) uncovered a number of constraints that influenced the process employed or reduced the range of available alternatives. The most predominant of these was time. On average, over all participants, time constraints made up twenty six percent of all constraints. Time constraints are the most common of any business constraint, and generally the most obvious to decision-makers. The next most common constraint was lack of information; resulting in the making of a decision with a greater level of uncertainty than was desired. Lack of information made up twenty two percent of the constraints identified. These constraints were followed, in order of significance by: Finance (20 percent), Legislation (15 percent), Community Pressure (10 percent), Staff Acceptance (5 percent) and Technology (2 percent) as shown in Figure 2-12.

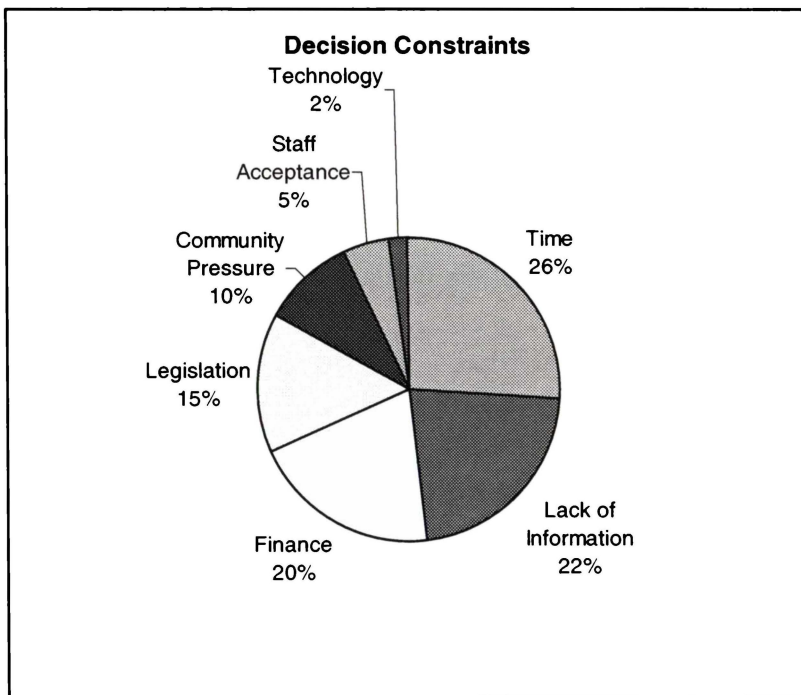


Figure 2-12 Decision Constraints in Managerial Choice (Dillon, 1998)

Contextual effects are best understood if they are viewed as being anything that influences the decision process yet is totally independent of the decision-maker; they will exist in the same form regardless of who is actually making the decision.

Time Constraints

Time is a significant issue in making decisions; decisions are often unable to be made in the most “efficient” manner simply because the time available does not permit that to occur (McConnell, 2000). As well as the obvious impact of restricting the available time used to structure the decision problem, time constraints can impose a number of downstream influences including the formulation of incomplete or a reduced number of alternatives (Dillon, 1998).

Information Constraints

One of the axioms of decision-making is that perfect information does not exist (McConnell, 2000), as the “best” alternative would be self-evident thus negating the need for decision to be made. We are however, always striving to improve our understanding of a given situation and for that reason, perfect information is considered a theoretical ideal and is used to temper our judgement (McConnell, 2000).

Financial Constraints

Limited finance has been described as the single most encountered constraint on the decision-making process (McConnell, 2000). This might be due to the “absoluteness” of it. For example, there might be only \$X dollars available and any alternative that exceeds this threshold must be eliminated; other constraints are often less rigid.

Political Constraints

The term “political constraint” is often used to describe two totally unrelated influences. It can be used to describe the constraints affecting process and options based on formal policy documents or procedures both within an organisation, and also regional and central government policies. It is also used to describe the undocumented, sometimes underhand processes (usually in group decision-making (Dearlove, 1998)) that exist within organisations. As an example, there might not be any formal requirement to notify a senior colleague of a particular decision, but in doing so, the person doing the notifying might be hoping that this person might support the decision at a later stage as a result of being kept informed.

Allen *et al.*, (1979) identified a set of eight tactics which suitably describes the type of organisational politicking that can influence decision outcome and to a lesser extent, decision process:

1. Blaming or attacking others
2. Manipulating information
3. Creating and maintaining a favourable image
4. Developing a base of support
5. Praising others or ingratiation
6. Developing strong allies and forming power coalitions
7. Associating with influential persons
8. Creating obligations through reciprocity

(Allen, *et al.*, 1979)

Executive level management in particular makes use of whatever political power they can apply to their decisions and the stakeholders of them. However, such power can also be used against decision-makers to the detriment of their decision processes and outcomes.

Ramifications

Ramifications, alternatively termed consequences, are the effects of the implementation of a decision solution. Ramifications can be both good or bad effects and may be expected or unexpected. The potential ramifications of a decision outcome may impact upon the decision process. Ramifications are generally considered most during the choice phase of the decision process when evaluating potential alternatives. The term consequentialism is used to describe those situations where the making of a choice should be governed by the consequence of that choice irrespective of any other factor (Machina, 1989).

2.15.2 COGNITIVE INFLUENCES

Physiological and psychological limitations of the decision-maker are also likely to contribute (Volkema, 1983). It is these influences we term Cognition. The human brain plays a significant part in the way that we structure decisions. The left hemisphere has been found to be dominant with respect to logical, analytical and rational processes. It also has been found to control verbal comprehension. The right hemisphere has been found to control intuitive, holistic and affective processes and is also proficient at comprehending spatial relations and pictorial stimuli (Sackeum and Gur, 1978). Therefore decision-makers assumed to be left-brain dominant, are likely to be far more receptive to mathematically based normative techniques as opposed to right-brain decision-makers who are more likely to make decisions based on gut feeling or intuition. It was stated earlier that contextual effects exist regardless of the decision-maker. While this is true, it does not imply independence between context and cognition. Influences that force the decision-maker to utilise left or right brain abilities will be moderated by the relative strengths of the two hemispheres.

The experience of the decision-maker has been found to have a significant influence on the way in which decisions are structured. These experiences influence the way in which environmental stimuli are utilised and how data is utilised (Volkema, 1983). One such occasion where the experience and perception of the decision-maker are influential is when a high quality solution is required. Low quality decisions typically result in a Satisficing type approach (Simon, 1957) where experience plays a major role. As quality requirements increase, the objectiveness of the structuring process increases and the reliance on experience lessens (March and Simon, 1958). A popular tool for measuring the impact of cognition is to evaluate an individual's cognitive style.

The term “cognitive style” is interpreted and expressed in many differing ways¹⁶. A cognitive style is an inbuilt and automatic way of responding to information and situations. It is inbuilt in that it is a part of the person's makeup; just like

¹⁶ Section 2.16 summarises the essential differences between cognitive style and decision style and outlines why only cognitive style was measured.

their personality. It is something that is developed at a very early age, and does not change. (Riding, 1991). Your cognitive style is automatic. Unless specifically told, you don't know of its existence and it is not the sort of thing which can be turned on or off, or which you can choose when to use it. It represents the only way in which you can behave.

The recognition of the cognitive styles of decision-makers within this study is important as it influences the way in which an individual deals with and responds to information. It also affects ideas and attitudes. Moreover, it provides the study with a response from the decision-maker that the decision-maker cannot influence nor have control over. Therefore it acts as a reference for verifying the responses provided for others areas of questioning. While a number of cognitive style measurement tools have been developed, Riding's (1991) Cognitive Style Analysis (CSA) was used. The CSA has been successfully employed in a range of fields including use in schools to improve teaching and learning performance (Riding and Rayner, 1998) and in the measure of occupational suitability (Riding and Wheeler, 1995; Borg and Riding, 1993). Riding (1998) believes the CSA to be superior to alternative cognitive assessment techniques such as self-report questionnaires (first used by Woodworth (1919)) and performance measures (e.g. Witkin *et al.*, 1962). He outlines several main inherent advantages:

- It is an objective test, in that the method of assessment is not obvious to those being assessed thereby making it difficult for those taking the test to contrive their results.
- It positively assesses both ends of the style dimensions. This is important, since otherwise it could be objected that the assessment is simply of ability and not of style.
- Since it does not contain questionnaire-type items, or difficult language, it can be used with a wide age range, from children to adults.
- It is context free, and can be used in a wide range of situations, such as, schools, industry, the health service, etc.

- It is probably culture free in nature, and it has been used in a number of countries¹⁷. This is important for the advancement of style work on a global stage.

(Riding, 1998; p. 6-7)

In practical terms, the CSA was quick to use and didn't require extensive training on the part of researcher or the participants being assessed. Also given that the CSA was just a small component of the study and that its use was only intended to identify the existence of cognitive influences, a more comprehensive test was not required.

Two Principal Cognitive Styles

The CSA measures two fundamental dimensions of cognitive style (Allinson and Hayes, 1996). These are:

- The Wholist-Analytic style; whether an individual processes information in wholes or in parts.
- The Verbal-Imagery style; whether an individual represents information verbally or in terms of images.

The two dimensions are typically viewed as being independent of each other, as shown in Figure 2-13.

¹⁷ The *Cognitive Styles Analysis* is available in various languages: English versions for the Australasian, North American, South African and United Kingdom contexts, and also in Arabic, Dutch, French, German, Malay, and Spanish.

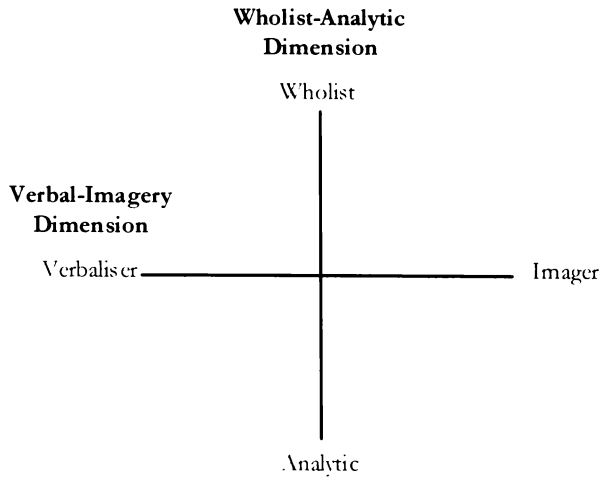


Figure 2-13 Relationship Between Two Style Dimensions

Wholist – Analytic Dimension

This cognitive style dimension represents the way in which people think about, view and respond to information and situations. This effects the way in which a person learns, solves problems and also influences their attitude. A Wholist sees the entire situation or problem as a whole, and resultantly, can take an overall perspective. Analytics view a situation as a series of parts. Their analysis of the situation is often restricted to just one or two parts at any one time. Figure 2-14 presents schematically how the wholist and analytic styles differ.

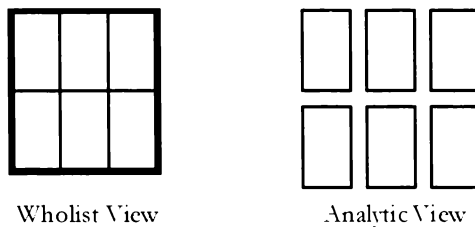


Figure 2-14 A Comparison of Wholist and Analytic Views

One of the by-products of the Wholist approach is that it is easy to develop a balanced viewpoint by seeing the situation within the entire context. This decreases the possibility of the extreme of negative attitudes existing. The converse and a potentially negative effect is that the Wholist can have difficulty in breaking a problem down into its parts for a more detailed analysis. For the Analytic, the situation is in reverse. They are able to decompose a situation

when required allowing them to reach the heart of a situation. However the difficulty becomes evident when they are required to view a situation in its entirety. Similarly, the Wholist can see a social group as a whole whereas the Analytic will likely only see a collection of individuals.

Verbaliser – Imager Dimension

This dimension indicates a preference as to the way in which information is represented. Based on this preference, an understanding of the tasks an individual might find easy and difficult can be predicted.

A Verbaliser represents information in terms of words, whether they be written or heard. The Imager use images when representing images. Verbalisers process information in terms of words whereas Imagers process the information in terms of mental pictures. Bimodals are those who have the ability to use either or both of the modes or information representation (Riding, 1991). While an individual can forcibly change his or her mode of information processing, this change is likely to be only temporary and will resort to his or her “true” style. It is generally assumed that Verbalisers are better verbal communicators than Imagers.

2.16 DECISION STYLES

It is necessary to identify at this point the differences (and similarities) between cognitive style and decision style. As was previously stated, a cognitive style is an inbuilt and automatic way of responding to information and situations – of which a decision might be such a situation. A decision style “...captures key aspects of a manager’s belief system...and unconsciously applied to decisions” (Nutt, 1990). Based on this definition, a decision style is the part of the cognitive style that relates to behaviour of decision-making. Cognitive style and decision style are often considered one and the same thing (e.g. Henderson and Nutt, 1980) and both comprise inbuilt cognitive effects that unconsciously work their way into any activity that a human is involved in. Generally however, it is considered that cognitive style encompasses decision style, as well as other

components of a human's psychological makeup such as personality (Saunders and Stanton, 1976) and perception (Litterer, 1965).

Haley (1997) describes the relationships between a decision-maker's cognitive style (also referred to as cognitive trail and personality types) and the manner by which they make decisions, or their decision style. Specifically, Haley notes an association between particular cognitive styles and observed decision heuristics employed by managers with particular personality types.

Haley (1997) presents three heuristics that characterise the various type of observed cognition. Although heuristics are not generally related to neither good, nor bad behaviour, the three heuristics are described in terms of "sequential biases".

1. Input biases – or errors that occur when managers collect data. Can be one of four types:
 - a. Anchoring
 - b. Perseverance
 - c. Availability
 - d. Vividness
2. Output biases – or errors that occur when managers generate alternatives. Four such biases exist in decision-making:
 - a. Functional fixedness
 - b. Positivity
 - c. Social desirability
 - d. Reasoning by analogy
3. Operational biases – or errors that occur when managers evaluate alternatives. Four types of operational bias have been identified:
 - a. Imputation of regularity and structure
 - b. Representativeness
 - c. Fundamental-attribution error
 - d. Illusory correlation

(Haley, 1997; Haley and Stumpf, 1989)

Different personality types develop different decision styles. Four personality types are presented, the nature of the biases presented above, and the decision styles associated with each.

Sensing Thinking Types (STs)

1. Anchoring input biases
2. Functional-fixedness output biases
3. Imputation of regularity and structure operational biases

These decision-makers prefer to make decisions with hard data, like structure and avoid risk. They are generally logical thinkers and are likely to follow a step-by-step, standard process in making decisions. This might be in the form of an existing decision-making method.

Intuitive Thinking Types (NTs)

1. Perseverance input biases
2. Positivity output biases
3. Representative operational biases

Such decision-makers are strategic and forward thinking in their decision-making. They prefer decisions that are complex with significant risk associated. Haley (1997) suggests that a decision-maker with an NT personality style may view a decision situation through rose coloured glasses and be more concerned with planning than implementation. They may also become too reliant on their prior beliefs when collecting data and ignore recent contrary evidence.

Sensing Feeling Types (SFs)

1. Availability input biases
2. Social-Desirability output biases
3. Fundamental-attribution error operational biases

These are decision-making communicators. They relate well to human issues and are well suited to problems requiring negotiation.

Intuitive Feeling Types (NFs)

1. Vividness input biases
2. Reasoning by analogy output biases
3. Illusory correlation operational biases

Decision-makers of this type have abilities relating to their use of judgement and their experience in decision-making. They prefer decisions that lack structure such that their experience and judgement can be used to develop innovative solutions.

The field of decision style research is vast. While relevant to the present study, the exploratory nature of the present study deems that a review of the psychological literature concerning decision style is not considered necessary. Nutt, (1990, 1993c) provides a good synopsis of decision style and its impact on decision behaviour. In particular, Nutt (1993c) reports on numerous empirical studies that have established a link between decision style related influences and decision choice making behaviour.

Although there exist numerous instruments suitable for testing decision styles (for example the Myers Briggs Type Indicator (Myers, 1963) is used to measure the significance of personality in a decision style) a conscious and deliberate decision was made during this study to use an instrument to measure the wider context of cognitive style. The logic behind this was that if decision style was a component of cognitive style (this has not been confirmed empirically) then investigating decision style as a potential problem structuring influence might conceal the true, underlying influence.

2.17 DECISION FRAMING

It is possible that decision structuring might be confused with decision framing; Russo and Schoemaker (1990) use the term framing to describe decision problem structuring. While these are related concepts, they are not the same. Framing is generally discussed in terms of choice; for example Tversky and Kahneman (1981) proposed that the term “decision frame”, refers to the decision-maker’s conception of the acts, outcomes and contingencies associated with a particular choice. Based on the synthesised definition of problem structuring presented in Section 2.12 (The process by which a decision situation is transformed into a form enabling choice), problem structuring therefore is

likely to be a major influence of the frame in which the decision choice is posed. Tversky and Kahneman state that the frame the decision-maker adopts is controlled partly by the structure of the problem and partly by the norms, habits and personal characteristics of the decision-maker.

Given this obvious link between decision structure and decision frame, it is necessary to understand the significance of the way in which the decision is framed. This is demonstrated by the results of research carried out by Tversky and Kahneman (1981) in which they carry out a decision experiment relating to a medical decision.

The United States is preparing for an outbreak of an unusual Asian strain of influenza. Experts expect 600 people to die from the disease. Two programs are available that could be used to combat the disease, but because of limited resources only one can be implemented.

Program A (Tried and True)	200 people will be saved
Program B (Experimental)	There is a 33.3% chance that 600 people will be saved and a 66.6% chance that no one will be saved

Tversky and Kahneman (1981, p. 453)

This above is framed in terms of the number of people who are likely to live as a result of the two programs. If we frame the same information in terms of the numbers who might die:

Program A (Tried and True)	400 people will die
Program B (Experimental)	There is a 66.6% chance that 600 people will die and a 33.3% chance that no one will die.

Tversky and Kahneman (1981, p. 453)

Tversky and Kahneman (1981) found that when a sample of decision-makers were given the option in terms of lives saved, people were generally risk averse, i.e. preferred saving a certain 200 lives rather than taking the gamble. However when another comparable sample was given the same problem, but framed in terms of deaths, the risk taking option was preferred. While the two cases are

effectively identical, the level of risk taking and the resultant choice was very much dependent on the way in which the data was framed.

Tversky and Kahneman (1981) describe framing in terms of the act of making a choice amongst alternatives. In doing so they are (intentionally or otherwise) assuming that the decision has come pre-structured and thus the decision-maker has not had any previous involvement with the decision. If this assumption is correct, then their description is also likely to be correct. However as it was previously stated as axiomatic that decisions rarely come pre-structured (see Section 2.1), we must assume that a decision-maker has had a previous involvement with the decision (in structuring it) and therefore has been influenced by the framing present during that earlier, initial contact; not at the time of making a choice as Tversky and Kahneman suggest. The manner by which the decision-maker receives the decision prior to structuring is likely to influence the way in which they go about structuring it. If the same decision-maker is also involved in the choice phase, then framing will only affect that one decision-maker and only at their initial contact with the decision. If however, the person is given the task of structuring the decision for somebody else, e.g. by a subordinate for a Chief Executive, then framing will also occur when the decision-maker receives the structured decision problem. Both scenarios indicate the importance of the structuring process and how the eventual choice is influenced by it.

A broad definition of framing is proposed by Russo and Schoemaker (1990). They describe framing as the structuring of the question, and state: “This means defining what must be decided and determining in a preliminary way what criteria would cause you to prefer one option over another” (p. 2). They add that good decision-makers will incorporate into the frame, the viewpoints of others in addition to their own. Russo and Schoemaker (1990) describe three characteristics of framing:

The boundaries of people’s daily lives, whether that be in work or leisure frame their view. For example, the CEO of an organisation is likely to have a broad, organisational wide boundary, whereas a manufacturing manager’s boundary is

likely to be constrained to the specific areas of the organisation in which he/she is most familiar. Equally influential are the reference points in which decision-maker's use to measure success or failure. What might be considered a potentially successful decision by one individual might be based on a limited experience of what constitutes success in this context. Another might see it differently because their greater experience has formed a more balanced reference point in which to assess the potentials solution. Finally, a yardstick is the measure by which something is assessed. People use the yardstick that seems most attractive for the given situation. For example, if a large organisation was reporting a reduced profit value, they would problem present the reduction as a percentage, as this would appear more acceptable than stating the actual profit reduction.

Mabin and Davies (1995) discuss decision framing as an aid to problem structuring. Through the use of real life situations, they demonstrate that framing can aid in the identification of values, the setting of contextual components of a decision problem such as objectives and criteria, and the generation of actions.

Tversky and Kahneman (1974) emphasise the importance of designing meaningful decision frames and problem structuring in the context of applied decision analysis. It is equally important when considered less formal and unaided decision situations.

2.18 CHAPTER SUMMARY

This chapter has set the scene in terms of decision problem structuring and how it fits within the wider discipline of decision-making. It began by introducing and defining decision-making. This was followed by a discussion of the components of a decision, and in particular, what characterised decision structure and why the structure of a decision is a critical component of the decision. Having analysed the various approaches to decision research, the

scope of the research was then outlined through the exclusion of group decision-making and the inclusion of executive level decision-making.

Next a summary of existing empirical research into decision problem structuring was presented. Following this, the process of decision problem structuring was investigated and then synthesised to produce a definition to be used throughout this research. Problem structuring is defined as: “the process by which a decision situation is transformed into a form enabling choice”. A synthesis of the various activities contained within this process was then presented. The next section looked at a variety of prescriptive approaches to decision problem structuring. These approaches were classified and evaluated in terms of their inclusion of the identified problem structuring activities so as to offer an initial comparison between descriptive and prescriptive problem structuring. The chapter was concluded with a discussion of the numerous problem structuring influences along with the important issue of decision framing.

Having now summarised the pertinent literature on decision problem structuring, it is necessary to comment on state of the literature in general, outline what obvious gaps appear to exist and propose a research direction in the present study. This and the identified research gap are present in Chapter Three.

3 GAP ANALYSIS

Having presented a summary of the literature concerning decision problem structuring from descriptive and prescriptive perspectives and also from the disciplines of management science and psychology, the state of the literature can be assessed and any gaps identified.

A striking feature of existing problem structuring research is the lack of recent contributions. From its heyday in the early 1980's, the rate of publications has significantly decreased. It is only work by a small number of authors including Nutt (1993a, 1993b), Adelman *et al.*, (1995), Keller and Guyse (1998) and Corner *et al.*, (2001) that has advanced the problem structuring discipline. Further research into decision problem structuring is warranted and, as outlined later, called for.

In Chapter Two it was found that while numerous definitions of problem structuring appeared in a variety of literatures, the similarities between these definitions varied. Many took a prescriptive approach and considered only aspects (e.g. the generation of alternatives or options) of the problem structuring process (e.g. Keller and Ho, 1988; von Winterfeldt, 1980), whereas others presented more conceptual definitions that lacked any significant procedural detail (e.g. Majone, 1980; Pounds 1969 etc.). While valuable within the context of their particular study domains and research fields, the contrasting nature of these definitions and the apparent underlying lack of clarity associated with the use of problem structuring has contributed to a field of research that, on the face of it, is poorly understood. This lack of clarity was reinforced through the identification of the many differing terms used to describe problem structuring. Terms such as problem formulation (Courtney and Paradice, 1993; Lyles and Mitroff, 1980; Schwenk and Thomas, 1983), option generation (Gettys *et al.*, 1987; Arbel and Tong 1982; Keller and Ho, 1988 etc.), hypothesis generation (Abualsamh, *et al.*, 1990) among others were regularly used.

Also in Chapter Two, descriptive research into decision problem structuring was surveyed. While various and significant contributions were found (e.g. Nutt, 1984, 1993a,b,c, 1998a, 1998b etc.), none specifically focused on the structured elements of the decision process. For example, although Nutt (1984, 1993a), Svenson (1979) and Mintzberg *et al.*, (1976) all give consideration to the structuring process, their main focus is the entire decision-making process. Descriptive research where the structuring phase is the focus is conspicuously absent.

Chapter Two also considered prescriptive based problem structuring research. This included some specific problem structuring methods, along with some problem solving/decision-making methods. In addition, the most well known of the “soft OR” group-based problem structuring methods were also presented.

In general, the use of prescriptive approaches in unaided decision-making is not well understood. One exception concerns the use of decision analysis where a conscious effort has been made to determine the practical implications of the approach (e.g. Kirkwood, 1987a; Howard, 1988; Corner and Corner, 1995). For other prescriptive methods, an assessment of their unaided usage is likely to have significant value.

Chapter Two looked into problem structuring influences. A variety of context and human behavioural influences are reported in the literature but are discussed in terms of the entire decision-making process. What the literature lacks is any empirical work that assesses the frequency and significance of these influences on unaided decision process, including that of problem structuring.

Dillon (1998) reviewed the wider descriptive decision-making literature, focusing in particular on the models that are purported to describe decision-making behaviour in naturalistic settings. General conclusions from that investigation implied that a number of the so-called “descriptive models” are in fact less descriptive than the literature would have us believe. Models such as: Elimination By Aspects (Tversky, 1972), the Lexicographic model (Tversky, 1969) and the Conjunctive/ Disjunctive models (Coombs, and Kao, 1955; Coombs, 1964; Daves, 1964; and Einhorn, 1970) all contain elements of the

normative, Expected Utility Theory (EUT). None of these models were identified, to any significant degree, to be used in naturalistic decision-making. Similarly, the wealth of prescriptive techniques presented in the literature is not represented at the coalface of “real” decision-making. Whether problem structuring methods are similarly poorly represented is also unknown.

It is becoming more widely acknowledged that prescriptive decision-making tools could benefit from the inclusion of description; i.e. aspects of existing human decision-making behaviour (e.g. Klein, 1989; Corner *et al.*, 2001). Furthermore, there is widespread agreement that structuring is necessary and beneficial (Mintzberg *et al.*, 1976; Abualsamh *et al.*, 1990; Perry and Moffat, 1997). The literature is, however, light on specifics. For example, Scherer and Billings (1996) state that an effective elicitation technique should yield high quality options, not merely a large quantity of options. Yet their statement is not supported by any description of what the technique might involve. Those who develop problem structuring methods (for whatever purpose) are likely to recommend their use, with or without a detailed “how”.

The difficulty faced by researchers of problem structuring is not contained within the process of identifying a gap in the existing research, but with deciding upon which gap warrants most attention. Many examples of these gaps have been presented, by way of calls for research, in various publications. Identified research gaps include:

- The design and testing of methods for generating entire problem structures (Keller and Guyse, 1998).
- A better descriptive understanding of how possible events are generated for decisions under risk in organisations (Keller and Guyse, 1998; Alderman *et al.*, 1995).
- The use of cognitive maps in the development of managerial problem formulation systems (Courtney and Paradice, 1993).
- The use of heuristics in problem structuring (Abualsamh *et al.*, 1990).

- Computer support in problem structuring (Kirkwood, 1987b).
- Alternative generation in decision analysis (Gettys *et al.*, 1987).
- Empirical testing of existing problem structuring methods (Pidd, 1988).
- Field studies investigating problem structuring behaviour (Schwenk, 1983)
- Conducting of laboratory experiments that closely resemble actual problem structuring/formulation situations (Volkema, 1983).
- Important variables in problem structure (Power, *et al.*, 1994).

In addition, numerous authors have simply called for more general problem structuring research (e.g. Abualsamh, *et al.*, 1990; Adelman, *et al.*, 1986; Keller, 1989; Keller and Guyse, 1998 etc.).

These calls for research provide clear evidence of the incomplete state of the problem structuring research field. Even though it has been a topic of investigation for the best part of thirty years and in discussion for many years prior to that, research output has never reached a significant and constant level. While there is variety in the work published to date, there has been no significant collective contribution in any particular area. The number of researchers regularly¹⁸ publishing in the problem structuring area is probably less than 10.

The wider decision-making research field appears to, in recent times, have increased its emphasis on the development of techniques and heuristics of a more descriptive nature, at least with respect to the choice phase of the decision process.

These developments (e.g. Image Theory (Beach and Mitchell, 1990), and Recognition Primed Decisions (Klein, 1989)) attempt to draw as much from empirically based decision-making observation as from normative, economic and mathematically based techniques. It would appear that problem structuring

research has been slow to follow. In part, this is likely to be due to the scarcity of empirically based, descriptive problem structuring research/data.

Given comments previously made about the poor state of the problem structuring research field, there is little value in identifying some new and unique area for conducting problem structuring research. Instead there is considerable opportunity for conducting further “mainstream” research into problem structuring so that our understanding of naturalistic problem structuring might be further enhanced such that the developments, as described above, might be later achieved. This does not imply that naturalistic problem structuring is better than the prescriptive tools/methods available, rather it is an acknowledgement that usage of existing prescription is low and perhaps this is because these methods are too unlike unaided practice.

Taking all of this into account, the research gap that this study will address can now be formulated. The gap attempts to encompass many of those issues presented above while retaining strict focus and direction. What is most evident in the literature reviewed to date is that while methods and techniques are being developed to aid in the structuring of decision problems, their usage in real world decision environments has not been reported. One must assume that decision-makers are continuing (as they always have) to approach decision-making in the manner that they personally deem as being most appropriate. What we don't know is what is contained within these unaided processes. Moreover, what causes the decision-maker to structure their decision problems as they do?

This study attempts to address the inherent gap in existing descriptive research concerning the understanding of unaided decision problem structuring at the executive level of organisations. It seeks to not only understand what processes are involved in the structuring of non-trivial decisions, but also investigates the likely causes of this observed behaviour. It will attempt to recognise the state in which decisions requiring structuring are received by decision-makers and the

¹⁸ Having five or more publications focused specifically on Problem Structuring.

various processes that subsequently follow up until the point at which a choice can be made. It will also attempt to uncover what influences problem structuring processes. For example, to what degree do time constraints impact the problem structuring process?

Based on this formulated gap, the next chapter (Chapter Four) presents the research design including a detailed description of the research questions that are based upon the gap described above.

4 RESEARCH DESIGN

A good design is one in which the components work harmoniously together and promote efficient and successful functioning. A poor design leads to poor operation or failure.

Maxwell, 1996

4.1 INTRODUCTION

This chapter develops a research design that is based upon and contributes to the existing problem structuring literature, as is presented in Chapter Two and that addresses the identified gap as outlined in Chapter Three. Maxwell (1996) provides a simple, yet concise model of the components of a research design. The model, presented in Figure 4-1 and summarised below, will loosely frame the content of the design of this study.

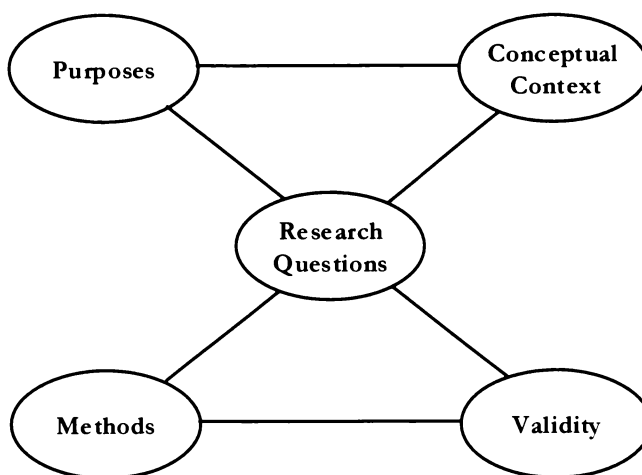


Figure 4-1 An Interactive Model of Research Design (Maxwell, 1996, p.5)

This chapter begins by presenting, and subsequently justifying, the theoretical perspective and research philosophies that have guided the author in carrying out this research. This is begun by presenting two (differing) views on this; firstly

that of Burrell and Morgan (1979) and then that of Creswell (1994). Having evaluated and contrasted these, the theoretical perspective and research paradigm of this research is then outlined.

The purpose of the research is then discussed. This includes the personal purpose of the researcher, the research purpose in terms of what phenomenon is being studied and the practical purpose concerned with actually achieving something.

The chapter then introduces the research questions to be addressed as developed from the research gap presented in Chapter Three. This includes the principal and overriding research question along with a series of sub-questions that have been derived from it. It is these more detailed questions that this study attempts to address. Each of these addressable sub-questions is discussed in depth culminating in the identification of the most appropriate method of empirical enquiry. In doing this, explicit consideration is also given to the research paradigm guiding the study and how this might impact the chosen methodology and the results obtained. Next the case study methodology is presented and the unit of analysis outlined. Following this is a detailed discussion of the procedures followed in undertaking data collection. Issues of trustworthiness are next outlined. This includes descriptions of measure taken to address auditability, credibility and fittingness.

The grounded theory approach used to analyse the interview data is then described. This involves a description of the process employed as well as some background to the approach.

The chapter is concluded by outlining relevant delimitations, limitations and the significance of the study.

4.2 THEORETICAL PERSPECTIVE

A good research design is one that is principally guided by the philosophical and theoretical perspective of the researcher, as they relate to the area being researched. The theoretical perspective is often referred to as the paradigm or worldview and is often described by way of a number of assumptions that guide the researcher's inquiries. Why should we be concerned with understanding the paradigm guiding a research? Burrell and Morgan (1979) state it well: "The principal concern is with an understanding of the way in which the individual creates, modifies and interprets the world in which he or she finds himself" (Burrell and Morgan, 1979: p.3).

The first significant contribution towards explaining paradigms came from Kuhn (1962, 1970). In his 1970 book "The Structure of Scientific Revolutions" he defines a paradigm as follows:

A paradigm is a set of beliefs, value and techniques which is shared by members of a scientific community and which acts as a guide or map, dictating the kinds of problems scientists should address and the types of explanations that are acceptable to them (Kuhn, 1970; p.175).

Earlier, Kuhn (1962) described a paradigm as having two characteristics:

1. The achievement is significantly unprecedented to attract an enduring group of adherents away from competing modes of scientific enquiry.¹⁹
2. It is sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve.

Patton (1978) also contributed with a useful, more detailed definition of a paradigm:

A paradigm is a world view, a general perspective, a way of breaking down the complexity of the real world. As such, paradigms are deeply embedded in the socialization of adherents and practitioners: paradigms tell them what is

¹⁹ More a description of a paradigm shift.

important, legitimate, and reasonable. Paradigms are also normative, telling the practitioner what to do without the necessity of long existential or epistemological consideration. But it is this aspect of paradigms that constitutes both their strength and weakness in that the very reason for action is hidden in the unquestioned assumptions of the paradigm. (Patton, 1978; p.203).

One confusing aspect concerning the discussions of paradigms is that there is little agreement on the definition of the term "paradigm", even amongst those with similar research perspectives (Sarantakos, 1998); in fact Kuhn himself used the term in at least 21 different ways (Masterman, 1970). A consequence of this is that there exists numerous paradigms and what is termed here as "inter-paradigms" or sub-paradigms; that being a paradigm that has been derived from another, formulated with another, or that contains elements of several existing paradigms. There is substantive overlap amongst existing paradigms.

4.2.1 PARADIGM ERAS

Lincoln and Guba (1985) present an historical account of the development of research in terms of "paradigm eras". These eras they describe as Prepositivist, Positivist, and, Postpositivist and are each based on a unique set of beliefs.

Of the three eras that are proposed by Lincoln and Guba (1985), it is the prepositivist era, which survived the longest; a period of approximately two thousand years ending during the eighteenth century. Many of the researchers during this era took the stance of "passive observer" (Wolf, 1981) and as such much of what was observed was distorted by the observer's interpretation of what he or she saw (Lincoln and Guba, 1985).

Reese (1983) describes positivism (the positivist era) as "a family of philosophies characterized by an extremely positive evaluation of science and scientific method" (p.450). In conducting research, the positivist must behave in ways that put questions directly to nature and allow the nature to respond (Guba, 1990). Guba describes that the inquirer (although might be better termed observer) "must stand behind a thick wall of one-way glass, observing nature as 'she does her thing'" (Guba, 1990, p.19). The positivist movement is reported to have emerged in the early nineteenth century in both France and Germany. Given the

obvious lack of understanding of basic axioms of inquiry, the transformation from pre-positivist to positivist was slow and undramatic (Lincoln and Guba, 1985). The interpretations and descriptions of positivism are vast and diverse. Examples include those by Hamilton, 1976; Schwartz and Ogilvy, 1979; Wolf, 1981 and; Hesse, 1980. For simplicity, this thesis is guided by the definition provided by Burrell and Morgan (1979), who describe positivism as: "a philosophical movement characterised by an emphasis upon science and scientific method as the only sources of knowledge, a sharp distinction between the realms of fact and value".

Post-positivism (the post-positivist era) is, in essence, a modified version of positivism. Guba(1990) believes that post-positivists have recognised, and subsequently attempted to limit, damage that has occurred during the positivist era. Lincoln and Guba (1985) choose to term the post positivist era the “naturalistic paradigm” and state that the “...basic tenets of the naturalistic paradigm are virtually the reverse of those that characterize positivism” (p. 29). Table 4-1 below contrasts the axioms of the positivist and naturalistic paradigms.

Axioms About	Positivist Paradigm	Naturalistic Paradigm
The nature of reality	Reality is single, tangible, and fragmentable.	Realities are multiple, constructed, and holistic.
The relationship of the knower to the known	Knower and known are independent, a dualism.	Knower and known are interactive, inseparable.
The possibility of generalization	Time and context-free generalizations (nomothetic statements) are possible.	Only time and context-bound working hypotheses (idiographic statements) are possible.
The possibility of causal linkages	There are real causes, temporally precedent to or simultaneous with their effects.	All entities are in a state of mutual simultaneous shaping, so that it is impossible to distinguish causes and effects.
The role of values	Inquiry is value free.	Inquiry is value bound.

Table 4-1 Contrasting Positivist and Naturalist Axioms (Lincoln and Guba, 1985, p.37)

Although we are now in what is termed the post-positivist era, this does not mean to say that all researchers adopt a post-positivist perspective. In fact

research conducted today is still predominately positivist, due mainly to the quantity of research conducted in the natural sciences (e.g. biology, botany, physics etc.). For this reason, and because this new era has yet to gain sufficient credibility or self-assurance, it has yet to have assumed a name of its own (Lincoln and Guba, 1985). The tenets of post-positivism are essentially those of positivism, reversed due, in part, to the many failings of the positivist paradigm. However, post-positivism is an entirely new paradigm, not simply a reaction to a failed past.

4.2.2 BURRELL AND MORGAN'S 2X2 FRAMEWORK

This section presents the most widely known view on research paradigms. Burrell and Morgan (1979) present a framework that views the assumptions about the nature of society in terms of two dimensions: the subjective-objective dimension and the regulation-radical change dimension.

The two extremes of the later dimension are termed sociology of regulation and sociology of radical change respectively. Sociology of radical change refers to the structural conflict and domination that is seen as being characteristic of society today, while sociology of regulation is concerned with social cohesion and solidarity and the reasons why society remains an entity. Burrell and Morgan insist that no continuum exists within this dimension, i.e. there is no 'middle ground'.

The subjective-objective dimension is similar to that of the five assumptions proposed by Creswell (1994). This framework is presented in Figure 4-2.

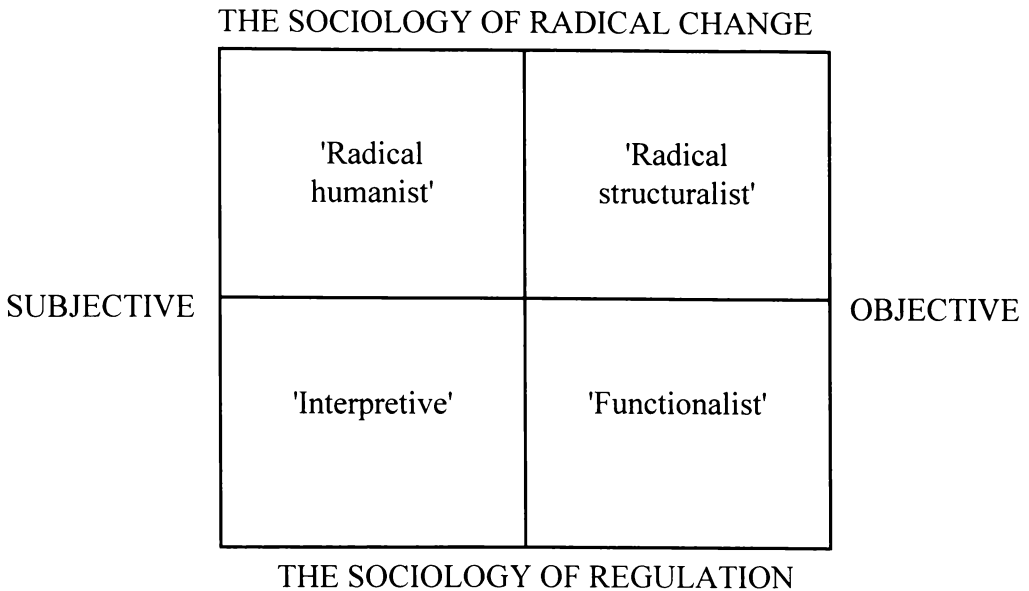


Figure 4-2 Burrell and Morgan's "Four Paradigms for the Analysis of Social Theory"

Within each of the four quadrants of Burrell and Morgan's framework exists a paradigm that represents meta-theoretical assumptions. Starting top left, moving clockwise, these paradigms are termed: Radical humanist, Radical structuralist, Interpretive, Functionalist.

Radical Humanist

This paradigm takes a subjectivist²⁰ point of view in attempting to develop a society of radical change. Burrell and Morgan (1979) describe one of the most basic notions of the radical humanist paradigm is that "the consciousness of man is dominated by the ideological superstructures with which he interacts, and that these drive a cognitive wedge between himself and his true consciousness" (p.32).

Radical Structuralist

This paradigm views the sociology of radical change from an objectivist perspective. It is concerned with social forces, radical change and structural conflict. It emphasises the fact that radical change is built into the very nature

²⁰ Stresses the importance of the subjective experience of individuals in the creation of the social world (Burrell and Morgan, 1979)

and structure of the contemporary society and it seeks to understand the interrelationships which exist.

Functionalist

This is the dominant paradigm. Is strongly orientated towards the sociology of regulation and takes an objective point of view. The fundamental paradigm is characterised by a concern for providing explanations of the status quo, social order, consensus, social integration, solidarity, need satisfaction, and actuality (Burrell and Morgan, 1979). It seeks to provide rational explanations of social affairs. Burrell and Morgan also describe the functionalist approach as being problem orientated - concerned with providing practical solutions to practical problems.

Interpretivist

Like the radical humanist paradigm, the interpretivist takes a subjectivist approach to the analysis of the social world. This paradigm is concerned with understanding the social world as it is from the perspective of a participant rather than an observer. It views the social world as one that is created by those who form part of it.

Although still widely accepted, the Burrell and Morgan framework has always had a community of detractors. This has been formed principally by those who found their research did not fit well within it. These researchers had to choose between misrepresenting themselves through Burrell and Morgan's framework or representing themselves well but being considered obscure or bad writers (Deetz, 1996). Although their framework includes the interpretive quadrant, it is still viewed from within a traditional, positivist framework.

4.2.3 CRESWELL'S QUANTITATIVE – QUALITATIVE PARADIGM FRAMEWORK

Creswell (1994) suggests that research might follow either a quantitative or qualitative paradigm²¹. He proposes five assumptions that exist for both paradigms, but also are used to differentiate between the two. These assumptions are: Ontological, the researcher's interpretation as to the nature of reality; Epistemological, the relationship between the researcher and that which is researched; Axiological, the roles the values of the researcher play in a study; Rhetorical, the language of the research and; Methodological, the process of the research (Creswell, 1998). The Ontological, Epistemological and Methodological assumptions are well established and appear to have wide support amongst the social research community. The Rhetorical and Axiological assumptions have been a recent addition. In general, two opposing perspectives of each of these assumptions exist, based simply on whether the overall approach is consistent with either a quantitative or qualitative worldview. What differentiates these contrasting perspectives will be outlined later.

Assumption 1: Ontology

Casually speaking, Ontology is the science of 'what is'. "What is the nature of the 'knowable'? Or, what is the nature of 'reality'?" (Guba, 1990, p.18). The purpose of the Ontology is to examine the fundamental nature of the 'being of anything'. What is the actual essence, or truth, of any thing or process?

Burrell and Morgan (1979) state that "social scientists are faced with a basic ontological question: whether the 'reality' to be investigated is external to the individual - imposing itself on individual consciousness from without - or the product of individual consciousness; whether 'reality' is of an 'objective' nature, or the product of individual consciousness; whether 'reality' is a given 'out there' in the world, or the product of one's mind.

²¹ The terms Positivist and Quantitative are both commonly used in the literature and mean the same thing. Interpretive, Qualitative, Phenomenological, Constructive and Naturalistic are also used interchangeably and again are used to describe the post-positivist paradigm era.

Assumption 2: Epistemology

"What is that nature of the 'knowable'? Or, what is the nature of 'reality'?" (Guba, 1990, p. 18). Burrell and Morgan (1979) describe an epistemological assumption as being the grounds of knowledge concerning how one might begin to understand the world and communicate this as knowledge to fellow human beings. This includes identifying how one might go about disseminating true and false information. The epistemological assumption is also concerned with whether knowledge is something that can be acquired or rather is something that must be experienced (Burrell and Morgan, 1979). This has a direct influence on the way the researcher might attempt, for example, to elicit information from his or her subjects.

Assumption 3: Axiology

What role should the researcher's values play in research? The axiological assumption questions whether inclusion of the values of the researcher might contribute to, or discredit study results.

Assumption 4: Rhetoric

The rhetoric used in research writing is such that it supports the theoretical and philosophical perspectives of the investigator. The degree of formality and use of personal or impersonal language in the presentation of the research offers one of the most recognisable indicators as to the theoretical and social foundations of the researcher.

Assumption 5: Methodology

Based on the identification and understanding of the four assumptions presented so far, the methodological assumption emerges, that being, how one conceptualises the entire research process - How the inquirer should go about finding out knowledge (Guba, 1990). Different ontologies, epistemologies, axiologies and rhetoric will influence the methodology adopted by the researcher.

A considerable amount of effort and space could be unnecessarily consumed in presenting a historical account of the development of paradigms, and describing

and subsequently evaluating the many different social and theoretical perspectives governing research paradigms (for further reading see: Burrell and Morgan, 1979; Kuhn, 1970, Masteman, 1970; Guba, 1990). To prevent this, discussion will be limited to issues of a generic nature. The framework presented by Creswell (1994) which guides much of this study will then be described.

To emphasise the vastness of research paradigms, Table 4.1 presents some common paradigms (or what have at various time been used as paradigms).

Paradigm	Discussed by:
Quantitative	Creswell (1994)
Qualitative	Creswell(1994)
Radical Humanist	Burrell and Morgan (1979)
Radical Structuralist	Burrell and Morgan (1979)
Interpretivism/ Constructionalism	Burrell and Morgan (1979); Sarantakos (1998); Guba, (1990); Smith, (1990); Lincoln, (1990); Lincoln and Guba, (1985)
Functionalist	Burrell and Morgan (1979)
Positivism	Burrell and Morgan (1979); Sarantakos (1998); Lincoln and Guba (1985); Wolf (1981); Hamilton (1976)
Pre-Positivism	Lincoln and Guba (1985); Wolf (1981)
Post-Positivism	Sarantakos (1998); Lincoln and Guba (1985); Philips (1990)
Naturalist	Lincoln (1990)
Critical Theory	Sarantakos (1998); Guba (1990); Popkewitz (1990)
Post-Modernism	Sarantakos (1998)

Table 4.1. Common Paradigms

This study adopts the perspective (or synthesis of various perspectives) that is best aligned with the author's approach to research and the requirements of this particular study.

4.2.4 QUANTITATIVE VS. QUALITATIVE: DETERMINING THE RESEARCH PARADIGM

Creswell (1994) offers a succinct description of the difference between quantitative and qualitative research paradigms as they refer to the aforementioned assumptions. Ontologically, quantitative researchers will typically view reality as objective and independent of the researcher, and being something that can be measured objectively through the use of an instrument such as a questionnaire or a piece of equipment such as a spectrometer²². Conversely, with the qualitative researcher, the only reality is that which is constructed by those involved in the actual research. For this reason, multiple realities are likely to exist for any given situation. These can be the realities of the researcher, the researched and any party who might read the published report. As a qualitative researcher, the nature of reality is such that it is constructed by those playing a part in the research. This ontology therefore assumes that multiple realities exist. These include that of the researcher, the researched, and any observer or reader of the research (Creswell, 1998). Throughout this investigation, the various views of realities of the stakeholders will require explicit consideration, out of necessity rather than desire. Doing so will protect the results from any perceived threat such as researcher bias. These realities are typically identified through the reliance on voices and interpretations of informants, through extensive quotes, presentation of themes that reflect words used by informants along with evidence of different perspectives on each theme (Creswell, 1998).

As for the epistemological assumptions, Creswell (1994) describes the quantitative approach as one in which the researcher is removed from the subject being researched and, as far as possible, is independent of that person or group. This is one way in which the quantitative researcher can reduce threats such as researcher bias and internal validity. This is far removed from the stance taken by the qualitative researcher whose epistemological assumptions are such that interaction with subjects is expected and, typically, encouraged so that values

²² An instrument for measuring refractive indices

of all parties can be easily identified (i.e. those of the researcher as well as the researched). In essence, rather than trying to remove all values and opinions of the researchers from those of the researched, in qualitative research this is encouraged for the attainment of greater richness in the data collected. In qualitative research the relationship between the researcher and that which is researched is of an interactive nature. Creswell (1998) describes such a relationship as ranging from living with or observing informants over a prolonged period of time, to some other less intrusive form of collaboration. The overall approach taken by researchers of a qualitative persuasion is to attempt to gain minimal distance or “objective separateness” between the researcher and that which is researched (Lincoln and Guba, 1985).

The quantitative axiological assumption is quite similar to that of its epistemology. The objective of the researcher is to remove his or her values from the study. This is typically achieved through the removal of any researcher statement that might contain or be seen to contain any statement that might influence that action or response of the subject. It also involves the removal of such statements from any written report based on the collected data, and through the use of impersonal language. Quantitative research only reports on the 'facts' (Creswell, 1994). Conversely, the qualitative researcher will allow, if not encourage, the opposite. The qualitative researcher declares the value-laden nature of the study and its inclusion of values that might not necessarily be that of the subject. Personal language is also used. In qualitative studies such as this, values of all parties play a significant part. In particular, the values of the researcher must be acknowledged and factored into any results of which the researcher plays a part in the collection. Much of the data gathered in this study is likely to have arisen from the interaction of the researcher with the researched. Discussion of potential research bias can found in Sections: 4.7.6, 4.8.2 and 4.11.

The axiological assumption is closely related to the rhetorical assumption. The quantitative researcher, while using impersonal language, also makes extensive use of accepted and traditional terminology. This includes words such as relationship and comparison. The research design section of a quantitative study is typically contained within a section entitled 'methodology'. Qualitative studies

however use more subjective and what might be termed 'fuzzy' rhetoric. Such words include 'understanding', 'discover' and 'meaning'. The rhetoric used in conducting, presenting and analysing qualitative research refers to the language used by the researcher. The researcher typically uses specific terms of a personal and literary nature in the report of the study. For example, in this study, the terms: auditability, credibility, and fittingness are used, whereas paradigmatically opposed studies might use the terms: reliability, internal validity, external validity, generalizability and objectivity (Lincoln and Guba, 1985). As qualitative researchers are concerned with process, the section heading “methodology” is often replaced with the like of 'research process' or 'investigative process' emphasising the developmental nature of the research design. In qualitative research, such as this, rhetoric is often evolving and developed as part of, and result of, the investigative process. Terminology used in reporting results is often taken from the subject from which the results are based.

Finally, the methodological assumption; quantitative research is typified through its use of a deductive form of logic wherein theories and hypotheses are tested in a cause-and-effect order. (Creswell, 1994). Variables and hypotheses are identified at the beginning of the study and don't change during the course of the investigation. Qualitative research employs inductive logic. Categories are identified during the course of the study and lead to the identification of patterns and theories. This inductive approach to developing the qualitative narrative shows that the process is one of an emerging design (Creswell, 1998). This often involves the development of an initial research question of which continual refinement is applied as the study proceeds.

Although the research questions are discussed at length in Section 4.4, it can be said at this point that the objective of this study is to develop some generic statements about the behaviour of decision-makers when structuring decision problems. The type of information needing to be gathered in conducting this study is consistent with the axioms, described above, of qualitative research. The objective of this study then, is to develop an understanding as to how decisions are structured in their actual settings. To do this it is necessary to study the processes employed from within or near these actual settings rather than from a

distance. This involves not only observing what decision-makers are doing, but also gaining an insight as to why they are doing it. What are the underlying causes for decision-makers to act in the way that they do? Clearly this research is concerned with process - outcomes to a large extent, in this study, are irrelevant – except as a measure of the performance of the process.

It would appear that a decision-maker's (lack of) understanding of their problem structuring process might inhibit the successful research and subsequent understanding of their unaided processes. This and the issues discussed above leads to the conclusion that a qualitative research design (based on Creswell's (1994) definition) is most appropriate for this study in an attempt to better understand both the processes employed and the influences on those processes. Others, in trying to understand the unaided processes of decision-makers have appeared to have had similar views (e.g. Klein, 1989, Nutt, 1984 etc.).

Six features of qualitative research provide support for it as the chosen paradigm of this study:

1. Qualitative researchers are concerned primarily with process, rather than outcomes or products.
2. Qualitative researchers are interested in meaning - how people make sense of the lives, experiences, and their structures of the world.
3. The qualitative researcher is the primary instrument for data collection and analysis. Data are mediated through this human instrument, rather than through inventories, questionnaires, or machines.
4. Qualitative research involves fieldwork. The researcher physically goes to the people, setting, site, or institution to observe or record behaviour in its natural setting.
5. Qualitative research is descriptive in that the researcher is interested in process, meaning, and understanding gained through words and pictures.

6. The process of qualitative research is inductive in that the researcher builds abstractions, concepts, hypotheses, and theories from details.

(Merriam, 1988; Creswell, 1994).

Having contrasted the quantitative and qualitative paradigms, and subsequently established the suitability of qualitative paradigm, we now can look specifically at Interpretivism.

4.2.5 INTERPRETIVISM

Also referred to as Constructivism (Guba and Lincoln, 1989; Guba, 1990, Roy, 1993), Qualitative (Creswell, 1994), Phenomenological (Hussey and Hussey, 1997), and Naturalistic (Lincoln and Guba, 1985), Interpretivism is concerned with gaining an understanding of the world as it is (Burrell and Morgan, 1979) rather than attempting to recreate reality within a fabricated environment. The interpretivist movement was established to address flaws identified in the positivist and post-positivist paradigms. Lincoln and Guba (1985) (also Guba and Lincoln, 1989) present four arguments as to why the introduction of a more qualitative approach was required.

1. The theory of ladenness of facts:

Reality exists only in the context of a mental framework (construct) for thinking about it. Positivism assumes complete independence between theory and observation - an assumption that receives less and less support.

2. The underdetermination of theory:

No theory can ever be fully tested, as we are always dealing with assumptions - no unequivocal explanation is ever possible. "Reality" can be "seen" only through a window of theory, whether implicit or explicit.

3. The value ladenness of facts:

Interpretivists argue that inquiry cannot be free of values. "If 'reality' can be only seen through a theory window, it can equally be seen through a value window" (Guba, 1990, p.25).

4. *The interactive nature of the inquirer/inquired into dyad:*

Complete objectivity is not possible. The results of a study are not always influenced by the interaction that occurs between the researcher and his or her subjects. The interaction between researcher and subject removes the distinction between the ontology and the epistemology in positivist or post-positivist studies.

A qualitative research design should contain each of the components contained within Maxwell's (1996) interactive model:

- **Purposes:** The ultimate goal of the study, why the study is being conducted and why the results are likely to be of importance.
- **Conceptual Context:** Use of existing theories, findings etc, that will guide the study and why they are relevant.
- **Research Questions:** What is the question(s) this research intends to address?
- **Methods:** How will data be collected such that the research question(s) might be best answered?
- **Validity:** What threats exist to the conclusions of the study - how could that affect the data, and how could it be best managed?

4.3 PURPOSE

It is crucial at this stage of the study that the purpose of the study is considered. As put simply by Maxwell (1996), "It is easy to find an unanswered, empirically answerable question to which the answer isn't worth knowing..."(p.14). A sustained period of focused thinking and investigation cannot be achieved simply through good intentions. This, and a successful research outcome can only be achieved through a clear and accurate sense of purpose.

Clarity of purpose can be accomplished by acknowledging the existence of, and subsequently identifying, three different kinds of purpose that might exist in a significant piece of research such as this: Personal Purposes, Research Purposes and, Practical Purposes (Maxwell, 1996). Personal purposes are what motivate the researcher to carry out the study, research purposes are focused on gaining an understanding of a particular phenomenon while practical purposes are concerned with actually achieving or accomplishing something.

The principal purpose of this study is to gain an insight into the processes employed by decision-makers while involved in the specific activity of structuring decision problems. This is just one part of an overriding desire on the author's part to be able to (in the future) better prescribe²³ a process (or processes) of problem structuring. To a large degree this study is concerned with process; understanding what actions are typically involved when a decision-maker structures a decision problem. To this end, outcome is of minimal consequence, apart from adding additional contextual information. From the understanding of such processes, it is hoped that causal explanations might be developed based upon those processes and the contextual effects that influence them. This purpose would fall into the category Maxwell (1996) coined the research purpose.

Practically, all researchers strive to produce research that has some downstream value for researchers and/or practitioners alike. Not only is it desired to gain an insight into the structuring process, but also, perform it such that it might later be used to advance research into problem structuring, and even the wider decision-making field. Principally however, it is anticipated that in some way, this research might be used to inform prescription. The limited (or non) use of existing problem structuring methods is well documented, both in this study and elsewhere. This research might help us better understand why this is the case. Who do executive decision-makers structure decision problems unaided? What differences can be observed between the problem structuring behaviour of decision-makers and the prescriptive models intended for use by them? Taking

²³ I make the assumption in this dissertation that problem structuring positively influences decision outcomes.

the longer-term view, it is hoped that in the future, the results of this study might in some small way be used in the development of "better" problem structuring methods and from that, contribute to "better" decision-making.

Given that the phenomenon under investigation is studied 'in situ' i.e. within the context of the decision-maker's environment, it is important that the study have "meaning" to those who are participating. Participants must be able to recognise the value, not only of the study, but also of the phenomenon on which the study is based. "The perspective on events and actions held by the people involved in them is not simply their account of these events and actions, to be assessed in terms of its truth or falsity; it is part of the reality that you are trying to understand" (Maxwell, 1992). It is easy to identify and subsequently document a process, however, when you view that process from the perspective of its owner, you cannot expect to be able to fully understand it. For this reason, it is important that the person is understood, as well as the process. Similarly, this research is not just concerned with identifying what process a particular decision-maker uses to structure his or her decision, it is also important to know what he or she thinks of this process - how they make sense of what they do - and to what degree they understand the phenomenon that influence their behaviour. A focus such as this is characteristic of interpretive research (Bredo and Feinberg, 1982). Most importantly however, this research addresses the issue of causality - what makes the decision-maker behave in the way that he or she does.

Until more recently, causality has been associated only with quantitative research:

In qualitative interview studies the demonstration of causation rests heavily on the description of a visualizable sequence of events, each event flowing into the next... Quantitative studies support an assertion of causation by showing a correlation between an earlier event and a subsequent. An analysis of data collected in a large-scale sample survey might, for example, show that there is a correlation between the level of the wife's education and the presence of a companionable marriage. In qualitative studies, we would look for a process through which the wife's education or factors associated with her education express themselves in marital interaction. (Weiss, 1994, p.179).

Studying the structuring of a decision process in context permits us to identify the contextual effects that might influence the way problem structuring occurs in

the naturalistic setting, and how these influences might function. This study places considerable emphasis on recognising contextual effects, in particular how they affect the structuring of decisions from the decision-maker's perspective, but also from the perspective of the researcher acting as a neutral observer.

The authors' personal purpose in conducting this research is a little more difficult to document. An obvious outcome of this study is likely to be that the author becomes an authority on problem structuring in naturalistic settings. Principally however, as with any research the main objective is to make a contribution; a recognisable contribution that has recognisable value.

Qualitative research is often used in fulfilling an exploratory role. As such, this study is intended to kindle further related work, both of a qualitative and quantitative nature. It is intended to pose more questions than it answers and provide opportunities for further research.

4.4 RESEARCH QUESTIONS

In determining the research question of this research, sight must not be lost of the overall picture; what is the principal objective of the study? For this research, it is clear-cut. Simply, the overall objective is to contribute to the understanding (and later) improvement and development of usable problem structuring processes.

Looking at the study in more detail, one objective of this research is to identify the elements of the problem structuring process. The study also wishes to identify any inhibitors to the structuring of a decision problem along with developing an understanding of what different problem structuring situations exist. What are these different situations? What makes them different?

So even though it is stated that a contribution to the development of new/prescriptive approaches to problem structuring is desired, this will be achieved by providing an understanding of what decision-makers do in this regard, and most importantly, why they behave as they do.

So in a nutshell, the principle research question being addressed in this thesis is:

How do individuals structure decision problems?

Stated more explicitly:

How do *executives* structure *non-trivial business* decision problems?

Non-trivial is intended to mean that the decision must be of a level of significance where it cannot be processed automatically or intuitively i.e. it requires conscious and deliberate thought, investigation, and judgement. Similarly, it might not include decisions that are not unique, i.e. have been encountered before by the same decision-maker such that the structuring process cannot be simply a replication of an earlier action (such as the behaviour described by the Recognition Primed Decisions model (Klein, 1989)). This study is limited to business decisions for several reasons. Firstly, business decisions are to a large extent universally comparable; a decision-making environment within a New Zealand organisation is unlikely to be far removed from decision situations faced elsewhere within the western world. Additionally, if the study were to also include personal decisions, then issues concerning such factors as beliefs, values and culture might play a far greater role (although they are still likely to be important within business decisions, especially in some cultures). This would only serve to further complicate what is an already complex process. Moreover, it would be reasonable to expect that of all decisions, the decision-maker would be most likely to describe business decisions. In personal decisions, a high degree of intuition could be common.

The most important reason however, is that as a student and researcher of business or management, I see the greatest value in any such research is to be gained by the business community. Many organisations fail, simply through poor or mistimed decision-making. This study should contribute to the overall understanding of unaided decision-making and the likely causes²⁴ of poor

²⁴ Although this study will not attempt to specifically identify these.

decision-making. It is this same community that will benefit most from (potential) developments that might be made following this research.

The development of the principal (often termed grand tour (Werner and Schoepfle, 1987)) research question presented above has not emerged as a result of lengthy deliberations and reflection. Firstly, such work is widely called for in the existing research (Schwenk, 1983; Keller and Guyse, 1998; Power *et al*, 1994 etc.). So from an existing research standpoint, the need for work such as this is clear. The second, and significantly less scientific reason for selecting the aforementioned research question, is that it is the author's belief that prescription is best when informed/influenced by description; much of the behaviour observed in naturalistic decision-making settings is non-negotiable on the part of the decision-maker - again no firm empirical evidence exists to support this claim (perhaps with the exception of Nutt (1984)). There are certain things we all do, and no matter what techniques or approaches are presented to us, we will continue to do them. Many such actions are based on values or morals, many are simply features of human behaviour. For that reason, there exists little justification in trying to fight such behaviour, but instead use it in the development of "decision-maker suited" prescriptive approaches. We do however, need to identify and understand these non-negotiable behaviours and determine if they are, in fact, non-negotiable. In addition to the above, calls for research are both vast and diverse, which appears to be characteristic of the problem structuring research field as a whole. For this reason it was decided that a general, rather than specific piece of research was required.

Addressing a research question as broad as that presented above is all but impossible. Simply, it has no succinct or concise answer and therefore needs to be decomposed. The principal research question has therefore been developed into a series of addressable questions that focus on the major components of how decisions are structured in naturalistic settings. The more detailed or sub-research questions are of two types: those that are related to decision context and those concerned with process. The research hierarchy is presented in Figure 4-3 followed by an explanation of each sub-research question.

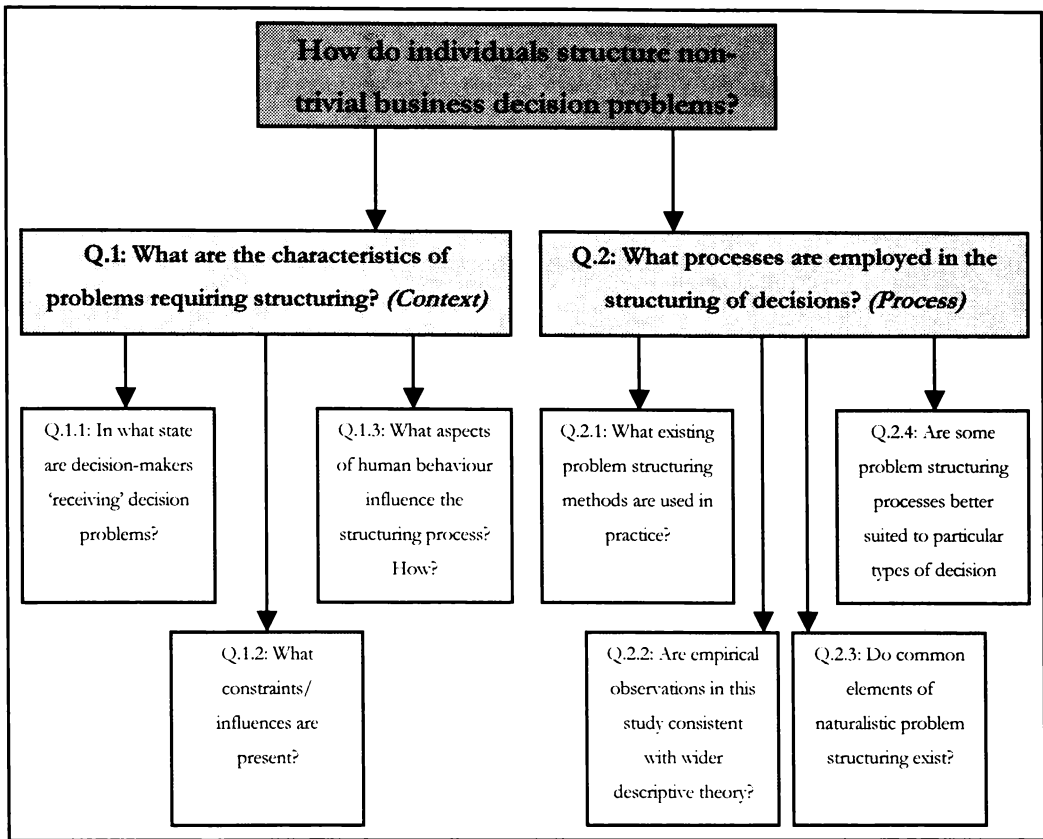


Figure 4-3 A Hierarchy of Research Questions

Whereas the principal research question addresses the “what” issue, many of the questions shown in Figure 4-3 are “why” questions; questions that collectively try to establish reasons or causes for certain behaviour. The “why” question is/cannot be explicitly addressed; often decision-makers simply “do not know” why they do certain things. Understanding the reasons for particular decision structuring behaviour is encompassed by all of the sub research questions. For example, research questions 1.2 and 1.3 investigate the effects that influence specific behaviour(s); understanding these influences goes some way to understanding why decision-makers act as they do.

It should be noted that this study is not about developing or indeed identifying relationships between the structuring process and decision outcome. However based on the above assumption, the decision-maker’s perception of the success of the decision outcome will be used in the evaluation of observed structuring processes. Causality is particularly important in explanatory studies such as this. Looking outside of this research, a manager might want to know what causes a decrease or drop in sales, or which variable causes stress in employees etc. The

manager in this case is not content with knowing all of the variables that are associated with the dependent variable, but wants to know which particular variable(s) impacts the dependent variable. Understanding causality within naturalistic problem structuring permits us to look beyond the actual behaviour we observe, so that we might understand the reasoning behind that behaviour.

4.4.1 CONTEXTUAL QUESTIONS

Being able to identify and describe problem structuring behaviour is only of any significance if it is done in association with an investigation relating the what with the why. A given behaviour does not typically occur by accident or for no identifiable reason, it usually arises in response to aspects or cues (Klein, 1989) from the environment. The major limitations of experimentally based research into decision-making is the exclusion of such cues. This group of research questions seeks to address such decision environmental impacts. In particular, it is asked:

- ***Q.1.1: In what state are decision-makers 'receiving' decision problems?*** The start of the decision process is when the decision-maker recognises the need for a decision (or is informed that one exists) and that he or she is to be the maker of that decision. This might be when the decision-maker is informed by a senior member of staff that a decision is to be made. Alternatively, it might be the result of an accumulation of uncertainties such that the decision-maker him or herself recognises that a decision is required. We would not expect all decisions to emerge in the same way. Nor would we expect their appearance to be consistent. How do decisions emerge? In what form? And most importantly, what influence does that have on the approach taken by the decision-maker in structuring decisions?
- ***Q.1.2: What environmental constraints/ influences are present?*** Few (if any) decisions can be made under ideal conditions. An ideal condition can be considered a state; free from all constraints or influences that might contribute to a decision being made that has a less than ideal outcome. In previous work (Dillon, 1998) time, financial, and political constraints were identified as major inhibitors to ideal decision-making. What

constraints/influences have the greatest effect on problem structuring? Why? How is the process affected and what is the eventual outcome of the structuring where such influences have been present? Addressing these questions could potentially offer the greatest insight into why decisions are structured in the manner that they are.

- ***Q.1.3: What aspects of human behaviour influence the structuring process? How?*** The decision-maker potentially has the greatest influence on the structuring process. The decision-maker decides upon what information to use or ignore, and often any action taken, is sourced from his or her repertoire of decision-making behaviour. What is the nature of this behaviour, and how does it impact upon the structuring process?

4.4.2 PROCESS QUESTIONS

The principal focus of this research is on process. This involves presenting a synopsis of processes employed by actual decision-makers in structuring decisions within naturalistic settings. What is the nature of these processes? Why are they used as they are? Can a level of similarity be identified such that relationships between process and structuring outcomes can be made? What similarities can be observed between the observed descriptive approaches, and the prescriptive methods presented in section 2.13?

- ***Q. 2.1: What existing problem structuring methods are used in practice?***

Other research has sought to investigate the use of OR/MS tools and techniques in domains such as strategy development (e.g. Clark and Scott, 1995) or look at the adequacy of OR for addressing strategic issues (e.g. Kirkwood, 1990). These studies have found that OR/MS practitioners widely use such tools. No study has attempted to describe their use by non-practitioners or in the domain of decision problem structuring.

Section 2.13 presents a number of the most widely known problem structuring methods. Some of these are process based (e.g. Interactive Planning (Ackoff, 1979; Lahr, 1983) and Strategic Assumption Surface and testing (SAST) (Elrod and Moss, 1994; Mason and Mitroff, 1981)). Most however, simply offer high level, generic prescription concerning what approach should be taken without including the necessary detail such that they can be realistically performed. So although it is suspected that usage of existing methods might be rare, (and this is supported by the non-existence of contrary statements in any published research) this research attempts to identify (even weak) relationships between the behaviour observed in the study, and aspects of these methods. Can any such relationship be identified, and if so, which of these methods have greatest in common with actual decision-making behaviour?

- ***Q. 2.2: Are empirical observations in this study consistent with wider descriptive theory?***

Dillon (1998) offers an introductory insight into the decision-making behaviour of managers. Section 2.5.1 summarises what is most widely known about how managers make decisions within their naturalistic environment. This part of the present study seeks to identify the level of alignment between problem structuring behaviour, and decision-making behaviour in general. From this it is hoped to be able to make some definitive statement about what aspects of general decision-making behaviour can be attributed to the problem structuring phase of that process, and in addition, what, if any, of the general behaviour can be used to describe problem structuring.

- ***Q 2.3: Do common elements of naturalistic problem structuring exist?***

One would expect that however diverse business decision-makers might be, there will be aspects of their behaviour that is not unique and in fact common to many decision-makers and to many decisions. These include actions that occur regardless of the decision-maker, regardless of the decision and regardless of any environmental influences or constraints. Identifying any such elements (if they exist), might then permit an assessment of why these elements/actions occur with such a level of regularity. It is also interesting to know whether, and to

what degree, they are incorporated into prescriptive problem structuring heuristics as a proportion of those identified to be part of problem structuring methods, as per Q 2.1.

- *Q. 2.4: Are some problem structuring processes best suited to particular types of decisions?*

This question endeavours to identify relationships between certain problem structuring behaviour and successful structuring outcomes, based on that process's suitability to the particular decision problem. Conversely, the research attempts to identify situation specific processes or actions that, when employed in particular circumstances, provide detrimental outcomes, i.e. actions that are definitely not suited to certain problems. What is the nature of any such relationship and how best could this be incorporated into prescriptive methods?

The seven sub-research questions presented above all in some way contribute to the principal research question. Furthermore, the results obtained in addressing these questions should offer some significant pointers on how the development of descriptively based problem structuring methods might be best achieved.

4.5 CASE STUDY RESEARCH

In the empirical component of this research, a multiple case study approach is employed. Multiple case studies are described as having both advantages and disadvantages (Yin, 1994). Multiple cases are more generalisable towards theory and the evidence from multiple cases is considered to be more robust than single cases (Herriott and Firestone, 1983). One of the greatest disadvantages of utilising multiple cases, is the greater effort required in conducting the study. The multiple case study approach was employed in this study so that theory could be established based upon a number of similar individuals.

While the intention of this research is to be qualitative, Yin (1994) rightly points out that case study research can be either quantitative or qualitative and is determined by the method in which data is collected and analysed. Given the nature of the study domain and earlier discussion on qualitative research, a qualitative investigation is clearly most appropriate.

The case study design of this study is based upon the structure prescribed by Yin (1994). It is an increasingly used tool for the study of individual, group and institutional processes within a variety of settings (Gay and Diehl, 1992). Examples include:

- Policy, political science, and public administration research;
- Community psychology and sociology;
- Organisational and management studies;
- City and regional planning research, such as studies of plans, neighbourhoods, or public agencies, and
- The conduct of a large proportion of dissertations and theses in the social sciences (Yin, 1988).

One of the principle reasons for using the case study research procedure is that it is contextual (Miles and Huberman, 1994; Stake, 1995). "...the primary purpose of the case study is to determine the factors and the relationships among the factors, that have resulted in the current behaviour or status of the subject of the study" (Gay and Diehl, 1992, p. 257). Another important reason for using the case study approach is that it addresses the "why" question; not just the "what". Understanding the existence of a phenomenon is fine, however unless it can be identified as to why it has occurred, it is of minimal value. This is one important limitation of quantitative approaches; they are excellent at providing vast amounts of information about what is happening, however unless an understanding of "why" is achieved, then typically, little can be done to improve or remedy, any problems or issues that might be identified.

Conducting an investigation within a naturalistic setting allows contextual effects to be identified, unlike when conducting experimental or laboratory type studies. Given that this study deals with problem structuring in its natural setting and identifying these contextual influences is extremely important, then the case study approach is most relevant.

While organisation-based case study research was popular during the 1950's, research outputs in the 1960's showed a decline as survey and experimental investigation came into vogue (Daft, 1980). A contributing factor in the case study decline was the belief that a limited number of cases prevented the researcher from making generalisations. Although true in part, more recently it has been acknowledged that this supposition has been as a result of viewing the case study from within a statistically based quantitative framework. Those who did this believed that statistical analysis was a required element of successful research.

Clearly, making generalisations from a single case is not possible, however when multiple cases are introduced, generalisation becomes increasingly possible. In this study generalisation is unlikely to extend beyond the context of executive level problem structuring within medium to large organisations in regional New Zealand. What must be remembered here is that qualitative research such as the case study is not intended to provide explanations of phenomena while also achieving high levels of external/internal validity. Instead research such as this is exploratory, aimed at identifying phenomena and their associated causes. Positivist researchers are best equipped for determining how widely the phenomena occur.

4.6 UNIT OF ANALYSIS

The identification of the unit of analysis within case study research such as this is important - possibly more so than in quantitative approaches, as the unit of analysis in these latter methods is often quite obvious. It is necessary so that we can understand how the results of this study relate to the broader body of

knowledge, and to permit us to understand the significance of this study with respect to existing problem structuring research and decision-making research in general.

The unit of analysis is the entity (or entities) which is under study and can include: the individual, group, role, position, relationship, organisation, social category or society in general (Neuman, 1994; Singleton *et al*, 1993). It can also include such things as books, documents or even buildings (Singleton *et al*, 1993).

Determining the unit of analysis is often one of the most difficult aspects of case study research design (Yin, 1994) as the true or 'best' unit of analysis can often be clouded by its environment or entities, which it is a part of. As an example, individual behaviour within an organisation in communicating with a client might be confused with the behaviour of the client.

In this research, however, the unit of analysis is quite clear. The focus of this research is on decision-making at the individual level, while acknowledging that many of the characteristics of individual behaviour are replicated within a wider context e.g. group or organisation. Existing problem structuring research is predominately of this nature. In fact decision-making research as a whole is almost exclusively (whether stated explicitly or not) concerned with decision-making at the individual level.

4.6.1 PARTICIPANT SELECTION

The method used in the contact and selection of the research participants had the potential to greatly influence the quality of the data obtained. In the first instance, it was necessary to recognise those decision-makers who actually made decisions that were non-trivial as opposed to the regular day-to-day decisions that require little or no structuring and are typically made automatically. Because the above situation was an issue in previous work (Dillon 1998), where what the decision-maker interpreted to be a major decision and what was interpreted by the researcher to be a major decision was often different, it was decided to take an alternative approach to the selection process in this study. Following the selection procedure employed by Nutt (1993a) (described later), it was decided to

identify a decision that was (in the author's view) a non-trivial decision, and in which the structuring of it would unlikely be an automatic process. From the identified decision, the principal decision-maker involved becomes the unit of analysis of that particular case, along with the decision. One could expect that given the decision-maker was making a non-trivial decision in this case, it was highly likely that they have done so in the past thereby being what could be termed an experienced decision-maker.

The term principal decision-maker is used cautiously. This study is concerned with decision-making at the individual level, however it could not be expected that such non-trivial decisions could be made in isolation by a single decision-maker. However as previously discussed, it is not the author's intention to investigate the group processes contained within the structuring of decisions. As also mentioned previously, the author's focus was on non-personal decisions. This was not because personal decisions are not important, rather because personal decisions are likely to be much more complex, and because prescriptively, a study of non-personal decisions is likely to provide the greatest contribution to the decision-making community, both in academia and practice.

The first part of the selection process involved making contact with a number of medium to large organisations from within the local area. Eighty such contacts were made. The contacts involved outlining to CEO's/ General Managers from each organisation, in broad terms, the objective of the study and how the contribution of his or her organisation could contribute to the success of that. What was required of them was then outlined, this being a decision nominated by them, which could be analysed along with the major player(s) involved. One requirement was that the decision had to have been made recently, i.e. within three or four months of them being contacted. This was so that the details were still relatively fresh in their minds. Within the initial contact, the benefits that they might receive from participating in the study were outlined, and also any fears that they might have had regarding the confidentiality of the information they might disclose along with the length of time they might have thought that would be required to commit were allayed. This initial contact involved a posted letter that included a short reply form and freepost envelope. Those who were

not willing/able to participate were asked to send back the freepost envelope also. After three weeks follow up letters were sent to those companies for whom no replies had been received. Of the initial eighty three contacts made, thirty six responded of which 12 agreed to participate. A further 15 companies were then contacted of which four agreed to participate giving a total of 16 participants.

Neuman (1994) offers four characteristics of what he terms the "ideal informant".

1. **Is totally familiar with the culture.** As he/she is the unit of analysis, then he/she is best qualified to answer questions regarding his/her behaviour.
2. **Currently involved in the field.** Subjects must be regular decision-makers and have made non-trivial decisions recently.
3. **Able to spend time with the researcher.** Total commitment will be established before commencing any interviewing.
4. **Non-analytic.** This is especially pertinent for interpretivist research like this. Neuman (1994) describes a non-analytic informant as being one who "...is familiar with and uses native folk theory or pragmatic common sense" (p. 361)

Based on these characteristics, it can be confidently said that all participants could be considered "ideal". Appendix D provides a summary of the participants.

4.7 DATA COLLECTION – INTERVIEWING

In Section 4.8.2 the use of triangulation to enhance credibility is discussed. One of the ways in which triangulation can occur within empirical research is through the use of multiple data sources. Yin (1994) describes six sources that might be utilised to provide empirical evidence: documents, archival records, interviews, direct observation, participant observation, and physical artefact. Given the

nature of this study, some are more relevant than others, in fact, some are of no use at all, e.g. physical artefacts and archival records. The principal method of data collection in this study is the interview, while observation of the participants during the interview is also employed. Interviewing permits a form of post-decisional reflection by the participant. The other candidate data collection method could have been the real-time observation protocol. Numerous negative effects e.g. observation bias²⁵ have been identified that bring into question the trustworthiness of this latter approach. More significantly, the duration of some decisions meant that observation of actual conditions is not possible.

The most common mode of data collection employed when conducting case study research is the interview. Interviews have erroneously been described as "...surveys conducted orally" (Sarantakos, 1998, p.80). In this study the definition of an interview is defined as being "a conversation with a purpose" (Dexter, 1970). Interviewing is especially relevant to the axiological assumptions of qualitative research which view data as being value-laden and biased (Cresswell, 1994); characteristics which are unlikely to be identified and subsequently considered in alternative data collection approaches.

Case study interviews might take a variety of different forms ranging from being totally open-ended to being based upon closed survey type questions. One of the first decisions which must be made when designing an interview programme is whether the interview should be structured or unstructured (Bordens and Abbott, 1991). The difference between the two modes is simple. The structured interview follows a set format and subjects are faced with a common set of questions. The unstructured interview contrasts in that the researcher has a general idea regarding the issues to be discussed but few details as to how that might occur. This latter approach recognises the variability of participants.

²⁵ Refers to changes in the behaviour or events under study that are caused by the observation process itself.

Chapter Four – Research Design

One disadvantage of the unstructured interview is that fluctuations in responses might occur as a result of questions being asked in a different order. Most often however, and this study is an example, a combination of structured and unstructured questioning occurs and the value of an interview is maximised where (when possible) a combination of the structured and unstructured format is present (Bordens and Abbott, 1991).

It is uneconomical to consume the valuable time of the participant by asking him or her questions that could quite easily be addressed by way of a questionnaire. Open-ended questions are used for gaining the "facts of the matter" as well as the respondents' opinions about particular events (Yin, 1994). For that reason, questions that could best be addressed by way of a simple questionnaire were done in that manner. This occurred at the end of each interview and was used to gain some background, contextual information about each participant. The questionnaire, which was given to all participants, is presented in Appendix B. A summary of the data obtained via this questionnaire is detailed in Appendix C.

One significant advantage the interview approach has over alternative methods of data collection is that it permits the researcher to conduct follow ups on incomplete or unclear responses by asking additional probing questions either during the same interview or during a subsequent meeting (Gay and Diehl, 1992). Also, the interviewer can establish a degree of rapport or trust between him or herself and the subject, thus encouraging responses that might not be elicited through questionnaires (Rosnow and Rosenthal, 1996). It also allows the interviewer to help subjects in their interpretation of the questions and allow flexibility in determining the wording and sequence of questions (Rosnow and Rosenthal, 1996).

The qualitative research interview has been described as an interview, whose purpose is to gather descriptions of the life-world of the interview with respect to interpretation of the meaning of the described phenomena. However, the overriding objective when conducting qualitative interviews is to see the research topic from the perspective of the interviewee, and gain insight into how that perspective has been formed (King, 1994).

One important element of qualitative interviewing is the nature of the relationship between the interviewer and the interviewee. As a qualitative researcher it must be recognised that there is no such thing as a "relationship-free" interview, and in fact the relationships that develop during the course of the investigative process might contribute to, rather than distract from, the process (King, 1994).

Lincoln and Guba (e.g. 1985) have published widely in the area of naturalistic research. For this reason, and the fact that their work is widely regarded to be at the forefront of research in this area, the interviewing process of this investigation was modelled on the contents of their five-step process.

4.7.1 DECIDING ON WHO TO INTERVIEW

Unless this initial stage is carried out adequately, and a suitable collection of participants is identified, all subsequent steps and the entire research might be at risk. In the first instance it was ensured that the potential participants were not only willing to participate, but also gave the impression of being reliable such that when it came time for the actual interview(s), the interviewer could be sure that they would make every attempt to fulfil their commitment. It is easy for a prospective participant to state that he or she is willing to be involved in the study yet when the time comes for the interview, find reasons to delay or withdraw from it.

The interviewer also had to be certain that the participants met the requirements of what constitutes a decision-maker in this study. The participants needed to be decision-makers who were regularly involved in the making of non-trivial decisions²⁶. One would expect that all managers would view their decision-making as being non-trivial. In selecting participants for the study, any "over stating" of an executives own decision-making had to be recognised. To achieve this, the interviewer gained a clear understanding of the nature of the executive's role, and the variety of decisions involved in that role. The magnitude of the described decision could then be evaluated.

²⁶ Section 2.2 clarifies a non-trivial decision in the context of this study.

4.7.2 PREPARING FOR THE INTERVIEW

Pilot testing the interview schedule was essential. Several subjects who could quite easily have been subjects for the real study were chosen to pilot the interviews principally through their accessibility and willingness to assist²⁷. Each pilot interview was treated as a real interview except that at the conclusion of each, the participant was asked to provide feedback on a number of issues discussed both within the interview, and also from the questionnaire. Once the piloting process had been completed and the interview design refined based on that process, preparation for the actual interviews could begin (note: by this stage subjects had been contacted and approval gained. Explanation of the selection process is given in Section 4.6.1.

Before the interview, it was important to know as much as possible about each participant and the decisions he or she made. This was for two reasons. Firstly interview time was valuable and it was felt that time should not be wasted gaining background information; confirmation was all that was needed. Secondly, it was hoped that the participant would be impressed (and subsequently more committed) once he or she recognised the level of pre-interview effort that the researcher had put in. Such preparation involved conducting pilot interviews (as described above), confirming the time and location of interviews with participants and sending out a pre-interview information sheet to all participants so that their level of preparation was adequate.

4.7.3 INITIAL MOVES

Bryman (1992) states that a typical qualitative, unstructured interview starts with some general questions, but relies chiefly on aide - memoire²⁸ keeping the discussion focused. “Truly unstructured interviews are not guided by a pre-existing schedule; at most, interviewers use an aide - memoire which reminds

²⁷ Data from these pilot interviews is not included in the study results.

²⁸ An aid to the memory in the form of documentation

them of the topic they wish to cover, while giving the respondents considerable latitude over what they want to say and how they say it.” (p. 147).

In setting the scene of the interview, what the interviewer thought to be one of the less risky approaches to interviewing was employed. This involved addressing factual or descriptive information at the beginning of an interview. This allowed a rapport to develop between the interviewer and the interviewee before any 'difficult' questions or issues did arise. The purpose of the research was re-iterated along with how the interview would play an important part in that.

Starting with some general questioning was important. This allowed the participant to understand the level of formality (or lack of it in this case) and to gain some practice in communicating with the interviewer in the relaxed atmosphere that the interviewer was trying to establish. Getting the participant to communicate freely was a major hurdle as most interviews contain a significant level of structure and formality and many managers are used to structured decisions, and subsequently, feel most comfortable in that environment, especially when they are the subject of the discussion. Lincoln and Guba (1985) describe this time as giving the participant an opportunity to "organise his or her head".

4.7.4 PACING THE INTERVIEW AND KEEPING IT PRODUCTIVE

Interpretivist research requires that the interviewer be both adaptable and reactive to the situation. No two subjects are likely to behave similarly, nor will they give similar information. For that reason, the interviewer must be prepared to guide the subject where necessary, but also let the discussion follow an unrelated path, in the hope that the preferred direction might be achieved later in the interview.

King (1994) describes flexibility as what can inevitably make or break a qualitative interview. He suggests that a common opening question might be employed, but beyond that, the slate is clean and the interviewer must be guided

by his or her assessment of the state of the interview. In the same manner, the interviewer must be adaptive. Difficult or sensitive issues might need to be softened or held back until the end so that the relationship might develop. The way questions are phrased and the rhetoric used by the interviewer can have a significant bearing on the way the interviewee interprets the questions and the subsequent responses. As a general rule of thumb, it is commonly advocated (e.g. Yin, 1994) that questions should be presented in the simplest form possible. Unsuitable responses which have resulted from a poor understanding of the problem domain are acceptable, situations where this is a result of poor communication between the interviewer and interviewee or an inadequate explanation by the interviewer are not. If the interviewee is allowed to become confused then this might result in anger or disinterest on his or her part and a subsequent reluctance to participate fully.

As the interview progresses, the discussion must become increasingly specific. The interviewer's role was to keep the discussion focused and in the desired direction while talking as little as possible. It was essential to maintain a level of flexibility (and of course maximum attention) so that promising leads might be developed further through the introduction of additional impromptu questions where required.

One of the tools that can significantly improve the quality of an interview is the use of probes. The use of probes often distinguishes the skilled and unskilled interviewer. Probes include: silence, particular sounds such as “uh huh” or “umm”, relevant gestures or hand signals, calls for more information or details, calls for examples, calls for reactions to particular statements or issues or reactive questioning following something that the participant might have said. (Lincoln and Guba, 1985). Correct use of probes are a result of being able to quickly and accurately read the situation and being able to react in a positive manner. For this reason it was imperative that the interviewer remained fully attentive and prepared to make speedy judgements as to the direction of the discussion. It was necessary to be able to identify rich lines of discussion in the same way that it was necessary to be able to recognise when the current subject was either irrelevant or had been exhausted.

4.7.5 GAINING CLOSURE: TERMINATING THE INTERVIEW

In most cases, time will determine the point at which an interview must be concluded. For obvious reasons, it was undesirable for premature termination to occur in any of the interviews within this study. It was therefore critical that the interview was kept progressing at the necessary rate so that it might be tactically concluded rather than simply "wound up". At the end of each interview the interviewer briefly reiterated his interpretation of what the participant had disclosed so that any obvious misunderstandings could be quickly rectified. It was hoped that this would limit the opportunity for the participant to retract, at a later date, any statements made. It also gave the participant an opportunity to add to statements they made earlier in the discussion.

The final act of the interview was to thank the participant for his or her time, gain any feedback on the process, and leave channels open for further discussion if necessary. Ending the interview on the right note was important; it was essential that all difficult or contentious issues had been dealt with before the end of the interview. This was the time for making positive statements so that as much as possible, the participant left the interview feeling good about the experience (King, 1994) and potentially receptive to a further request for information.

4.7.6 INTERVIEWER EFFECTS

In relation to issues of a sensitive nature in particular, Lee (1993) identifies two kinds of interviewer effects: The social characteristics of the interviewers themselves might have a biasing effect on results and also, the expectations the interviewer might have about the interview.

The greatest problem that exists when conducting the face-to-face interview is the likelihood of interviewer bias. The appearance and demeanour of the interviewer might influence the responses given by the subject. For example, if an interviewer smiles and makes a positive statement after a subjects response to a particular line of questioning, then the subject might be inclined to give similar

responses to other questions - thus trying to satisfy or impress the interviewer. The best way in which a researcher can deal with this is to appear positively neutral to all responses and comments and not give the impression that the statement was good or bad, but of the nature that was required. In addition it was important to declare any interviewer bias in reporting the result, as opposed to trying to eliminate it all together, which would only serve to minimise the richness of the data gathered.

4.7.7 INTERVIEW FORMAT

The format of each interview loosely followed the research questions, for ease of processing only. Formal questioning was left to the end and the focus of this depended on what had been included in the preceding discussion.

Each interview began with the interviewer outlining the purpose of the study and the interview. Issues of confidentiality were then discussed along with the participant's rights of withdrawal. During this time each participant was asked to read and complete two confidentiality agreements; one for them to retain, the other to be held by the interviewer. Participants were then given the opportunity to ask any questions they might have before the interview "proper" began.

Interviewer – Interviewee Interaction

Having cleared up any concerns that may have been present, the participant was then provided with a simple definition²⁹ of problem structuring and a description of the activities contained within it. Ensuring that the participant understood the activities that had just been described, they were asked to think of a recent non-trivial decision (they were asked to think of this in advance of the interview) and describe the process they followed in making that decision, asking them to place special emphasis on the structuring elements of that process. It was during this process description that a number of the research questions were covered. The interviewer was active during this time and asked many questions during the

²⁹ Based upon the definition presented in section 2.12, but phrased for ease of understanding: "Problem structuring is the preparation of a decision: the understanding of the decision problem, the collection of the relevant information and the formulation of that information such that a choice can be made."

description so as to clarify issues or determine whether what was being described was typical of the participant's wider decision-making behaviour. Appendix H provides a sample of the types of questions that were asked during this time. This list was used in all interviews simply as a guide to ensure that each research question had been addressed. Numerous other questions were added during the course of an interview, but which related specifically to that participant. The first part of the interview took on average 25 mins. To give the interviewer time to go over the list of questions derived from the research questions and to give the participant a break from talking, the Cognitive Style Analysis (CSA) testing was next undertaken.

Cognitive Style Analysis (CSA) Testing

To this point, all of the investigation into human behavioural influences on problem structuring will have emerged solely through the researcher's interpretation of the statements made by the participants. While potential interviewer/researcher bias is acknowledged (Section 4.7.6) it is advantageous to also use a tool that independently measures the psychological and cognitive attributes of the decision-maker. This helps validate the observations made and also permits comparison across participants. The CSA tool was employed due to its ease of use, its short duration to administer, and because it is purported to measure cognitive elements relating to decision-making (Riding, 1998).

The Cognitive Style Analysis (CSA) is administered via a specifically developed software package. The use of the computer-based tool is an important factor in the assessment of the subject as the time taken for undertaking certain tasks is assessed. A laptop with the testing software ready installed was supplied by the interviewer and prepared for use at the start of the interview. Section 2.15.2 describes the theoretical underpinnings of the CSA, but in terms of process, the testing operated as follows. Some basic guidelines were provided to each participant as per the CSA administration documentation (Riding, 1991). The participant was then given the laptop in which to complete the test. After entering their name, age and sex, they were provided with on-screen guidelines as to how to complete the first part of the test. Several examples were also

provided. The first part of the test involved the participant recognising word associations and was subsequently required to state (by pressing one of two keys on the keyboard) as to whether they agreed with a given statement or not. Each time they made their judgement, they would be informed whether the computer agreed with them or not, and the next screen would then appear automatically. Approximately fifty such screens appeared. At the conclusion of the first part of the test, the software described the second part, again including some examples. This time, the participant was required to judge graphical associations. Approximately twenty of these were required. Part three of the test was similar to part two, but involved more complex graphical judgements. Again approximately twenty such judgements were required. At the conclusion of the test, an output screen was displayed containing information relating to that participant's cognitive style. The interviewer outlined what the cognitive style indicated and asked them to briefly indicate whether they agreed with the summary analysis and also what they thought of the test. They were then provided with a prepared description of all cognitive styles so that the participant could (following the interview) investigate their result in greater depth and also compare their style with others. The entire process took from 6-10 mins. While the CSA test was being undertaken, the interviewer reviewed the prepared interview questions and made notes of any issues that had not been raised or that required further investigation. He also provided a brief analysis of the participant. The analysis included whether the participant appeared knowledgeable in the area, was confident, seemed to understand the questions being asked, etc.

Having completed the CSA, any further questions that the interviewer now had were asked of the participant. Once these questions were answered, a short questionnaire was given to each participant to be filled out before concluding the interview.

Questionnaire

The questionnaire (see Appendix B) was used as a triangulation tool for enhancing credibility. The questions contained were again based on the overall research questions and required participants to indicate their level of agreement with a particular statement using seven point likert scales. Demographic and background information was also collected in the questionnaire. This allowed the decision-making experience of the participants to be evaluated and the time spent in their present organisations and industries (along with prior employment and industries worked in) to establish their significance. They were also asked to list their qualifications and state whether they had received any formal decision-making training. At the end of the questionnaire, several questions were included that related to the existence and impact of excessive information, i.e. information overload. These questions were included for the purpose of additional (but related) research being carried out into the effects of information overload on decision-making. The inclusion of these questions was made more acceptable given the obvious relevance information overload had for problem structuring.

4.7.8 TERMINATING DATA COLLECTION

The number of participants involved in the study (16) might be perceived as limiting. This was not found to be the case. No decision was made prior to data collection as to the “necessary” number of participants. This was to be guided primarily by the quality and nature of the data as it emerged and secondly, based on the number of respondents following the initial contact. It was thought appropriate to continue data collection until no new data emerged. This was based on the subjective assessment of the researcher. To ensure that the data was not misread, the ordering of the interviews was random (which incorporated an equal distribution of public and private sector participants) so that false signals of completeness might not be misinterpreted. Furthermore, it was decided that when this termination point was felt imminent, several further interviews would be conducted to ensure that termination was in fact appropriate. The first indication that little new data was emerging occurred after about 10 interviews. Some minor additions to the results were uncovered after

12 interviews so it was decided to continue for a further four. It was decided that the information that came to light during these final interviews was of marginal value, and so data collection was terminated.

4.8 TRUSTWORTHINESS

An essential element of any research is a description of attempts made to ensure the adequacy or rigor of the eventual results. In traditional positivist research, considerable emphasis is placed on ensuring the reliability, internal validity, external validity and objectivity of the measures and procedures used in conducting the investigation. While equally important in qualitative research, the alternative terminology of: Auditability, Credibility, Fittingness and Objectivity (Lincoln and Guba, 1985) are used. Figure 4-4 presents a comparison of quantitative and qualitative research in terms of adequacy measures.

Criteria	Quantitative Research	Qualitative Research
Consistency	Reliability	Auditability
Truth-value	Internal validity	Credibility
Applicability	External validity	Fittingness

Figure 4-4 Adequacy of Research: Quantitative vs. Qualitative (Adapted from Davis, 1997)

4.8.1 AUDITABILITY

Auditability is concerned with the degree to which present study results might also be obtained by another researcher when following the same method of analysis. Quite simply, it is a measure of whether the research process is adequately documented such that a replication of that process might produce the same results. Auditability is often discussed in terms of the “decision trail” (e.g. Lincoln and Guba, 1985) that adequately documents the following process.

Because of the large role the researcher plays in the qualitative investigation, and since much of the reported results of a study are subject to the investigators

interpretation, the reporting must be in a form that is understandable by others (Ruderstam and Newton, 1992). This allows readers to determine as to whether they interpret the results similarly. The coding scheme that is used in this research is presented in Section 4.9.2. In addition, Appendix E presents an extract from one of the interview transcripts, and is accompanied with the grounded theory analysis that was undertaken on it.

A number of threats exist when conducting qualitative research; auditability is one of the greatest. Auditability is the qualitative equivalent of research reliability, the degree to which results obtained in the analysis of the results might be also obtained had the analysis been carried out by another person. In addressing audibility, every endeavour is made to present the results and the analysis of the results (discussion) in a form such that any suitably qualified person might take the results and draw similar conclusions from them. Clearly, it is neither feasible nor ethical to include complete interview transcripts with this thesis, however where possible, results or analyses will be presented in association with supporting extracts from relevant transcripts or other sources (e.g. interview notes). In addition, every attempt is made to outline the context in which comments are made and subsequently referred to or quoted. While complete transcripts clearly cannot be included, short summaries of each interview and the general nature of the participant's problem structuring is attached in Appendix D. These provide the necessary contextual and background information and support the analyses presented.

4.8.2 CREDIBILITY

Credibility is principally concerned with ensuring that observations or responses are correct. While auditability is concerned with correct analysis of the data, credibility is about being sure that the data being analysed is correct. "Credibility or truth value is ascertained through structural corroboration." (Rudestam and Newton, 1992, p. 38-39). Three approaches can be used to enhance credibility:

1. **Prolonged Engagement:** Spending sufficient time with subjects so as to identify and subsequently remove any potential disorders.
2. **Persistent Observation:** Exploring the participants experience in sufficient detail.
3. **Triangulation:** Employing multiple methodologies or data sources such as written records, diaries, field notes, other similar investigations etc, where appropriate of course. The main advantage of triangulation is that it can provide a more complete and contextual portrait of the subject (Ghauri *et al.*, 1995). One of the problems that can be encountered with triangulation is that it is often difficult to determine whether triangulated results are consistent or not. Also if results are found to be contradictory, it is often difficult to know how this should be reported.

Triangulation within this study is difficult. Decision-making behaviour (and the logic behind that behaviour) is the subject of the study. Although short questionnaires and asking subjects to simulate their behaviour might triangulate certain aspects of the data, the research was, in general, reliant on a sound design and testing regime to make up for these limited triangulation opportunities.

A number of other techniques might be suitable for making the results of a study more credible. These include peer-debriefing, revision of interpretations, post interview clarification, etc.

Even within a single interview it is possible to revisit comments made earlier in the interview or discussion. One way in which this was undertaken was to ask principally the same question, but within various, and differing, contexts. As an example, one could ask decision-makers about the degree to which time constraints influenced their structuring of decision problems. Later on during the interview, that same issue could be addressed by way of a real or simulated example. A decision-maker might not believe that time constraints play a major role in their decisions, however when they describe a recent decision they have made, they might realise that they play a greater role than they initially believed.

As earlier mentioned, in addition to the actual face-to-face contact that occurred with each participant, initial, background information was also obtained about each. Follow-up confirmatory feedback was also sought so as to ensure that what was disclosed during the interview, was in fact a true account. Without going to extremes, this was as much as could be feasibly achieved with regard to addressing credibility risks through persistent observation. Information was gathered at three different points in time, in three different ways; this should have identified all but the most subtle credibility risks.

4.8.3 FITTINGNESS

“The qualitative study emphasises the “thick description” of a relatively small number of subjects within the context of a specific setting” (Ruderstam and Newton, 1992, p.39). The challenge in such studies is to conduct it in such a manner that its results might have a far wider application. Fittingness refers to the degree of transferability or congruence that exists between contexts or cases (Lincoln and Guba, 1985) within the present study and the degree to which they can be generalised outside of the study. Fittingness is best dealt with by gaining maximum understanding of the cases within the study and ensuring that they are representative of the wider community.

The fittingness or generalisability of a study is often difficult to evaluate until it has been completed. In this study, a significantly large number of decisions and decision-makers were included to minimise any likely questions of fittingness or transferability. Although location imposed physical constraints, the sample of decision-makers came from wide backgrounds, varying industries, and the decisions were of varying levels of complexity and importance.

4.9 DATA ANALYSIS STRATEGY

There are very few sources that guide the novice (or in fact the experienced researcher) as to how to go about analysing case study evidence. As a rule of thumb however, one is unlikely to go too far wrong by following a strategy which is consistent with the research questions and by "following his or her own style of rigorous thinking...." Yin (1994). Clearly the nature of the study and more specifically, the nature of the expected result should be the principal guide to the method of analysis.

A range of different strategies exist, from those entirely qualitative to the other extreme where, as much as possible, all the data is quantified and statistically analysed. Clearly, the former is applicable to this study, although descriptive statistics are employed based principally on the data provided by the questionnaires.

The method of analysis must be guided by the research questions when determining the most appropriate method of enquiry. In the case of this thesis, the literature also provides direction. Consideration must also be given to the overall objective of the research when identifying the methodology. Attention is also paid to the methodologies employed by research peers not only in the field of problem structuring, but in all research studying the decision-making behaviour of managers in organisations. Given this, and the nature of the results, the grounded theory approach to data analysis was deemed to be a suitable method for analysing the qualitative data of this study. In addition, the grounded theory approach has received widespread support (e.g. Calloway and Knapp, 1995; Audis and Roth, 1999) as being suitable for analysing interview data, irrespective of the context of the research.

4.9.1 INTRODUCTION TO GROUNDED THEORY

“The grounded theory approach is a general methodology of analysis linked with data collection that uses a systematically applied set of methods to generate an inductive theory about a substantive area” (Glaser, 1992, p. 16). Barney Glaser and Anselm Strauss originally developed grounded theory for use in nursing

research. The name “grounded theory” refers to theory that is developed in an inductive manner directly from the data rather than through the testing of hypotheses. This contrasts with deductive theory development in which theory precedes empirical investigation thereby potentially resulting in minimal commonality existing between the theory and the data in which the theory is supposed to represent.

In its simplest form, grounded theory involves reading (and usually re-reading) a textual representation (although visual observations might also be used) of the data (e.g. field notes or interview transcripts) and identifying potentially relevant data and their interrelationships. Being able to identify such variables and the interrelationships between them is termed theoretical sensitivity (see Glaser, 1978, for a full discussion). Theoretical sensitivity relates to the researcher’s ability to understand the data. It is concerned with having: insight, the ability to give meaning to data, the capacity to understand, and the capability to separate the pertinent from what isn’t (Strauss and Corbin, 1990). It is this theoretical sensitivity that permits the researcher to develop a grounded theory in an effective and efficient manner. While it is the researcher who demonstrates theoretical sensitivity, it is generated from a number of sources including: existing literature, professional experience, personal experience, and also the act of processing the data itself.

The grounded theory approach consists of a set of steps that, if carried out correctly, produces “data grounded” theory as an outcome of which the quality of the eventual theory is dependent on the execution of the process by which the theory is constructed. The advantage of the grounded theory approach is that if done well, the resulting theory will fit at least one dataset perfectly. This contrasts with theory derived deductively from grand theory, without the help of data, which could turn out to fit no data at all.

The grounded theory approach has been employed within many disciplines and contexts. Given the association of its creation with the medical field, it is not surprising that application in this area is still common (e.g. Baszanger, 1992; Charmaz, 1994; Fujimura, 1988 for example). It has also been successfully

applied to research on recruitment (Konecki, 1997), relationships (Lempert, 1997) and sociology (Mizuno, 1992).

Section 4.9.2 presents, in detail, the process that was employed in analysing the data collected in this study. Following this (Section 4.9.3) is a brief discussion of two conflicting interpretations of grounded theory that have evolved since the approach first emerged. While grounded theory was jointly developed by Glaser and Strauss (1967), there has since been significant departure in terms of their respective views on the method.

4.9.2 GROUNDED THEORY PROCESS

The data gathered in this study is processed and analysed using an adaptation of the data analysis aspects of the grounded theory approach. This adaptation has occurred such that the procedures best match the subject of the study and the theoretical underpinnings of the research and the researcher. The flexibility that permits such an adaptation is prescribed necessary for the successful implementation of the grounded theory approach (Strauss and Corbin 1990). The procedures followed, as described below, are based upon the conceptual prescription of Glaser and Strauss (1967), Strauss and Corbin (1990) and Glaser (1992) but better reflect that nature of the collected data and the overall research design. Accompanying the subsequent description is a worked example performed on an extract of one of the transcribed interviews. This example appears in and is referred to several times in the ensuing discussion.

Open Coding

Open Coding is the first major stage in the grounded theory development process. It is the “...initial step of theoretical analysis that pertains to the initial discovery of categories and their properties” (Glaser, 1992; p. 39). Simply put, it involves the identification, naming, categorising and describing of events found within the data. For the purpose of this research, these events exist within interview transcriptions in the form of a collection of words containing nouns and verbs and also the notes prepared by the researcher during and immediately following each interview. We term these incidents, the individual elements of information. These incidents are then organised into a pattern of concepts and

been eliminated, incidents are then grouped with other, closely related incidents to form concepts as also shown in. Likewise once all incidents have been placed within concepts, these concepts are arranged into more abstract category groupings. In some instances the level of abstraction of a concept might simply require it to be renamed as a category. There are no set rules as to how many categories are required or the level of abstraction of them, this is something judged by the researcher at the time. Appendix E displays the identification of the categories emergent from the sample transcript extract.

The process by which the identification of concepts and categories occurs is almost impossible to describe. It is simply a step-by-step process where one by one, each incident is viewed and matched (where possible with a concept). When no concept exists, (which was the case for the first and a number of subsequent incidents), a concept name and description (property) is developed that suitably represents the nature of the incident. This will be, at first, a process of trial and error in identifying the correct level of abstraction, firstly for concepts, then for categories. Sub-categories are developed in those situations where large numbers of related concepts are required to be further separated so as to differentiate between similar categories.

In accordance with the issues relating to theoretical sensitivity as outlined in Section 4.9.1, following the identification of categories through the above approach, an additional list of potential categories might be established (which also addresses any underlying concerns about credibility). These categories are identified from the previously reviewed literature as being related to the research area, but which do not emerge through the open coding procedures described above. The lists of incidents, concepts and categories are then contrasted with any such “new” categories to determine whether a more suitable overall representation and data structure might exist. The categories are now almost ready to be contrasted with the research questions (see Section 4.4). A combination of competent data collection and data analysis will at this stage produce a number of categories that directly relate to these research questions. It is possible that categories might have emerged that have no obvious

association with any of the research questions. This is typical of the grounded theory approach and might or might not have any real significance for the study.

Axial Coding

Axial coding is the process of relating categories and their properties to each other, via a combination of inductive and (to a lesser degree) deductive thinking. While open coding is concerned most with identifying individual elements and forming them into loose but related groupings, axial coding involves restructuring and rebuilding the data into patterns that are intended to reveal links and relationships (Hussey and Hussey, 1997). One of the principal components of axial coding is the development of the categories and sub-categories in terms of their properties and dimensions and also the research questions (see Section 4.4). This is likely to result in the formation of fewer, more theoretically aligned categories. In the data analysis of this research, relevant phenomena³⁰ are identified from the categories established during open coding. This is simply the renaming or reclassifying of a category or sub-category. In certain circumstances however, where a single category appears to contain more than one phenomenon, the concepts associated with that category might be viewed to determine what the phenomenon are most likely to be. Appendix E provides a brief example of the translation of open coded categories into phenomenon.

Once the above coding process has been completed for all categories/concepts, a good understanding of the possible relationships between them should have been established. It is the existence of such relationships that might indicate the existence of potentially significant research outcomes – in addition to the phenomena_themselves. Relationships are then further measured through the inductive/ deductive process of verifying them against the original data. Phenomena (and their detailed properties as established by the coding procedures) and relationships supported by the data at this stage are then assessed again to determine if the current set of phenomena and relationships is still appropriate and ‘in tune’ with the data. This involves the “tracking” of the

³⁰ In this study the terms phenomenon and category (and sub-category) are used interchangeably.

original incidents to ensure that the phenomena now intended to represent is in fact valid.

It is often at this stage (after several iterations of comparison and classification) that it will emerge that not all the data will apply to the theory at all times. “These anomalies must not only be accepted, but must be incorporated into the research” (Hussey and Hussey, 1997, p.267). The complexity and non-uniformity of real world data often becomes most evident at this point.

Selective Coding

The final stage of grounded theory, selective coding is often considered the most difficult. It involves integrating all the categories into what can be called, the “grounded theory”. However as Strauss and Corbin state “integration is not much different than axial coding. It is just done at a higher more abstract level of analysis” (1997, p.117). In essence, selective coding is about developing a single storyline that encompasses all data, grounded categories and relationships. In this research, the seven research questions are used to guide the selective coding process. To establish the storyline, a ‘core category’ needs to be identified, this being the central phenomenon around which all other categories are integrated. The core category should first emerge during axial coding and be further emphasised during selective coding. The storyline is essentially the conceptualisation of the story being told in the research in respect to each particular research question.

Having been established, the stories to be told have to be developed. Strauss and Corbin (1990) describe this process as beginning with the writing of a few sentences describing the essence of the story, simply providing a general descriptive overview of the story’s contents³¹. By this point in the analysis however, a good understanding of the data should have already been achieved and the formal process of writing the story proposed by Strauss and Corbin will do little but complicate the process, or as Glaser describes “...the analyst should remember that we are dealing with a myriad of rules and dictums by Strauss on

³¹ It is at this point that the method employed in this research diverges from the formal step by step process prescribed by Strauss and Corbin (1990).

‘how to’, all of which just become moot and excess baggage if the analyst trusts the emergence and his or her ability to conceptualise indicators” (1992, p.76). Having identified phenomena that relate to the research questions and a cross referencing schema relating these phenomena back to their contributing categories, concepts and incidents, the “stories”, written in the form of results and discussion, can now be formulated. Those relevant phenomena that “emerge” from the data yet appear to be unrelated to any particular research question are presented in a similar (consistent) manner and are presented in Section 5.11 under the heading of “Other Interesting Observations”. All stories/results/discussion are presented in Chapter Five. Appendix E exhibits the evolution of story descriptions that relate to the research questions.

Grounded Theory Data Sources

It is important that the roles of all data sources used in the grounded theory data analysis approach is made clear. As has been previously noted, the grounded theory approach is a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon (Strauss and Corbin, 1990). This induction is based, primarily, on the transcribed face-to-face interviews that were held between the researcher and each participant. In addition, notes made by the researcher both during and immediately following the interview are also analysed. These notes are analysed in exactly the same way that the transcripts are. If a relevant incident is identified, then it is added to the incident list for that participant. Data emergent from the CSA and the questionnaires are not analysed in the same way, but used to provide support for the primary data sources, where appropriate.

While the grounded theory approach used is inductive, it does employ both inductive and deductive thinking processes. “The grounded theory methodology does not view ‘inductive theory building’ as implying that the researchers need to flush out their pre-existing theoretical conceptions or knowledge about the phenomenon under investigation, and just let the data speak for itself” (Sarker, *et al.*, 2000). The existing knowledge held by the researcher, whether that be prior experience, or familiarity with existing literature, does in fact make a useful contribution to the grounded theory analysis process in terms of the important

insights it often permits (Strauss and Corbin, 1990). In this study, the data presented is entirely inductive. Researcher knowledge and existing literature is only used to aid the process of naming and comparing data entities (incidents, concepts, categories etc).

4.9.3 CONFLICTING INTERPRETATIONS OF GROUNDED THEORY

The development of grounded theory as a widely used data analysis strategy has not been aided by the divergence in interpretation of the approach by its founders, Barney Glaser and Anselm Strauss. It appears now that two somewhat different, but still related, methodologies have evolved. Babchuk (1996) provides a useful analysis of the debate that has emerged from the development of the two approaches, what makes them different and what implications this has for research methodology.

Grounded theory was first presented by Glaser and Strauss in 1967 as The Discovery of Grounded Theory. It has subsequently been applied to many research disciplines and fields. The most well known publications emerging from this initial work include: Theoretical Sensitivity (Glaser, 1978); Qualitative Analysis for Social Scientists (Strauss, 1987); Basics of Qualitative Research: Grounded Theory Procedures and Techniques (Strauss and Corbin, 1990) and Basics of Grounded Theory Analysis (Glaser, 1992).

Babchuk (1996) believes the principal differences between Glaser's and Strauss' versions of grounded theory "...seem to hinge on both epistemological and methodological chasms" (p. 2) that exist between them. Babchuk suggests that Glaser might be more deeply committed to principles and practice relating to the wider qualitative paradigm. His approach is intendedly flexible to the point of being based upon the socially constructed realities of research informants. Conversely, the view of Strauss (and Corbin) is that the process of research should be determined by the researcher(s) although much of what they present is prescriptive and quite detailed. Strauss' use of such terms as generalisability, replicability etc suggests that he has attempted to 'nudge' grounded theory in the direction of more mainstream qualitative research.

Glaser's criticism is concerned with Strauss and Corbin's use of predetermined coding schema (comprising six elements) rather than relying on the data to provide these. The reason for using their schema in this research does not signal a disagreement with Glaser's criticism, the reason for its use is far more straightforward. Glaser (1992) is frequent in his warning that grounded theory is an approach that requires practice. A doctoral dissertation is not the medium for such experimentation or experience building; however the method clearly has value for analysing the qualitative data present in this study. This research intentionally made use of whatever guidance and assistance was available so as to ensure the success of the analysis.

Glaser and Strauss (1967) and Glaser (1992) describe the grounded theory approach as a complete research methodology. Given that grounded theory is employed in this research for the purpose of data analysis only, not as an entire research approach, the manner by which it is used must be determined by the nature of the inherent research methodology and the nature of the data being analysed.

As a result, neither Glaser's nor Strauss and Corbin's approaches was intentionally utilised; rather an approach was taken that was not dissimilar to that which was presented by Strauss and Corbin, but which recognised the advanced nature of the research and the essence of the data. The central element of grounded theory, coding, was employed, although the method by which this occurred was as a result of a synthesis of both authors' perspectives. In many respects, such an approach is not dissimilar to that prescribed by Glaser; i.e. letting the data guide the method of analysis.

4.10 DELIMITATIONS

This research focuses on the decision problem structuring of executives within medium to large New Zealand organisations, including those in both the public and private sectors. The executives interviewed are all in roles such as, Chief Executive Officer (CEO), General Manager, Deputy CEO etc. Data is primarily gathered via interviews and observation.

4.11 LIMITATIONS

Some limitations have been identified as being present in this study. While they may not necessarily indicate a weakness in the research, they may indicate areas where generalisations may not be possible or potential bias might exist, for example.

Firstly, the results obtained were from a selection of executives operating primarily within regional New Zealand. These results might not be generalisable with respect to all decision-making situations both in New Zealand and globally. Replication of this research within different environments would be required to assess the likely extension of this generalisability.

Also, the results and subsequent discussion presented are based on the interpretation and analysis of the researcher/author. Others might interpret the same results differently. Furthermore, the researcher/author conducted all of the interviews. The likelihood of interviewer bias is significantly increased under such conditions. It was however, felt important that a single person be involved in all of the interviews as that allowed for consistency to be achieved. It was also important that the interviewer was also involved in the data analysis. Much of the richness that emerges from the interviews becomes diluted when only the interview transcripts are considered. Much of what is said during each interview is said within a particular context. The transcripts cannot record emotion, facial expression, tone etc.

4.12 SIGNIFICANCE OF THE STUDY

Section 4.3 describes the purpose of the study in terms of its research purpose, its practical purpose, and the personal purpose of the author in conducting it. Beyond this however, the significance of it should be outlined along with the contribution it will make to existing research and also to decision-making practice.

This work contributes to two related fields. Firstly that of descriptive decision-making, where, by and large, the activities occurring before choice have received little attention or have been discussed within the context of wider descriptive processes (e.g. Nutt, 1984; Mintzberg *et al.*, 1976). This work will be the first significant descriptive contribution that focuses specifically on the descriptive understanding of problem structuring. Also, it contributes to the field of problem structuring research. In taking a descriptive approach, it seeks to add to existing research, much of which is prescriptively based. In addition, as is the case with exploratory research, this work is intended to produce many more questions than it answers, thus opening up new research opportunities.

These new opportunities may, in time, have significant implications for problem structuring in practical terms. A descriptive study such as this, can only hope to improve understanding of existing processes; research emerging from it however, may offer the opportunity of new, improved prescription that may eventually lead to greater use of research-based prescription within real decision-making environments. This research takes a small, but important, step in this process.

4.13 CHAPTER SUMMARY

This chapter has outlined the theoretical positioning of the research and the researcher. A qualitative research design was subsequently proposed that seeks to understand the unaided processes employed by executive decision-makers.

The research purpose was outlined, followed by a description of the research questions that seek to address the research gap presented in Chapter Three. Following this the case study research methodology was outlined along with the procedures followed in data collection. Towards the end of the chapter, the adaptation of the data analysis aspects of the grounded theory approach was described. This approach was developed such that it best suited the theoretical perspective of the research and researcher, the type and nature of the data being collected and the research questions being addressed.

The next chapter (Chapter Five) contains the combined results and discussion based on the grounded theory analysis. The grounded theory data analysis forms the structure of the chapter, which itself is based upon the research questions presented in Section 4.4. Other relevant results, which don't specifically address any of the research questions, are also discussed.

5 RESULTS AND DISCUSSION

5.1 INTRODUCTION

This chapter presents and discusses the results of the research undertaken. The results and discussion are presented simultaneously and are supported by referring to their sources. Primarily, these sources include the interview transcripts, but also include questionnaire data, interviewer notes based on observations made during and immediately after each interview, and any relevant results emerging from the Cognitive Style Analysis (CSA). The structure of this chapter is guided by the research questions presented in Section 4.4.

Subsections 5.2, 5.3, 5.4 and 5.6 begin by presenting a synopsis of each of the decisions as it relates to the particular research question. This synopsis is based primarily upon the interview transcripts, but, also makes use of the post interview notes made by the interviewer and the CSA results (where appropriate). The presented synopses are subjective, holistic assessments presented to provide a preliminary description of each decision as it relates to its respective subsection. They are particularly useful in providing a reference for the later discussion, where specific decisions are often referred to. The synopses, however, are not intended to be interpreted as a summary of results, they simply provide context to the discussion. Synopses for the remaining subsections (those not listed above) are either not necessary (i.e. not central to the study) or contain little data. Explanation of their exclusion is given at the start of each relevant section.

Within subsections 5.2, 5.3, 5.4 and 5.6, the emergent results from the grounded theory data analysis that was performed is presented. Given the nature of the remaining subsections, and the questions some of them are addressing, no grounded theory analysis could be conducted. The transition from identified

incidents to the “stories” that resulted from the selective coding is summarised, with incident tables for each subsection presented in Appendix F. Incidents were first identified from the transcripts, followed by the interview notes and the CSA data. Existing literature was only used to help define the incidents and did not form any basis whatsoever for the data. It should be noted that the frequency of each incident is not a measure of the strength of that incident. For example, all executives identified that time constraints were present in their decision-making, however few mentioned it more than once. Conversely, for example, one executive mentioned on nine occasions the presence of external politics/lobbying in his decision-making.

Acknowledging the assumed sequentiality of the overall decision process (e.g. Simon, 1960), section 5.2 investigates the manner in which executive decision-makers are receiving their decisions for structuring. Accordingly, this section (5.2) first looks at the various types of decisions being received (human resources, property acquisition, company strategy etc.). This is followed by a detailed analysis of how an executive becomes aware of a decision problem and the subsequent need for structuring. Different types of decision problems are then described, with a discussion provided as to how the type of decision problem might influence that awareness. Such types include top-down/bottom-up decisions and foreseen/unforeseen decisions. Section 5.2 concludes with a discussion of decision states, or the degree of structure associated with a decision when it is received by the decision-maker.

Section 5.3 looks at the important issue of contextual, or external, constraints and influences on the problem structuring process; influences over which the decision-maker has little control. Four major influences are identified and their impacts on the structuring process are outlined. These are: time, excessive information, finance and political interference.

The most obvious of the human behavioural influences are considered next (Section 5.4). Issues found to be significant include the decision-maker’s understanding of the nature of, and need for, decision problem structuring, the level of problem structuring experience, and the confidence of the decision-

maker. Finally, the significance (if any) of the cognitive style of the executive in structuring decision problems and supporting the existence of the above influences is assessed.

Section 5.5 also focuses on problem structuring influences. In addition to those influences or constraints described in Sections 5.3 and 5.4 (for which strong evidence was found), a number of other potential influences are also recognised. The support, however, for these additional influences was less than for those previously described. Other influences identified include: self imposed constraints, ability, external accountability and organisational culture. The anticipated ramifications of a decision are also described as influencing the process.

In Section 5.6, the major components of the problem structuring process are assessed in terms of their degree of incidence within the unaided naturalistic processes described by the participants. The major components are the defining of decision objectives, the generation of relevant alternatives, and the collecting of information.

Section 2.13 was concerned with problem structuring prescription. The likely application to unaided individual decision problems is suggested as being fairly limited. Section 5.7 uncovers the use of this prescription by the participating executive decision-makers.

Section 5.8 takes the results gathered in this study, and attempts to relate the general problem structuring behaviour with behaviour reported on in the wider descriptive decision-making literature. It has been noted several times that existing problem structuring literature is limited in quantity, and disparate in terms of its coverage of many research areas. Generalised descriptive decision-making literature is much more prevalent, and in comparing it with the problem structuring behaviour of executives, provides the opportunity to identify those aspects of that behaviour that might be present, not only in the entire decision-making process, but in other executive activities. Only those descriptive elements that are clearly present are discussed.

Section 5.9 presents the results and discussion relating to the part of the investigation that attempted to understand the level of commonality that occurred across decision problem structuring processes. Firstly, this section looks at those elements that appear common to all decision-makers within this study. It next looks at each executive decision-maker in turn and compares the decisions they make. Finally, it presents those fundamental activities that seem to be undertaken irrespective of the decision problem.

As already stated, Section 5.2 outlines the various decision types observed in the interview data. In Section 5.10, an attempt is made to relate these decision types to certain problem structuring behaviour and processes. The discussion focuses on the most identifiable decision types; public and private sector decisions, opportunity and threat-based decisions, top-down and bottom-up decisions and, foreseen and unforeseen decisions.

Typical of any research (in particular where grounded theory type coding techniques are used), a number of results which may or may not be relevant, but do not specifically address the developed research questions, may arise. Section 5.11 presents a summary of these “Other Interesting Observations.”

Section 5.12 presents a brief summary of how this study’s results might be incorporated into decision problem structuring prescription. The exploratory nature of the study is acknowledged; however it is suggested that if the results are found to be an accurate representation of problem structuring behaviour beyond this study domain, then a number of descriptive elements might successfully be included in prescriptive developments. These elements are presented in the form of an annotated list.

One of the study objectives presented in Chapter One of this study was to attempt to understand/model unaided decision problem structuring behaviour of executives. Presented graphically, a model of executive decision problem structuring evolves as the results are presented and discussed. While components of this model are initially presented in isolation, Section 5.13 attempts to formulate these parts into a larger model of decision problem structuring based upon the behaviour described and observed within this study.

To be able to conceptualise these components, the proposed influence model of executive decision problem structuring is presented in Figure 5-1 followed by a brief description. Full explanation is provided in the relevant sections and is summarised in Section 5.13.

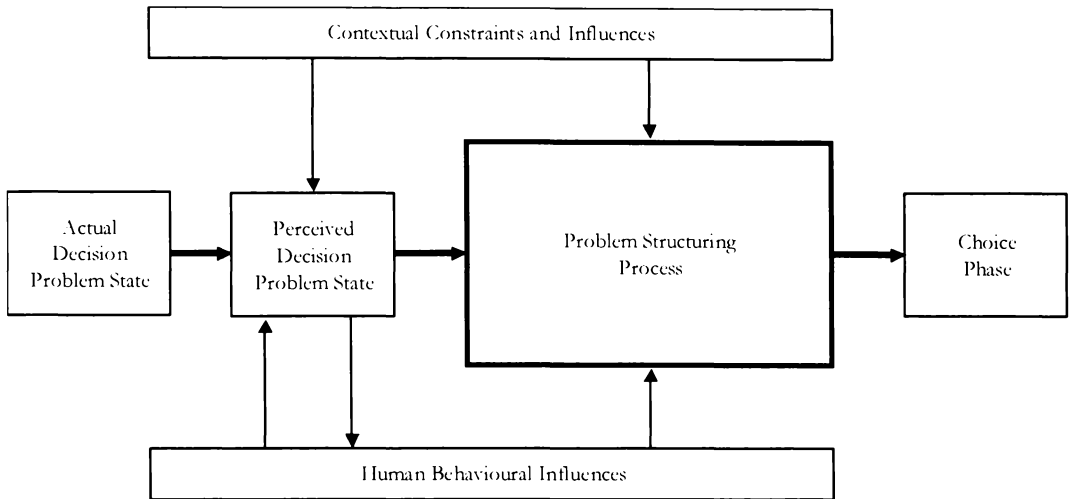


Figure 5-1 A Proposed Influence Model of Executive Decision Problem Structuring

The synthesised model (based upon the behaviour of all participants) of decision problem structuring shows that all structuring actions are based upon some form of influence; it is for this reason that the presented model is termed an “influence model” or “model of influence”. Figure 5-1 shows the transformation from an identified decision problem, through the decision problem structuring process and ending with the choice phase. Reading from left to right, the state of the decision problem, as perceived by the executive decision-maker, might not be the same as the actual decision problem state. Various contextual and human behavioural influences can distort this perception, such that it differs from the actual state. The decision-maker’s perception of the decision problem can, in turn, influence the problem structuring process. For example, a decision problem perceived as complex and heavily constrained by time is likely to cause the decision-maker to view the problem structuring activities with that perception in mind. The decision-maker’s perception is also found to contribute to the human behavioural influences which later impact upon the structuring process. Contextual and human behavioural influences also impact upon the problem structuring process.

A common theme of this model is the influential nature of actions and events, and the effect they have on the various components of the structuring process. Influences (both internal and external) affect not only one aspect of the process, but often have further, down-stream effects.

The chapter is concluded with a summary in Section 5.14.

5.2 DECISION PROBLEM EMERGENCE

Q1.1: In what state are decision-makers ‘receiving’ decision problems?

The first step in attempting to understand the process and behaviour of naturalistic problem structuring involves identifying the form or “state” in which decision-makers are receiving their decision problems, i.e. the point in time at which the decision-maker is first aware of the need to make a decision or at least the existence of an “issue” (Nutt, 1984). It was decided to investigate the nature of decision problem emergence, and ascertain its significance, as much of the existing problem structuring literature simply assumes that the decision problem has emerged and that there is no relationship between that emergence and the subsequent structuring process (e.g. Arbel and Tong, 1982; Farquhar and Pratkanis, 1993; Butler and Scherer, 1992). Others, (e.g. Pounds, 1969; Schwenk and Thomas, 1983; Lyles, 1981) give consideration to the understanding and recognition of the decision problem.

We begin by defining the boundaries of the system of which we are interested. In terms of problem structuring (or the design phase of Simon’s (1960) model), one boundary can be viewed in terms of the point at which the (principal) decision-maker first interacts with the problem. Any previous structuring (by someone other than the principal decision-maker) can be thought of as contributing to the definition of the decision problem (i.e. the outcome of Simon’s (1960) intelligence phase). The nature or state of the initial decision

problem, and in particular the decision-makers' perception of this, is likely to have significant bearing on the eventual processes the decision-maker employs during the development of the decision in preparing both it, and him or herself, for making an informed choice. The familiarity of the decision-maker with the decision problem is also likely to be an important consideration at the start of the structuring process.

The other system boundary is the point at which structuring concludes, with the choice phase commences. Such a definition presumes a sequential process and distinct start and end phases within Simon's (1960) three-phase decision-making model.

This section of the analysis involves identifying not only the types of decision problem that the decision-makers were receiving, but also the conditions under which they became aware of the problem and the relative state of those problems in terms of their progression along the decision-making process³². Such a progression is likely to be determined by things such as, but not limited to, any previous processing that might have occurred (e.g. by other decision-makers), the general nature of the decision problem (well or poorly defined, complex or trivial), etc.

The issue of decision state, or the form of the decision problem as received by the decision-maker, was addressed at two principal times during the contact with the decision-makers using differing approaches of data gathering to enhance triangulation. In the first instance, in describing their 'significant' and 'recent' decision(s), each participant was asked to begin their description by outlining how they became aware of the need to make a decision, and in what state the decision problem was when they received it. They were later asked to describe the nature of the decisions they generally had to make within their managerial roles; again how they became aware of the need for a decision to be made and the nature of these decision problems. The nature and adequacy of the

³² It was not assumed that all decisions described were at the point at which structuring was to begin, i.e. problem definition completed. Neither was it presumed that further problem definition might not occur once structuring had commenced.

information that came with the decision problem was also questioned, as was the associated difficulty in obtaining further information and the volume of information present (identifying potential information overload). These latter issues are discussed in Section 5.3.4.

To begin, some comment needs to be made regarding the executive decision-makers' familiarity with the emergence and state of their decision problems. Having already informed the researcher of the decision to be described (via mail before the interview), each interview was begun with the following request being made of the decision-maker by the researcher: **“You mentioned that you have recently been involved in the decision to [*Decision*]. Can you describe to me how that decision problem firstly came about, that is, how you became aware of it, and then the steps that you followed in making that decision. I am particularly interested in the steps that you followed preceding the actual making of the final decision.”** The first part of this statement was intended to elicit from the participants the various decision problem states and types that were present.

The understanding of the manner by which decision problems emerge, and the general nature of them at the point at which they were first recognised, was generally poor. Furthermore, this often necessitated significant coaxing by the researcher so as to help participants recognise the type of decisional cues that first indicated the existence of a decision problem. Once an understanding of what constituted the first instance of a decision problem was gained, description of the decision problem state appeared less challenging.

5.2.1 SYNOPSIS OF DATA RELATING TO DECISION EMERGENCE

The manner by which the executives became aware of their described decisions varied. The following summarises the results obtained relating to awareness for each of the described decisions. Those decisions that were viewed negatively (i.e. made in response to a potential threat) by the decision-maker are highlighted.

1. Diversification into a new area of business

Over a period of several months, the organisation received an increasing number requests for a service which they didn't offer to a large degree, and what service they could offer, was far exceeded by demand. This got to such a level that the executive felt it necessary to consider diversifying to take advantage of this increasing demand. He noted that his intuition told him that there was a lot more work out there. The decision was definitely not considered to be based on a problem; the executive viewed it as an opportunity and appeared excited about it.

2. Opening a new branch office

This decision had been made (and implemented) a number of years ago, and had been found to be unsuccessful. Consequently, the branch office had closed. However, the opportunity arose again under different conditions (a third party offered to share the risks and expenses). To this end, the decision was definitely unique. Until the third party had made its approach, no thought had been given to re-opening the branch office. However the opportunity re-emerged with less associated risk.

3. Management of a flooding situation (-ve)

All natural events are uncontrollable. This decision came about due to an ongoing flooding situation, which escalated to a state that had never been encountered before. Information was being constantly fed to the executive through monitoring equipment, via subordinate staff. It was a decision where

the outcome would always be bad; it was the severity of that outcome that the executive was attempting to manage.

4. Entering into an international trading relationship

Through changes in international market forces, the company's financial position and the identification of a potential international business partner, the executive was provided with an opportunity to form a mutually beneficial relationship with an international firm that would provide access to new, large, and expanding, markets. There was no real surprise involved with this opportunity as the executive described one of his roles as seeking out such ventures.

5. Purchasing a new computer system (-ve)

A previous implementation of a computer system decision had proven to have been unsuccessful. Members of staff were regularly reporting errors or deficiencies in the computer system, and it had come to a point where the system was restricting normal business operation and making growth almost impossible. The executive was highly reluctant to concede that another computer system was required as the present system had only been in place for a short time. Moreover, the same system was working successfully in similar organisations, and although the evidence was available, he was could not work out exactly why the system was not working for his organisation. However, he knew that this prior decision was made under less than ideal conditions (Y2K time constraints) and had employed a Satisficing type decision process on that occasion. What finally convinced him that a new system was required was its poor management reporting – the function that he relied on most.

6. Buying out a staff gratuity

This decision came about with a change in central government. The new government planned to introduce a new tax rate for higher income earners. This had direct implications on a number of staff who had retirement gratuities. These gratuities were now going to be taxed at a higher rate when they were paid out to the employees. Consequently, the proactive executive realised that if he were to act quickly, he might be able to offer to pay out the gratuities to as many

staff as possible before the new tax rate took effect, thus not only providing a benefit to the employees but also to the organisation through a reduction its financial liability.

7. Entering a new market

This decision came about after a strategic planning session. Several risks were identified to the organisations current operation, and so it was thought that the company needed to future proof itself by entering into a new, but related, industry. The executive was thus given the job of identifying what that industry should be. The executive soon became aware that some of these potential markets could offer greater profitability than what was presently being experienced.

8. Termination of a long term project due to escalating costs (-ve)

The executive's organisation had been engaged in lengthy discussions with another company for quite a number of months. The organisation was providing a regulatory service during this time which the other company was paying for. The paying company was planning to setup an enterprise for which certain environmental concerns needed to be first addressed. The executive's organisation was providing these services. His organisation was also investing considerable effort into the project, as some mutual benefit was anticipated should the project be successful. However without warning, the paying company ceased payments for the regulatory services being provided. They stated that they felt they were paying excessively for services which they did not believe were necessary. At this point, the executive was faced with a decision of continuing with the project (unpaid – in the hope that payment might come later) or to end the project (and suffer loses as a result) due to the public nature of the time and money being invested. Neither decision had an attractive outcome.

9. Allowing a new operator to compete in a limited market

The executive was in charge of a regulatory organisation. His primary goal was to ensure the survival and development of a regional service in a highly

competitive industry. He was approached by an organisation that wanted to begin operating within that service area. He had known that such a request was imminent, and knew several of the individuals involved as they had been involved in a similar enterprise several years earlier (which had turned out to be unsuccessful). This earlier enterprise had cost the executive's organisation financially, while on the other hand it had done good promotional work for the service. He was receiving a significant amount of pressure from his staff, who believed that a decision in the affirmative was best.

10. Satisfying competing demands for limited funds (-ve)

This executive became charged with allocating limited funds to a number of competing areas. This was an annual event, and therefore was an expected decision. The complexity of the decision was only known when the request for information and the budget were provided to him. Demand always far exceeded supply and so the executive was keenly aware that none of the applicant parties would be happy with their allocation. As a result, this was not a decision that was looked upon fondly.

11. Purchasing a new company

The executive was aware (through his contacts) that an organisation was looking for a new owner. He had been waiting for the opportunity to investigate the purchase of this company as his own company was in a good financial position, and the other would provide a useful accompaniment to it.

12. Cutting costs in order to avoid major financial losses (-ve)

The organisation had not been performing for several months and all indications were that costs would need to be cut in order to return to profitability. The executive had been watching the organisation's performance over a number of months and knew that without a dramatic change in the organisation's fortunes, cost cutting would be required. Unfortunately, he did not want to have to make such a decision. The industry was such that the less money that was spent, the more the organisation would (hopefully) make, and given that the largest budget was that of marketing, it was that alternative which was most obvious.

13. Tendering for a major contract

This decision was one that the executive proactively sought. He became aware of the opportunity through official documentation and advertising. Tendering for contracts is part of his role and the organisation's business and identifying contracts to tender for are viewed positively.

14. Appointment of a senior employee

An existing employee had decided to resign. The executive had no prior warning of this and was therefore forced into making a relatively quick decision regarding a replacement. Also, as with most senior positions, the position needed to be filled quickly so as to keep the function of the position operational. However, with staff turnover common in this business, the executive was reasonably well prepared. The executive was not initially happy to have to be replacing the employee; firstly because it meant that he had to take time out from other duties to carry out the recruitment and secondly, because the new employee would require training and would take time to come up to speed with the role. However he did see it as an opportunity to bring new skills into his senior team.

15. Purchasing of high value commercial property

This decision arose out of an annual planning process. The executive stated that some risks were identified in terms of the company's current business and its reliance on a single geographical market. He decided that such risks could be addressed by expanding geographically. While he knew that such a decision was likely, it was not until financial reports had been prepared and industry data collected that the exact nature of the problem was fully known. However given the proactive and risk taking nature of the business, this decision problem was viewed positively in terms of the likely benefits that might be achieved rather than any negative outcome. The executive believed that given the financial nature of his business and the decisions he makes, this was typical of how he became aware of non-trivial decisions. Furthermore, he felt that it was important for him to be aware of decision opportunities, should the need arise,

and it was for this reason, that the option of entering into a new geographic market was already formulated.

16. Changing major suppliers

Based on this executive's prior work experience, she had particular knowledge, insight and contacts within the industry of one of her organisation's suppliers. She learnt that the service that her organisation was presently receiving was not as good as what others could offer. Moreover, it appeared that some financial savings could be afforded by changing suppliers; an outcome she was hopeful of achieving.

The above synopses relate specifically to the manner by which each decision emerged. In the next subsection, summaries the results that emerged from the adapted grounded theory data analysis process are presented. Each group of synopses/grounded theory summaries appear in this manner.

5.2.2 GROUNDED THEORY SUMMARY

The data-sourced incidents all emerged from the interview transcripts. Neither the post interview notes nor the CSA results contributed to the results for this research question. Furthermore, for this particular question, the existing literature provided little assistance in terms of identifying additional incident suggestions or in supporting those identified from the data. In this regard, the emergent theory relating to this research question is truly grounded.

96 Incidents emerged from the 16 interview transcripts relating specifically to the nature of the decision's emergence, and the executive's awareness of it. Five main incidents groupings emerged:

1. External information/pressure (25 incidents) includes, for example, the changing requirements of customers, changes in government policy, the placement of advertisements, lobbying from other parties/groups/organisations etc.

2. Internal information/pressure (23) is characterised primarily by the identification of decisions by subordinate staff who then inform the executive.

3. Decision-maker perception (30) was noted in all but 5 of the interview transcripts. It was common in decisions that were based on perceived opportunities, so generally demonstrated proactive behaviour.

4. Situational monitoring (16) comprises the routine observation of internal operating activities and processes as well as the activities of competitors, suppliers, customers and the environment in general. Those executives who were either proactive in their decision-making behaviour, or who were constantly aware of potential threats, provided most of these incidents.

5. Staff unhappiness (2) was identified in just one transcript. It was the purchasing of a new computer system decision. In grouping the incidents into concepts, it merged with internal information/pressure. The concept groupings that were derived from the above incidents were:

1. External
2. Subordinate
3. Decision-maker
4. Monitoring

These then formed the **Problem emergence** category and phenomenon (from the axial coding). This was the only phenomenon to relate to the research question: 1.1, “In what state are decision-makers “receiving” decision problems?”

The principal story that emerged from the selective coding of the phenomenon can be summarised as: decisions can emerge from either top-down (external or from the decision-maker) or bottom up (from subordinates) (monitoring can be either). To further develop this story with additional details, the associated raw data is revisited (with the aid of the identified incidents). This adds richness to the “core category” story. Thus, we can also now say that emergent decisions can be characterised as being either foreseen or unforeseen, their emergence can be viewed positively or negatively by the executive, and their emergence can be classified as resulting from either reactive or proactive behaviour of the executive.

These results are further explained and discussed in the following sections.

5.2.3 DECISION AWARENESS

One of the objectives in addressing the issue of “decision emergence”, or decision problem state, was to determine whether decision problems emerged in a top-down or bottom-up manner in terms of the organisational hierarchy. Did the decision problem get identified by the lower level managers and then get “pushed” up the hierarchy to the executive for him or her to structure? Was it the executive who first became aware of a decision problem and then delegated or “pushed” the processing of it down to whom he or she thought was at the most appropriate decision-making level? In most situations, the executive would prescribe how the structuring would occur, and then have subordinates carry out that prescription. This of course excludes those decision problems which neither move up nor down (i.e. processed entirely by a single individual). A search of the literature failed to find any specific mention of the upward movement of decision problems within an organisation’s hierarchy. Delegation, however, is widely reported on (e.g. Lee *et al.*, 1999; McConalogue, 1993; Hind, 1991).

Participants were specifically questioned (as described at the start of Section 5.2) about how they became aware of the decision problem. In general, while decision problems were found to be “pushed” both up and down the hierarchy, it was by far more common that a problem would move up through the hierarchy, often until it could simply go no further, i.e. reached the executive level at which time the executive would prescribe a method of structuring and delegate the implementation of the structuring process. In most cases, this transmission did not occur by accident; rather it was as a result of an existing policy having been put in place instilling such a practice throughout the organisation. For example:

“...there might be an issue that will percolate up.”

This practice occurred in both public and private sector organisations.

The state of these upward moving decision problems varied from the unsolved “I don’t know what to do” end of the spectrum, to those where a decision had effectively been made, but needed rubber-stamping. Bottom-up decision problems were almost exclusively reactive; in response to (often undesirable) situations coming about that needed some sort of directional action. For example, the decision to purchase a new computer system was reactive to the complaints that emerged from the lower level users of the existing system.

Conversely, proactive decision problems were typically initiated by the executive and were either processed exclusively by the executive, or defined and partially structured and then assigned to the appropriate decision-maker within the hierarchy below for either complete or partial processing. The “bottom-up” computer system decision mentioned above was also an example of such delegation. Once the executive had recognised and accepted the need for a new system, he then proceeded to delegate the structuring to one of the principal users of the system. He asked her to go about firstly deciding what it was they needed in such as system, and why the present system didn’t achieve this. Secondly, the subordinate was asked to identify a limited number of alternatives that would achieve these objectives. He would then become involved in the choice process.

Most executives believed they had instilled within their management team a structure of decision-making responsibility, such that the executive only became involved in a decision process that absolutely necessitated it. As one participant stated:

“If I am a good chief executive, I have ensured that there is sufficient responsibility and accountability down the line so that I am not sitting here like Solomon making decisions on things that other people can make decisions for.”

Based on the results, it can be proposed that an executive’s reaction to a given decision problem situation is likely to influence the process he or she employs in structuring it; a decision with potentially beneficial outcomes is more likely to see a greater level of enthusiasm than one that has a more negative association. For this reason, each decision described was evaluated to determine whether it was viewed as an opportunity or threat. 12 of the 16 executives described decisions

that were in response to a perceived opportunity. Such opportunities included: a new line of business; a new branch; a new business partnership and; the employment of a new senior staff member. The remaining four threat-based decisions included the likes of: terminating a project suffering from sky rocketing costs and reacting to impending changes in central government policy.

Top-Down and Bottom-up Decisions

As previously identified, a large number of the participants discussed their decisions in terms of whether they were bottom-up or top-down decision problems. Bottom up decision problems were those that were first identified by a person below the executive within the organisation that filtered up through the hierarchy, for whatever reason. This often occurred when the decision was of significant importance, or was outside the subordinate's jurisdiction. Frequently in this situation, the executive would pass the decision problem back down to whoever gave it to him or her, and ask for some or all of the processing to be done before receiving it later, in a more defined or structured state. For example, one executive described a decision process based upon the development of the strategic goals of the organisation. Five overall goals were identified, and each of his senior staff were required to take ownership of (at least) one so that he was able to decide upon the final makeup of them with the best information available.

“I said to staff, they could be involved with all five, but they had to be involved with one. So everyone has got to take ownership of one, but if you want to, you can be part of the decision-making group for the five. So those people then went back, they have had their series of meetings, their roles have been refined and reviewed and they have been brought back to me. Now at the end of the day, I can imagine there would be very few changes being made by myself as I then present that to the board as the strategic goals.”

Bottom up decision problems were almost exclusively of the reactive, unexpected type described above, and quite often involved dealing with threats or potential threats.

Conversely, while top down decision problems were also generally unexpected, their undertaking was proactive and viewed positively. These were often high-level decisions that the executive had identified in response to an identified opportunity or as part of the ongoing development of the organisation. These decisions were often concerned with new product releases, new market entries, etc.

While a number of the described decision problems could be viewed as emerging in a top-down or bottom-up manner, this appeared to be based on the nature of the decision itself; whether the problem emerged from the top down or from the bottom up did not seem to have any obvious influence on the process employed in structuring it.

Irrespective of whether the decision problem emerged in a top-down or bottom-up fashion, a number of participants outlined policies (sometimes formal, but usually informal) they had developed within their organisations that stated that they did not want to be given unstructured decision problems. The policy did not specify how structuring should occur; it merely outlined who should be responsible for certain activities. They typically wanted one of two things. They wanted the decision to be made for them in a transparent way so that they could follow the process that had been employed, and either accept the recommendation (rubber stamp) or reject and return it for further development. Alternatively, the executive decision-maker might ask for some initial processing to be completed in terms of data collection; the decision-maker would then make the decision his or herself; accepting the frame that the subordinate had placed upon the decision. Most often in this latter case, the executive would prescribe the method of structuring as with the computer system decision described earlier.

Foreseen and Unforeseen Decisions

A quick breakdown of the decision descriptions provided by the participants, and the associated actions that caused them to be aware of the need to make a decision, produced two contrasting types of decision trigger, the foreseen and the unforeseen.

Foreseen decision problems were generally those that were the result of some form of strategising or planning process within the organisation. They related to activities that were initiated by the organisation (or employees of it) and were typically problems that came about in response to opportunities or as part of the ongoing development and growth of the organisation; they were generally proactive decisions. For this reason, such decision problems were typically seen in a positive light. For a decision problem to be classified as foreseen, it either had to have been initiated by the decision-maker or have been an element of the organisation's typical business activities (for example decision-making is an essential element of the typical investment company). Many of the foreseen decision problems described in the interviews emerged through organisational strategising – the process of setting organisational visions, goals, objectives etc. Although these decision problems often had a degree of risk and uncertainty associated, they were typically decisions that were enjoyed and welcomed, at least relative to other decisions that the executives were forced to make.

Another instance of a foreseen decision problem was where the participants' roles in their organisations were to seek out and make decisions. An example of this was a participant who was responsible for acquiring land for commercial development activities. His role was not only to identify prospective properties, but having done so, he was then also responsible for deciding amongst those as to which amongst them should be purchased and when.

Unforeseen decision problems were typically characterised by those that resulted from, and were reactive to, negative events. Whereas foreseen decision problems were relatively enjoyed, unforeseen problem were certainly not. They

were usually a result of threats³³ (both internally and externally) and were often situations where the eventual decision outcome would not be measured in terms of its success, but in the minimisation of such things as cost, negative exposure, adverse public response, etc. A decision problem defined here as being unforeseen, is not limited to those that occur from “nowhere” and require instant attention; an unforeseen decision problem is any decision that could not be reasonably planned for. For example, the need to hire a new employee because of a resignation could not typically be foreseen. Although staff come and go, it would in most cases be impossible to plan decision-making around anticipated departures. For some of the larger firms, certain policies might exist, however in this study, little evidence of such was found.

A prime example of an unforeseen decision problem was that of a flood management problem. The need to make a decision was not foreseen and was certainly not wished for. Another example involved the poor performance of a product and the decision problem concerning whether it should be left in the market or not.

An example of an unforeseen decision problem that had more of the characteristics of a foreseen decision (positivity, etc.) was the decision described by one participant relating to dramatic growth in one area of his business. Rather than initiating the development of his organisation from within, it was as a result of external factors (in this case customer demand) that the need for a decision was recognised, yet unlike most other unforeseen decision problems that were observed, this one was welcome.

Positively and Negatively Viewed Decisions

Following each interview and during the transcribing of the interviews, the researcher attempted to classify the main decision described by each as being either viewed positively or negatively by the executive. The subjective evaluation of each was based primarily upon the comments made by the participant. A search through the interview transcripts also assisted in determining the

³³ Threats such as increased competition, change in government regulations, etc.

executive's desire to be making a decision. Comments such as “this was an opportunity that we could not afford to lose” or “I didn't really want to do this” were examples of statements implying the positivity or negativity associated with the decision. In all, 11 of the described decisions were deemed as being viewed positively, the remaining five were considered to be viewed negatively.

Reactive and Proactive Decisions

It was observed that for some decision problems, the executive appeared to proactively search for them; for others, their involvement appeared much more reactive. The proactive-reactive dimension is closely related to the positivity or negativity of the decision. It also has some relationship to decision problem being foreseen or unforeseen. Reactive decisions were those that were typically forced upon the decision-maker in response to a negative or potentially damaging situation. They were often concerned with damage control type issues. An example of such a reactive decision was a natural event, i.e. the flood management decision, which caused significant property damage and had the potential to be life threatening if not properly managed. The decision in this particular situation involved making significant trade-offs with which no single affected party would be completely satisfied; yet equally, no single party would be likely to be completely dissatisfied either. This was a decision that the decision-maker neither chose nor wished to have to make, but was forced to nevertheless. It was one of many examples where the decision problem had been transferred to the highest authority decision-making level within the organisation.

Proactive decisions were typically made in response to a perceived opportunity rather than a threat. All such decisions described during the study had been identified top-down rather than bottom-up. These decision problems were then often assigned to others to process. Examples of proactive decision problems include the purchasing of a new piece of equipment to develop a new area of the business, the tendering for a large contract, or the opening of a new branch office. Proactive decisions were more prominent within the private sector than the public sector.

While not intended to offer statistically significant results, based on the 16 decision problems described by the study participants, there would appear to be a relationship between the expectedness (either foreseen or unforeseen) of the decision and the desire to be making it – in terms of the positivity and negativity associated with the decision. Figure 5-2 presents a summary of the described decision problems in terms of these two dimensions.

Expectedness of the Decision

		Foreseen	Unforeseen
Attitude towards Decision	Positive	10	1
	Negative	1	4

Figure 5-2 Nature of Decisions

Any conclusions that might be drawn from Figure 5-2 must be tempered by the fact that the executives self-selected the decisions they described. While no specific instructions were given as to what type of decision problem to discuss (except that they should be non-trivial) it is not unreasonable to expect that an executive might feel more comfortable in describing a decision that presents both him or herself, and their organisation, in a good light.

In summary, having compared the decision descriptions within the context of the complete interview transcripts of all participants, it would appear that the above description is fairly representative of how the participant decision-makers generally view the decisions that they receive. The above categories appear to adequately represent the type of decision problems they are faced with and their reactions to those situations.

5.2.4 DECISION PROBLEM STATES

It seems likely that the state of emergent decision problems is strongly linked to the manner by which their existence becomes known. Whether the decision is perceived as being an opportunity or a threat does not appear significant, however as one might expect, bottom-up decisions are generally more defined than those that the executive identifies his or herself, or are made known from some external third party. In general, executives are unresponsive to situations in which a decision problem is presented to them in which no prior definition or structuring has occurred. All those spoken to believed most decision problems that emerged from within their organisation needed to be well defined before they received them. They needed to have a good understanding of the real problem and be sure that a decision problem did truly exist. For example, one participant stated:

“...a lot is just about them bringing me their ideas and bouncing them off me, and looking for my approval basically. In most situations I just tend to ask some questions to clarify things and they get on and do it.”

Or as another participant put it:

“I hope if I have got the managers trained right, they will bring a question but with the answer...don't give them the decision, but ask them what their decision would be and why their decision would be that and then I would quite often just confirm it.”

This participant also said that such an approach requires patience and in his case, requires him to consciously try not to put too much pressure on the decision-maker and give in and suggest an answer.

“...once you spit out the answer you have always got to spit out the answer and then the guy comes to you with his brain turned off.”

What appears to be common is that the executive puts in place a framework for structuring or defining decision problems. This framework incorporates the procedures that should be followed, and also some sort of organisational strategy statement that will guide the decision-maker in the initial stages.

“...we set the goal posts into the playing field with myself talking through the issues with those key people, and once those goal posts are in place I leave the playing field so to speak...”

In summary, bottom-up decision problems emerge in varying states of definition and structuredness depending on the existence of relevant organisational policy. The nature of the decision problem itself in terms of associated risk, ramifications and complexity, for example, also influences how such decisions are received by the executive.

Conversely, those decision problems that are identified by the executive him or herself, or are exposed by an external third party (e.g. government agency, competing company, supplier etc.), are by their very nature in the embryonic stage of development. In fact, describing these as decision problems is probably premature, they are better described as decision cues; indicators that a potential decision might exist. Based on this study, many problems that emerge in this manner do not survive much beyond their identification, as they are not found to necessitate a decision or are considered more to be symptoms of other problems. Alternatively, one solution might be so apparently obvious that in fact no conscious decision needs to be made. An example of such a decision problem is one described about a business expansion situation. The problem was initially perceived as being one of expanding or not. However after minimal analysis and thought, it was discovered by the decision-maker that all the processing that was being undertaken, was in fact, being done to make the decision appear (to have been made in a) responsible and prudent (manner), while ensuring that something had not been overlooked.

Section 5.6 discusses the observed and described problem structuring processes. This discussion is also relevant to the decision states described above.

5.2.5 A MODEL OF DECISION EMERGENCE

Based on the results presented above, a model of decision emergence can now be proposed. Figure 5-3 presents the proposed model, exhibiting how this emergence precedes the proposed (high level) model of decision problem structuring.

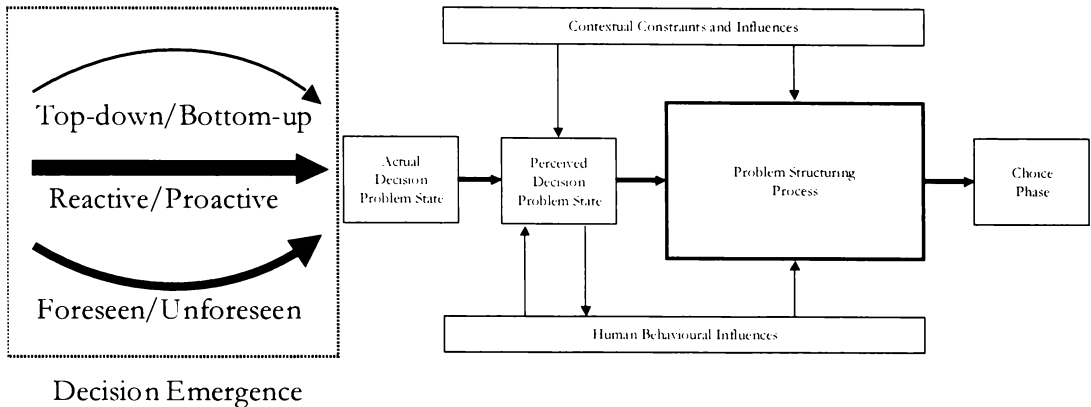


Figure 5-3 A Proposed Model of Decision Emergence

Figure 5-3 indicates only the nature of decision emergence, based on the descriptions of the study participants. It does not form part of the overall influence model, rather it provides a simple view as to the nature of decisions requiring structuring.

Focusing on the extreme left of Figure 5-3, the three decision emergence characteristics are shown. The size of the arrow indicates the dominance of each characteristic³⁴. For example, the reactive/proactive dimension was most widely observed from the interview data, i.e. it was generally quite easy to assess a decision's emergence as being reactive or proactive. As is described later (Section 5.10.1), reactive decisions emerged mostly within the public sector, whereas the private sector was generally proactive in the instigation of decisions.

Foreseen/unforeseen decision emergence was the next most recognisable dimension. The emergence of foreseen and proactive decisions is clearly linked, as is that of reactive and unforeseen. The final dimension is that of top-down

³⁴ In analysing how the decision-maker became aware of a decision problem, certain characteristics were more obvious.

and bottom-up emerging decisions (the thinnest arrow in Figure 5-3). This dimension was the least recognisable (of the three) from the interview data. All decisions were however reasonably easily categorised as being one or the other. In terms of the combinations of the dimensions, for obvious reasons, certain unions are not feasible (e.g. proactive and unforeseen). The most common amalgamations were bottom-up, unforeseen and reactive, as evident in most public sector decisions described, with top-down, foreseen and proactive, typical of the observed private sector decisions. An example of the former was the decision to terminate a long-term project due to escalating costs. While an understanding of the rising costs did exist, it was unexpected external events that changed the status of the project and caused the likelihood of reclaiming those costs to diminish. The latter type was typified by a described decision involving the purchase of a new company to complement existing operations. It was known that the company was to come onto the market and its acquiring was seen by the executive as an opportunity that could not be missed.

5.3 CONTEXTUAL CONSTRAINTS AND INFLUENCES

Q.1.2: What environmental constraints/influences are present?

Previous research into managerial decision-making (Dillon, 1998) uncovered the existence of numerous constraints and influences that can impact upon the decision process at certain times under particular conditions (see Section 2.15). Not only was it intended in this study to verify these earlier results by investigating a different group of decision-makers, but also to try and gain deeper insight as to the underlying causes of these constraints/influences and to determine what the exact impact of them is on both the decision-maker and the process he or she employs.

Decision-making influences relate to any factor, variable or environmental condition, dependent or independent of the decision-maker, that in some way plays a part in the process employed in decision-making, or in the case of this thesis, problem structuring. Given that constraints are a type of (negative) influence, they are also discussed here along with all other influences identified.

Probably the most significant of all of the results in this thesis, was the degree to which influences of all types were present in the structuring of decision problems. Many of the processes described by the decision-makers involved discussion of those influences (both positive and negative) that were present. This also included the effect the influences had on process (and eventual outcome), along with the measures taken to counter them. Much of this description was delivered with an associated defensive tone; a number of participants found it necessary to justify the processes they employed and the existence of negatively impacting influences was one way of doing this.

Constraints and influences were generally viewed as being one and the same thing, as per the definition given above. No decision-maker described a “positive” influence; that is something that was seen to be beneficial to the structuring process or the eventual outcome of the decision. This is generally consistent with the “negative” view of influences affecting the entire decision-making process, not just the structuring elements. Furthermore, positive influences are generally much less obvious to the decision-maker.

Discussion in this section is restricted to influences that are independent of the decision-maker, i.e. contextual. Decision-maker influences (e.g. cognition, experience etc.) are discussed in Section 5.4. Previous research (Dillon, 1998) found that while both contextual and decision-maker influences are likely to be present, the former are disproportionately more recognisable by the decision-maker. For this reason, they were addressed individually in the present study. Special attention was needed to assist participants in identifying any influence that was present in their decision problem structuring.

In questioning participants about the influences they faced in their decision-making, they were first given the opportunity to describe them with no involvement or prompting from the interviewer. Several were quickly able to list influences of varying types (of which limited time and finance were most common), while others were unsure as to what constituted an influence. This latter group was then given a brief definition of an influence (but with no examples) and were also asked to think of likely influences in terms of constraints to both process and outcome. In general, by this stage almost all participants were able to describe at least one or two influences. Following this, the interviewer asked to what degree certain influences (excluding those already mentioned) were present in their decision-making processes. This list was derived principally from the literature, but also included some generated by the interviewer based on the nature of the particular participant, their organisation and industry. For example, all participants were asked to consider the impact of internal and external political interference. While most private sector executives felt strongly about the influence local and central government has on their operations, they considered internal politicking to be part of business. Conversely, the public sector demonstrated a strong dislike for internal interference, but given the nature of each of their particular operating environments, felt that external interference went with the territory. At this point it was often found that the participant's understanding of influences improved; he or she was subsequently able to add influences additional to those thought of earlier and which were not included in the interviewer's list. Finally the participants were asked to loosely rank the influences so that their relevant significance could be measured.

The significance of constraints/influences on the decision structuring process is nicely summed up by one participant who said:

“You have to make the best decision at the time given the information and the circumstances you have”.

The influences that were most prominent were: time, excessive information, financial constraints, and decision ramifications.

5.3.1 SYNOPSIS OF DATA RELATING TO CONTEXTUAL CONSTRAINTS AND INFLUENCES

A variety of contextual constraints and influences were described/identified as being present during the course of each executive's structuring process. The following summarises the various external constraints and influences that were present in each of the described decisions.

1. Diversification into a new area of business

Given the opportunistic nature of this decision, many of the contextual constraints and influences were self-imposed by the decision-maker. The decision-maker stated that financial constraints rarely influenced any of his decisions; if a decision was deemed to have a positive associated outcome, then any financial limitations present could be overcome. The only (minor) external influence that needed to be taken into consideration, was that of the views of the other major shareholders in the business. The executive had the final say in most decisions, but preferred unanimous agreement where possible. This was not an issue on this occasion as all parties were in agreement.

2. Opening a new branch office

Time was the greatest influence in this decision. An offer had been made to the executive's organisation which, if accepted, could produce a good financial return with minimal risk. However, the decision had not proactively emerged, and in receiving the offer, the executive was forced into making an unexpected decision with an externally imposed time constraint – the offer had a deadline attached. Delaying the decision could have resulted in the offer being withdrawn. No other external constraints were identified.

3. Management of a flooding situation

The impact of limited time on this decision was considered by the executive as potentially life threatening. The time constraint was such that it dominated any financial constraints that might have been present. It was a situation where cost was not considered. This was a political decision and the executive was

subjected to lobbying from various affected parties. In this case, however, such political influences had to be ignored.

4. Entering into an international trading relationship

This decision was solely a financial decision, and that was its single measure of success. However, financial restrictions did not directly impact upon the structuring process; instead the executive described information as being most constraining. The vast majority of external information gathered was sourced from a non-English speaking company making information difficult to obtain without delays. Furthermore, the different culture meant that general operating procedures often differed.

5. Purchasing a new computer system

Time was described as being a major constraint in this decision. The computer system was regarded as being central to the successful, operation of the organisation, and it could ill afford to continue operating with one which was not performing well. Having already made a significant financial investment, the executive felt unwilling, and unable, to make another such large investment, and so financial constraints were present. The executive also found it difficult to get what he felt to be unbiased information about the likely alternatives to his decision. He struggled to find reviews of the computer systems being considered; the information he was receiving was always complementary of the products.

6. Buying out a staff gratuity

Being a public sector organisation, financial constraints were inherently present in this decision. The decision was not likely to be seen (in the eyes of the stakeholders) as being particularly important. So the decision-maker knew that he was constrained by both the potential fallout that might occur and also the limited funding he had. He was also heavily constrained by time as he was taking advantage of an opportunity that came about through a change in government – an opportunity that had a limited duration.

7. The entering of into a new market

This decision had several physical constraints. It was constrained geographically in terms of the alternatives it could generate, it had limited funds (which also restricted the alternatives), and it was a decision that had to be ratified by a diverse range of individuals, so the decision-maker knew that some “back room” lobbying would be required.

8. Termination of a long term project due to escalating costs

The decision, by its very nature (cost minimisation), was heavily constrained financially. The organisation was happy to continue its investment, but only when prospects of a positive return were visible. This was a highly political decision and involved court action (with the associated bad publicity). On a personal note, the executive noted the overall decision-making environment as being a major constraint to him, given that it was significantly different to what he was used to in previous decision environments. The rules/regulations etc. were inhibiting to both his ability as a decision-maker, and also the resultant decision structuring process itself.

9. Allowing a new operator to compete in a limited market

This was one of a few decisions seen to have no financial constraints. Instead it was the political pressure that was present, from many sources. The nature of this pressure varied; some parties were against allowing the new operator, others were for it. The operator itself desired a quick decision thus placing time pressures on the executive.

10. Satisfying competing demands for limited funds

The overriding influence present in this decision was the significant financial constraint, which had both a direct and indirect impact on the structuring process. Pre-set time constraints were in place, but knowledge of them at the outset limited their impact on the process.

11. Purchasing a new company

This decision-maker made it quite clear that he never permitted financial constraints to influence his decision-making, and that was definitely the case for the decision that he described. His concern focused more on the lack of return that might be achieved by any investment decision he made. He also stressed that he would not permit time to play a part in the decision process; he said he would rather make a decision slowly and get it right. The only external influence he described as being present, was that of restrictions placed by central and local government. This had an indirect effect on the process.

12. Cutting costs in order to avoid major financial losses

This decision was not specifically influenced by limited finance in terms of the process; however the decision itself was about managing limited funds. Given this, time was of the essence and a lengthy decision process was not desired. The organisation was also operating under the control of a ruling body which had an impact on the freedom he had in his decision-making.

13. Tendering for a major contract

Time and finance were the major constraints in this decision. Time, in that there existed a specific deadline in which the tender documents had to be submitted. Finance, in that the decision-making process was considered to be part of the project, and therefore included in the expense of the project. The more time spent on the decision process, the better the decision was likely to be. However if the decision was unsuccessful, then the time spent would have been wasted (i.e. no financial return).

14. Appointment of a senior employee

This decision had well defined time constraints present; the position had to be filled by a certain date so that the new employee could take up the responsibilities of the leaving person. The executive had full control and authority over this decision and was familiar with the process and relevant issues. For that reason, he did not have any problems relating to information. In terms of the process he chose to follow, he was restricted to some degree by various

cultural and anti-discriminatory considerations. He had to ensure that the process was fair and transparent as there were certain expectations as to the nature of the resulting appointment.

15. Purchasing of high value commercial property

This decision-maker was often faced with the conflicting constraints of time, lack of information and company expectations. He was expected to obtain a certain number of properties in order to provide the organisation with work. He stated, however, that he rarely made a decision without the necessary information, and that often cost him in terms of missing opportunities; i.e. the lack of information constraint would dominate any time constraints present.

16. Changing major suppliers

The decision-maker found limited time to be a constraint when structuring decisions although the underlying cause was often self-imposed. For the described decision, local government intervention, in terms of what the decision-maker was permitted to do, was also present.

5.3.2 GROUNDED THEORY SUMMARY

Data incidents relating to contextual constraints and influences were identified primarily from the interview transcripts, with supporting evidence coming from post interview notes and prior literature.

A total of 139 incidents were found that related to the environment in the decision problem structuring process. Eight incident groupings emerged as described below. The incident table in Appendix F shows the presence of the incidents within/by each of the described decisions/decision-makers.

1. Information (32 incidents) comprises any data “event” or extract that relates to the gathering of information. This included, for example, lack of information, excessive information, as well as poor quality or incorrect information.

2. Time (20) relates to the lack of time.

3. Finance (11) is concerned with the effect of limited finance.

4. Internal politics/lobbying (20) includes the actions of stakeholders within the executive’s organisation in influencing his or her actions, whether intentionally or otherwise.

5. External politics/lobbying (35) has similarities with internal politics/lobbying, except that the influence comes from individuals or groups outside of the organisation.

6. Other external events (8) comprises those external events that are not described as being political in nature. Further analysis suggested that most were generally quite similar to those in (5) above.

7. Subordinate problems (5) were explicitly noted by just one executive. He, on several occasions, described behaviour by his subordinate staff that, whether intentionally or not, had a negative impact on the decision structuring process.

8. Decision ramifications (8), while not specifically external constraints or influences, are included here (in lieu of a better location). They are discussed in section 5.5.5 and are not further incorporated into the grounded theory data analysis process.

The concept groupings that were derived from the above incidents are:

1. Information
2. Time
3. Finance
4. Internal influences
5. External influences

The internal and external influences were then merged into a single concept, “political”. These resultant four concepts then formed the **External constraints** category and phenomenon. This phenomenon addressed research question 1.2, “What constraints/influences are present?”

Having established the phenomena, the selective coding can proceed. The story resulting from the selective coding can be summarised as: a variety of external

constraints or influences exist and impact upon the decision structuring process. These can be classified as influences relating to time, politics, finance and, information.

The following discussion expands upon this summary.

5.3.3 TIME

The constraint most recognisable by the participants was time. Time constraints are widely publicised within the context of decision-making (e.g. Simon, 1955; McConnell, 2000; Zakay and Wooler, 1984; Eisenhardt, 1989) as well as many other managerial activities. Ask any overworked manager and they are likely to put lack of time as the principal cause of that overwork. Typical comments included:

“Time constraints, or the lack of people’s time to do the job has been a major limitation for us. In the past what we have tended to do is still make the decision and what we have realised is that people have been over-committing and not delivering because they have got too many things on their plate.”

“...then you don’t have the luxury of getting all the information, you use what information is available at the time and do your best.”

“Time certainly. And that is probably a weakness of the organisation, because we have got a flat structure here, a lot of people report directly to me, and bring problems and issues directly to me and the reason our structure is like that is because we are relatively small.”

“So time is certainly an issue because I tend to get involved in a lot of day-to-day micro issues as well. And that is just my style. So because I get involved in those issues, time is a problem. So one of the problems I have when an issue comes up, I need to be effective in allocating the minimum time I need.”

For most participants, time was the constraint first mentioned and was described as a process inhibitor; it caused the contraction of the activities contained within, and increased the perceived complexity of the problem. For example, one participant stated:

“...in hindsight the error we made in the previous decision was that we didn’t research well enough. In defence we were under some time pressure.”

Its existence reduced the decision-maker's ability to better understand the problem; they could not afford the time to read all of the documentation associated with the problem, and/or they were often unable to speak with all parties who were involved or able to contribute. Limited time was also found to inhibit the process of accurately identifying the objectives associated with the decision. Defining objectives often necessitated talking with other decision stakeholders, researching the problem and its relevance to the organisation, and formulating this into objectives that could be usefully incorporated into the decision process. Time related constraints impacted upon all of these activities. Time constraints were most widely discussed in terms of the process of searching out possible alternatives and their associated likely outcomes. Time is needed to identify where such alternatives might be found, and it was found that with limited time, only the most accessible sources would often be considered. Reduced time also led to decision-makers identifying potential alternatives, without spending any significant time in building up a description of each with required supporting evidence.

As was noted in Section 5.1, such effects are not isolated. For example in a given decision structuring process, time constraints might be prevalent only at the time in which the problem is being understood, yet not an issue during when objectives are being defined and alternatives generated. These later activities are still impacted by these earlier influences. To avoid repetition, evidence of such "paths of influence" is presented only when the activities involved are the specific focus of discussion.

A result of the time-constrained process was a decision prepared for subsequent choice that had additional associated risk due to the abbreviated structuring process. Another related effect was that some decision-makers were unwilling to permit time constraints to impose upon the process.

"We would rather make a decision slow and get it right. Especially the people decisions."

In this situation an opportunity would be lost simply because that opportunity (the cause of the time constraint) expired. On the positive side, it was noted that

time constraints had the effect of ensuring that the decision-maker operated in an efficient manner and aided in reducing time wasting and procrastination. In extreme cases however, time constraints caused the decision-maker to panic thereby rushing the process, ignoring key signals of risk or danger.

“...I think we should have asked some harder questions at the time rather than just thinking it would be ok and be panicking about the time issue which is what we did.”

A result of this could be that the decision-maker spends the limited time available to them on the aspects of the structuring process they are most familiar with, and generally poor use of what little time is left available. It was both interesting and encouraging to note that several of the study participants refused to allow their structuring processes to be affected by time constraints, and preferred to either suspend, alter or cancel the entire decision process rather than be held accountable for a substandard decision-making process.

One participant was very clear in stating that time was certainly not a constraint, and in fact was not permitted (in his decision-making) to be a constraint. This particular participant's job was to seek and purchase commercial properties for future development³⁵ and it was stated that the decisions were so critical, in terms of the associated risk and ramifications of making a bad decision, that time constraints were not allowed to hamper the decision structuring process. It was also made clear that the organisation this decision-maker was representing would prefer to miss out on an opportunity than be forced to make a decision under less than desirable conditions. Through what might have been considered a lengthy decision process, opportunities were often lost to competing purchasers and that was seen as an acceptable outcome; the participant was adamant that external forces would not influence the decision process he employed. Conversely, one participant described a decision problem involving the management of a flooding situation. He described it as:

³⁵ Although there is a repetitive nature to this executive's decision-making, the decisions are still very much unique. The organisations "state" is highly dynamic and the decision process at any given time must reflect the present "state" of the organisation. Furthermore, every alternative that is considered, is totally unique, and cannot be compared with any previously considered alternative. Part of this is due to the dynamic nature of the environment and the effect it has on the decision process.

“...a situation where I would be having to make decisions on the best information I could get, time would be of the essence, because human life could be at stake and all I could hope would be that I have got a structure available to me that would give me as much information that I could reasonably get.”

It was also described by some decision-makers that while limited time was an influence on the structuring of their decision problems, the removal of other constraints, such as lack of information or decision-making skill, would not necessarily mean that the decision could then be made in less time. This suggests that in these circumstances, the process of structuring the decision problem took a particular amount of time, and that time could not be significantly reduced by the elimination of those factors contributing to it. So there is some critical mass in terms of reduction of contributing influences. Once a certain level of influence has been removed, no additional time-related benefit might be achieved through further removal. Time constraints were found to have a specific relationship with excessive information. The association between these influences is discussed in the next section (5.3.4).

The discussion above has made the assumption that when a participant has identified time constraints as being an influence in their decision-making, that this has actually been the case, rather than them simply believing that to be the case. This assumption also excludes those decision-makers who are themselves the cause of the limited time, i.e. those who procrastinate (several executives confessed to doing so).

There is no official measure or standard that allows degrees of time constraint to be classified; it is based solely on the interpretation of the individual decision-maker. What influences this interpretation is likely to be complex and an entire field of study on its own. For this reason, it must be assumed that irrespective of the actual level of time constraint, or any other constraint for that matter, what is described by the decision-maker must be assumed to be a true and accurate representation.

The view of the author however is that while time constraints are rigid and generally inflexible, there is a flexibility and predictability that, in many cases,

negates the perceived impact of limited time. In reality, time constraints are always going to be present; it is therefore one constraint that can be accommodated within a decision-making process. During the data collection, it became expected that at some stage during each interview, and usually sooner rather than later, that the issue of limited time would be mentioned. This is likely to be due to the perception that in whatever task being carried out, time is always limited and more time would be desirable.

5.3.4 INFORMATION

The issue of information in decision problem structuring is an interesting one. Decision-makers have a certain tolerance level when dealing with information. Once that level is exceeded, information overload results. One could presume that if any individual within an organisation was able to cope with a large amount of information, then the most senior person, the executive, would be that person. It should therefore be recognised that the occurrence of information overload might be less for those operating at the executive level (as opposed to those at the managerial level or below). This, however, is just one way in which information was found to influence the decision structuring process. Lack of information was most recognisable by participants. It was also described as the most easy information related problem to remedy by simply gathering more information. The other identified information constraint related to poor or unreliable information. This was identified by several participants who noted that having unreliable information was often more troublesome than having too little or too much information.

Part of the questionnaire given to each of the participants at the end of each interview focused on the occurrence of information overload³⁶ and its likely cause. As was stated in Section 4.7.7, these questions had a dual purpose; both to address the impact of excessive information in problem structuring, and to

³⁶ “a state in which the amount of information that merits attention exceeds an individual’s ability to process it” (Schultze and Vandenbosch, 1998, pg125).

assist with the identification of the general causes and effects of information overload, as being investigated for other related research.

While information overload is a widely acknowledged and researched phenomenon (e.g. Schick *et al*, 1990; Schultze and Vandenbosch 1998; Buchanan and Kock 2000) only three of the participants reported the existence of information overload when specifically questioned. As will be described later, evidence of information overload was greater than this would suggest. Although difficult to compare (due to the small number of participants) this contrasts with a study by Buchanan and Kock (2000) which found that of 108 Masters of Business Administration (MBA) students from New Zealand and the US, 66 percent believed they suffered from information overload.

The questionnaire administered in this study (as shown in Appendix B) firstly asked participants to state whether they believed they experienced information overload. This was done to provide a cursory evaluation of the level of information overload present. To add further value to this, participants who responded in the affirmative were then requested to state the degree to which they felt overloaded (given the options of mild, moderate, intense and veryse). Beyond this, each participant (whether a sufferer of information overload or not) was asked to provide what he or she believed to be the three most significant causes of information overload. The results that emerged from the questionnaire provided concepts to search for from the interview transcripts, along with enhancing triangulation. The perceived causes of information overload are summarised in the Figure 5-4.

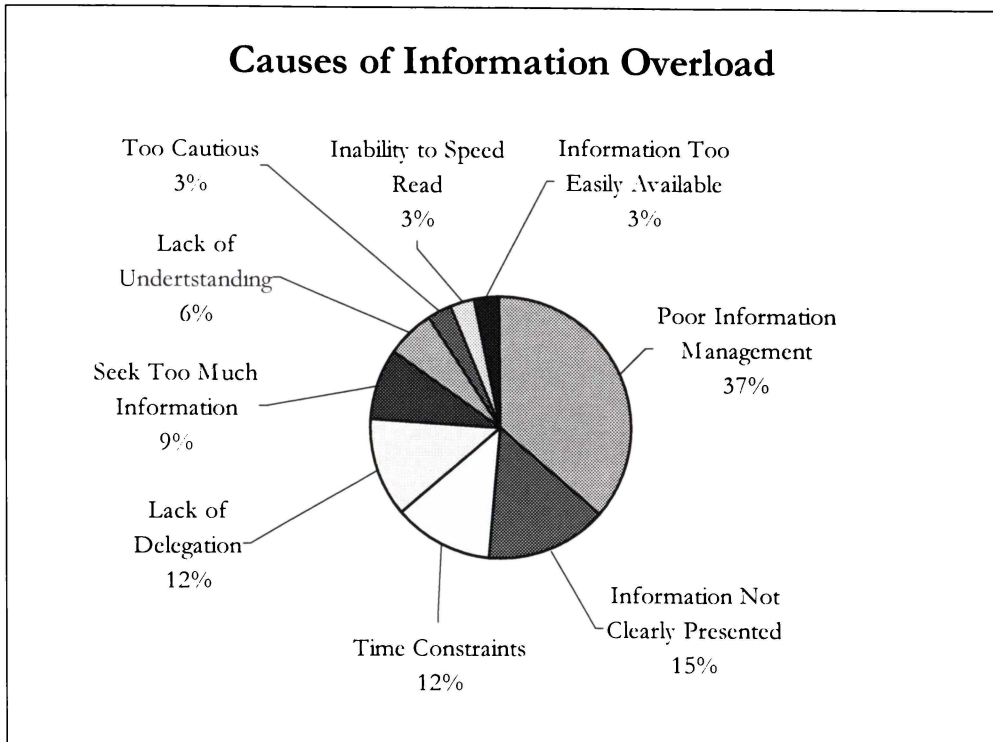


Figure 5-4 Causes of Information Overload

It is interesting to note that around 70 percent of the suggested causes of information overload are related to deficiencies in the decision-maker (poor information management, lack of delegation, inability to speed read, lack of understanding, too cautious and seeks too much information). The remaining suggested causes could be classified as being out of the control of the decision-maker. Curiously, two of the three who stated they thought they suffered from information overload believed that they were the principal cause of that overload. The other overloaded participant stated that too much “superfluous” information was being given to him. This is perhaps something that he has control over; if he was to be more directive in terms what information was provided to him, then the “superfluous” information might be minimised.

While only three of the participants stated that they suffered from information overload, evidence, based upon the researcher’s interpretation of the data, showed it was much more widespread. A number of the participants described a process where they chose to conclude data collection in the structuring process for no specific reason. Also, others described a process where subordinates would process much of the relevant information before the executive would become involved.

Whereas the questionnaire forced the participants to consider information as a potential constraint, the interviewer did not specifically question them (initially) on whether information might have been considered influential in the structuring of decision problems. Instead, participants were firstly asked how they gathered their information in the formative stages of the decision process and then, what difficulties (if any) they were likely to encounter in collecting it. A number of interesting observations can be made from the responses to these questions.

The significance of information in the task of structuring decision problems varied, not just between the participants, but also in terms of the decisions made by each. For example, one participant described a situation involving the management of river flows during a flood. Volumes of numerical information were available that could help structure and later make the decision; however, given the nature of the decision, a quick decision was required such that the decision-maker's combined experience, judgement and intuition, i.e. gut feeling, was called into practice. However, in general it was found that the greater the use or availability of information, the less reliance made on gut feeling. This appeared apparent for most if not all of the participants. In general, information gathering was described as a critical component of the structuring process.

“...you have to go searching for information. Especially when you are looking for trends and numbers, you have to go searching for it. Otherwise we are basing the decision on just some snap shot information, really we need to go back and have a look at the bigger picture.”

“...sometimes I collect more information to find out what the real problem is. I determine what the real problem is, and then I collect as much information as I can.”

Some participants felt that their confidence in their own gut feeling was superior to that of the information that they had available to them; again this depended on the nature of the decision. These individuals often chose not to use or seek further information. An interesting issue that emerged relating to the balance of gut feeling and information, was that several participants believed that a decision-maker could become too reliant on information, and the use of gut feeling or intuition was an attribute of a good decision-maker.

“To be a good decision-maker, you need to be able to make decisions without all the information on hand, otherwise you will never make any decisions.”

One participant went as far as suggesting that some decision-makers use information as an excuse for postponing what might be considered risky or dangerous decisions. The (private sector) participant stated:

“In the public service, the way you don’t make mistakes is that you don’t make decisions, and the way that you don’t make decisions is that you keep asking for more information.”

He termed this as “paralysis by analysis”. An executive operating within the public sector suggested a possible reason for this interesting view. He stated that those operating within the public sector generally had less flexibility in terms of decision process than in the private sector. Furthermore, many laws, legislation and statutory requirements constrained the public sector decision-maker. The legal constraints were suggested to directly influence not only the quantity of information that needed to be processed, but also the nature of it. Legal or official documentation is generally of a technical nature, often written using legal jargon that might be more difficult to disseminate than natural language. Therefore, it is not just information quantity that can influence the structuring process, the nature of that information is also influential.

Although not widely present, participants generally believed that the existence of too much information would have a negative influence on the decision problem structuring process.

“You have to have a bit of courage to realise when to draw the line and say, that’s all the information I am going to get or that I need and then make the decision.”

Little comment, however, was made on the significance or impact of having too little information. Perhaps it is assumed by decision-makers and researchers alike that too little information is inherently more problematic than too much information. To verify this assumption, during the interviews participants were asked whether having not enough information was viewed as being a constraint. Generally, the above postulate was supported. It was further suggested however, that too little information only became an issue if the time available did not permit the collection of what was seen to be an adequate level of information.

In terms of the specific process of problem structuring, excessive information impacted at various points. Too much information about the decision problem causes the decision-maker's perception of the decision problem, and its state, to be misconstrued. The effects of such misinterpretation are described in Section 5.2.3. In terms of the problem structuring activities, too much information has the greatest impact on the collecting of information. If decision-makers are unable to process the amount of information they already have in their possession, they are unlikely to be proactive in gathering further information. Valuable, often readily available information, is often ignored simply because the decision-maker feels overwhelmed with the information they presently have. This affects the defining of objectives and the generating of alternatives (of which the information gathering process supports). It can be concluded from the study results that executives feeling overloaded often feel overwhelmed with information and subsequently produce a limited number of decision alternatives. These would often be poorly formatted and be based more on the executive's judgement than the information that is causing the overload.

Several participants made mention of information availability. It was said that information is often difficult to gather. In these circumstances, the gathering of information is found to impact on the time made available to conduct other aspects of the structuring process.

“A lot of the time you are making decisions without all of the information so I sort of work on the 80/20 rule. 80 percent of my decisions are made fairly quickly – without all of the information but we will get it pretty right. You can get to the 80 percent real fast, but if you are going to go for the other 20 percent you're just going to procrastinate – so in making a decision go for 80 percent and then figure out the other 20 percent later on.”

“You never have all the information required to make a decision in reality. Otherwise it takes forever.”

It was commented that a good project management focus was often required so that the time required for downstream activities, such as generation of alternatives etc., could still be completed in the remaining time available. Failure to manage the time available could result in an abbreviated structuring process that is unable to incorporate much of the information that has been gathered. It was also found that whereas information gathering had the potential

to impact upon the time available, time could also restrict the information gathering/dissemination process. So the impact of one type of constraint (e.g. information) could be transferred to another (e.g. time).

Having gathered what is thought to be the information necessary for completing the structuring process, it was observed that the next obstacle met involved trying to make sense of it. Not only is there likely to be more information than required (thus necessitating some form of filtering process) but also the information is quite often in a format which does not allow for easy dissemination, or, if it is, then it is in a format that is not well suited to the structuring process. This suggestion emerged from several of the questionnaires administered during each interview.

A number of participants believed that the decision structuring process should be continued until adequate information has been gathered, i.e. the adequacy of the information should guide the process. It must be noted that it was felt that gathering all of the possible information for a decision is asymptotic, i.e. unachievable, which as previously stated, is one of the axioms of decision-making (McConnell, 2000). Whether consciously or otherwise, the decision-maker needs to be able to assess when a satisfactory level of information has been gathered for the decision to progress. The 80/20 rule was mentioned on several occasions; 80 percent of the information could be gathered in 20 percent of the time. The rest would always be difficult to obtain. Additionally, it was noted that courage was required to know when to say “enough is enough”.

Information gathering appears throughout the decision problem structuring process. However, most processes described appear to begin with some form of data collection. The subsequent process also seemed to be influenced by the manner in which that information was gathered and the quality of the acquired information.

One of the most interesting things to emerge about the use of information was that often information was collected, not (as one might think) because the executive thought it might benefit the structuring process, but because it could be relied upon later, if the decision was found to be unsuccessful. In this case a

decision can be defended by the fact that it was made with the best information that was available at the time.

Finally, it is useful at this point to remind the reader that like all of the results, those on information overload are based, in the first instance, on the single decisions described by each of the participants. The executives chose the decisions, so a self-selection bias might be present. One could expect that decisions that present the executive/organisation in good light (good process, successful outcome) might be more prominent than those viewed negatively.

5.3.5 FINANCIAL CONSTRAINTS

As was stated earlier (Section 2.15.1), McConnell (2000) suggests that limited finance is the single most encountered constraint in decision-making. The grounded theory analysis suggests that, in the context of this study, this is not an unreasonable postulate. What was found was that unlike the other influences presented, financial constraints were described as being the most inflexible; the most difficult to reduce, let alone eliminate all together. Where financial constraints differ to the others described here is that they don't have the same degree of influence on the process followed. It is easy to observe how limited time could impact on a process; the impact of financial constraints is much less obvious. It was generally found that limitations of a financial nature had a generalised and non-specific impact upon the process. Knowledge of such limitations was generally at the forefront of the decision-maker's mind, and this was subconsciously translated into the process that they employed. As will be outlined later, financial constraints also impacted upon other influences.

Financial constraints affect all decision-making whether in the public or private sectors. What determines the size of the constraint, and how rigid it is, varies between the two sectors. In the public sector, someone other than the executive decision-maker often sets the size of the financial constraints. For example, a budget might be decided by a senior board or council of elected representatives and then given to the chief executive for him or her to incorporate into their decision process. Conversely, the private sector decision-making executive often has a greater influence over the size of the financial constraint, i.e. has greater

financial control. The private sector decision-maker also has greater influence in renegotiating or adjusting these constraints (if required) after such a budget has been set.

Financial constraints can impact decision problem structuring in two ways: on the process and on the range of alternatives generated. In terms of the process of structuring, the processes might be abbreviated if it has significant costs associated. An example of financial constraints impacting the structuring process might be where useful information is not obtained due to the cost associated with the gathering and analysing of it. None of the participants however, described financial constraints as directly impacting on their problem structuring processes and a post data collection analysis of the described decisions suggests that this is likely to be true, for the executives involved. Indirectly, knowledge of financial constraints can impact on the process of defining decision objectives. With public sector decisions in particular, a decision budget is generally defined or known before the structuring process begins, and so the defined decision objectives will normally take budgetary constraints into consideration especially given that in many cases, it is the objectives that influence the alternatives that are generated. An expansive decision strategy can only be achieved by the consideration of equally expansive alternatives.

As was previously noted, while financial influences were widely discussed, their influence was concerned mostly with the range of alternatives that could be included rather than on the structuring process itself. In this respect, financial constraints were the most tangible of those identified. For example, one participant stated:

“Other times there are financial constraints. You can’t do the things that you would like to do, just because there isn’t the budget for it.”

A reduced number of alternatives might be considered to influence the outcome of the structuring, it does not however, necessarily imply that the process might be affected. Often what is perceived as being the “best” alternative is unobtainable because the associated cost is too large.

It would appear that the less intuitive a decision process (i.e. less reliance on intuition or judgement), the more likely it is that the dominant constraints on the decision were imposed by financial limitations. As an example, one participant spends a significant proportion of his time in distributing limited funds into many competing areas. Typically, the level of funds requested significantly exceeds supply, so the decision-making process needs to be accurate, impartial and transparent. This is because those who feel aggrieved by the decision (and the executive stated that there always would be), would analyse the decision process in an attempt to find flaws within it.

5.3.6 POLITICAL CONSTRAINTS

In Section 2.15.1 two types of political constraints were described. The first of these were those that occurred through the involvement of local or central government agencies in the enforcement of certain legislative controls. The participants considered these to be “external” political constraints. The other types of political influences (termed as “internal” political constraints) were those which exist informally, and often covertly, within an organisation.

Most participants considered the former type of political constraint as being present, although in varying degrees, within their decision-making. As would be expected, public sector decision-making, by its very nature, is most influenced by external political constraints. While all of the executives from the public sector, and the majority of those in the private sector indicated that political interference was present, that interference appeared greatest within the public sector environments. Also, many stated that political interference was present, but found it difficult to justify it with an example given its subjective and often informal nature.

“What is more qualitative is the community and political judgements. What are the implications of this, how will this be seen. A lot of that is intuitive; a lot comes from experience from being around and having a feel for what the issues are.”

It appeared that they just assumed the existence of political interference, and that this interference contributed to a difficult decision process. Such views are likely

to be a product of the individual's experience within the organisation, and perhaps others.

One decision-maker described how central government politicking between government and opposition parties found its way into his operation. He stated:

“At the end of the day, we are a government organisation and those changes I talked about [referring to changes implemented by the new government] aren't necessarily for the better, and we don't really know, but when a political party is in [power], the opposition party is in to try and critique the policies at the time. Then they get in and the roles are reversed. So because of this “to-ing” and “fro-ing” of the political process, no matter what the structure is, it is quite likely that things will change, if for nothing else but the fact that the new government has to follow through its electioneering promises.”

Others described the magnitude of the political interference in their decision-making:

“I might not be very happy with the decision because it wasn't my recommendation but I have got to work here.”

“Sometimes those are made for political reasons as much as anything else.”

As has been previously noted, private sector decision-makers exhibited far greater contempt for the political interference that they felt they suffered than their public sector counterparts. They felt such external “busy bodying” imposed unnecessary restrictions on their operations, and at times hampered their growth and development. One private sector decision-maker believed that being part of a larger company made him more immune (in terms of decision-making) to government regulations, stating that smaller private companies were most at risk.

The existence of external political interference had the most obvious effect of lengthening the duration of the structuring process, i.e. increasing any time constraints that might have already been present. For example, political interference often meant that numerous meetings would be required. This type of influence also often necessitated the inclusion of variables (e.g. cultural effects, taxpayer implications etc.) into the process, thus adding additional complexity.

External political influences can impact upon all aspects of the problem structuring process. Primarily, they cause the activities to take longer, thereby potentially causing time constraints. Generally political interference necessitates the consideration of a wider range of issues; often issues that are not directly related to the decision problem. As a result, the decision objectives are often more complex, subsequently increasing the difficulty in generating alternatives. This also necessitates the gathering of a greater amount of information.

In terms of “internal” politicking, this was described as being:

“...often difficult to predict and can catch you by surprise.”

It was also interpreted as:

“I don’t want to do that because it might upset someone.”

It was also noted by one executive that a good executive decision-maker needs to be aware of the likelihood of internal politicking and hidden agendas at all times. He went on to suggest that one of the best ways to counter internal politicking was to be consultative throughout the decision-making process, in the belief that it only existed when information was withheld and when decision-making occurred in secrecy.

“Some people have got their agendas and that’s where you have to be consultative and getting people around a table you tend to thrash these things out a bit.”

The executive was not suggesting that the process should be a group one, he still felt that he had control over it, rather he wanted to ensure that all available information had been considered.

The effect internal politicking has on the structuring process is unclear. Most participants preferred to view it as part of all their decision-making, something that they expected, and it is likely that they either accommodate it in the structuring process, or even structure their decision so as to avoid it. Perhaps for that reason, it did not appear to specifically affect the structuring process to any significant degree.

Depending on the specific situation, a decision-maker might try to make a decision with a level of secrecy, i.e. attempt to eliminate potential interference simply by hiding the fact that a decision is being made. Conversely, the executive might take the opposite approach and “advertise” the decision in the early stages of the process so that any potential political influences might then be recognised and factored into the subsequent process. Internal politics do not appear to have any direct influence on the specific decision problem structuring activities. Instead, existence of such influences provides the decision-maker with an overall negative feeling about the decision process.

5.3.7 A PROPOSED MODEL OF CONTEXTUAL CONSTRAINTS AND INFLUENCES

The contextual influences described above can now be interpreted and presented graphically. Figure 5-5 presents the four major contextual influences identified, and indicates what aspects of the decision-making process they influence.

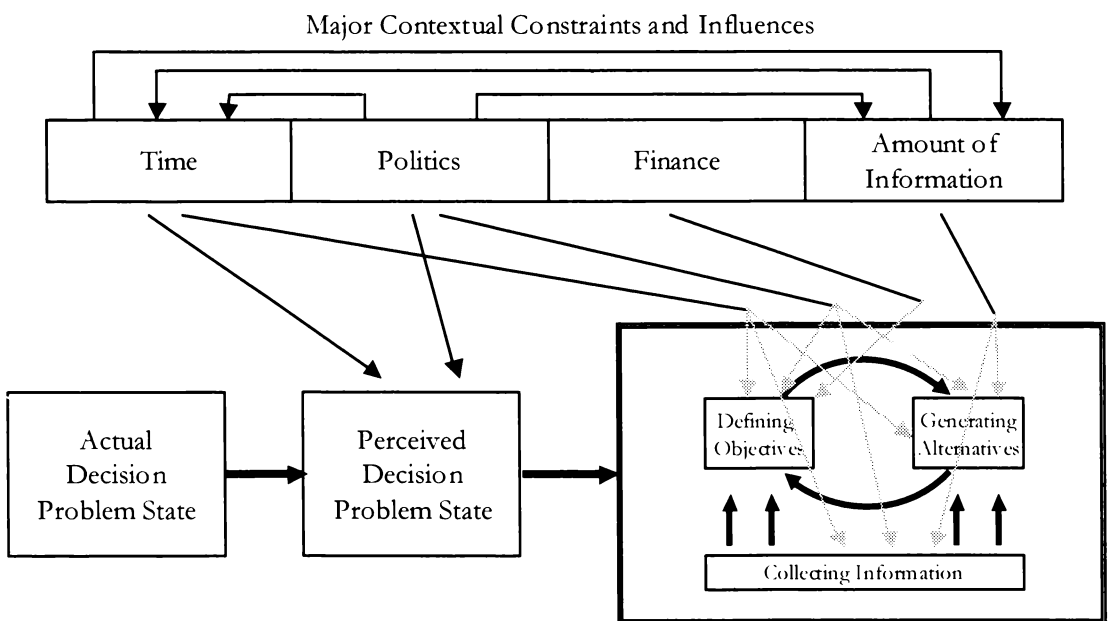


Figure 5-5 A Proposed Model of Contextual Constraints and Influences

The executive’s perception of the decision problem can be associated with the decision’s frame. As outlined in Section 2.17, framing has been described as referring to the decision-maker’s conception of the acts, outcomes, and contingencies associated with a particular choice (Tversky and Kaheman, 1981). This associates the decision frame with the result of the structuring process. In

addition to this, the actual state of the emergent decision problem can “frame” the perceived decision problem state. That framing can also aid, or otherwise, in identifying values, objectives and criteria etc, (Mabin and Davies, 1995).

Time constraints were observed to influence not only the process of decision problem structuring, but also the perception the decision-maker had of the problem. A problem with time constraints recognised at the outset, might lead the decision-maker to accept the initial definition of the decision problem and not take the time to ascertain the true problem; type three errors³⁷ might result. As is outlined in section 5.3.3, time constraints can influence all aspects of the problem structuring process. In turn, they can also impact upon another influence, amount of information, whether it be too much or too little. The level of information considered excessive is largely determined by the amount of time available to process it.

Political constraints might influence how the decision problem is expressed to the decision-maker. For example, a subordinate might choose to put his or her “spin” on the decision problem so they might be seen in a better light or so that the decision outcome has a better chance of positively affecting them. The effect of political influences on the specific decision structuring process is similar; individuals can be disruptive by withholding, delaying or filtering information. This can affect all components of the structuring process. Furthermore, the existence of political interference has been found to impact upon the amount of time available as well as the amount of information that needs to be processed.

Financial constraints were only found to have a significant affect on certain aspects of the structuring process; in particular, when generating and screening alternatives. Any other effects of financial constraints were felt down-stream, as a result of the objectives definition phase.

Earlier discussion focussed on the presence and effect of excessive information. As was noted, although lack of information was often mentioned, it was only

³⁷ The right solution to the wrong problem.

viewed as being a constraint when the information appeared to be particularly difficult to obtain or when time constraints restricted the collection of that information. Otherwise, obtaining the required information was an obvious remedy; although the 80/20 rule appeared common. It is inherent however, that although excessive information might be problematic, limited information is always going to have the greatest impact on the structuring process.

5.4 HUMAN BEHAVIOURAL INFLUENCES

Q.1.3: What aspects of human behaviour influence the structuring process? How?

It might appear peculiar to be discussing the influence the decision-maker has on his or her decision structuring process. In fact some may question whether an individual can even in fact influence their own process. Clearly (at least in all but the most constrained environments) the decision-maker determines the process he or she carries out. What is not recognised, in the case of decision problem structuring is, what aspects of human behaviour influence the process, and furthermore, the effect of that influence. Influences such as experience (Volkema, 1983), cognitive style (Riding, 1991), decision style (Nutt, 1990) as well as others, are reported in the literature as influencing the decision process.

Evaluating the influence that the human decision-maker has on the structuring process was one of the more revealing aspects of the research. A number of issues emerged that were highly relevant to understanding the reasons behind certain behaviour and the employment (or non-usage) of recognised problem structuring processes.

5.4.1 SYNOPSIS OF DATA RELATING TO HUMAN BEHAVIOURAL INFLUENCES

Some human behavioural influences were described by the executives. However, for many, the existence of these was often difficult to identify. Consequently, much of the data relating to this area of the study came from the researcher's observation of the decision-maker and his/her described process. The results of the CSA also provided data. The following summarises the various human behavioural influences that were present in each of the described decisions.

1. Diversification into a new area of business

The decision-maker imposed few negative influences on his decision process(es). He was a confident person, having made many large, successful decisions in the past. The CSA described him as being creative, innovative and good at thinking of new ways of approaching situations.

2. Opening a new branch office

This decision-maker relied on his experience when making and structuring decisions. He would be considered as quite risk averse, due in part, to operating during times when the business was far less successful than it is now.

3. Management of a flooding situation

Having made many decisions in the past, all within the same operating environment, this decision-maker had a good understanding of the decision structuring process. He was also a confident decision-maker, which was, in part, a requirement of his position. The results of the CSA suggest that this decision-maker has a broad range of skills and abilities, and is comfortable with all types of decision problem.

4. Entering into an international trading relationship

Data relating to this decision-maker's human behavioural influences were difficult to identify from the interview transcript. He was very much "to the point" in his responses and described a "no-nonsense" approach to decision-

making. This was supported by the CSA, which described him as being more detailed and analytical rather than subjective and holistic in his views.

5. Purchasing a new computer system

This decision-maker demonstrated a general confidence that was also borne out in the way that he structured his decision problems. He was comfortable in making decisions based on his experience and intuition. He was described by the CSA as being articulate and verbally fluent and overall having good communication skills. It also suggested that he was better at taking a wide view of issues rather than a detailed perspective.

6. Buying out a staff gratuity

Experience was the dominant attribute of this decision-maker. He had been in the industry for many years, and was intimately familiar with the environment within which he was operating. He also displayed a reasonable level of confidence and an understanding of the decision problem structuring process. The CSA suggested that he might be impulsive at times, perhaps relying too much on his experience, and as having too much confidence.

7. Entering a new market

Most of the data relating to the human behavioural influences of this executive came from the CSA and post-interview notes. He was not forthcoming in terms of identifying his personal attributes and the impact of these on the decision structuring process. However, he was clearly highly confident in his decision-making. This was supported by the CSA which described him as being “good at summing up situations and decisive”.

8. Termination of a long term project due to escalating costs

This executive probably had the greatest range of experience of all the participants. The diverseness of this experience however, appeared to negatively affect his decision-making, especially when previous experiences had involved decision-making under more favourable conditions. He did, however, have a significant degree of confidence, which assisted him in dealing with this. The

CSA suggested he was unlikely to be fanatical in his views, and described him as creative, innovative and able to provide a balanced synthesis of all issues.

9. Allowing a new operator to compete in a limited market

This participant was one of two with an “intermediate bimodal” cognitive style. This described him as an individual who has no definite weakness, nor any strong dominant cognitive related behaviour. His experience had provided him with a level of confidence such that he generally felt comfortable in making decisions.

10. Satisfying competing demands for limited funds

“Relaxed” would best describe this executive. Although he was regularly making decisions involving hundreds of millions of dollars, in a highly political environment, he showed no signs of stress or pressure. This may be due to the close match that exists between his cognitive style, and the nature of the decisions he makes. He was described by the CSA as an analytical imager (the highest such score of all participants) indicating that he was comfortable in working with numerical data, which was a requirement of his job.

11. Purchasing a new company

This executive was in the fortunate position of having made many successful decisions in the past, such that he and his organisation had become very successful. This had contributed to the confidence he exuded. He was not a person to be flustered or influenced by external forces. The CSA described this executive as fairly easy going and someone who shows concern for people. It also suggested that he was good at standing back and seeing the big picture.

12. Cutting costs in order to avoid major financial losses

Although one of the younger executives, this participant was unique in that he had worked in a variety of organisations that had exposed him to a variety of decision-making situations and approaches. As a result, he demonstrated a good understanding of the process and requirements of decision problem structuring. His cognitive style supported this, and also suggested that he was an effective communicator.

13. Tendering for a major contract

This decision-maker had an analytical background and this carried through to his decision-making approach. He was most confident when making decisions that were well defined and did require a large amount of judgement or intuition. This observation, however, was not fully supported by the CSA which suggested that he was equally comfortable with non-analytic problems.

14. Appointment of a senior employee

This executive had one of the strongest personalities of all the participants. It appeared that his intuition or judgement would be dominant in his decision-making. He also appeared to have a good understanding of the decision problem structuring process. The above observation was not supported by the CSA, which suggested that he was more comfortable in detailed analytical decisions. This may be due to the high level of accountability and transparency associated with the industry in which he operates.

15. Purchasing of high value commercial property

This decision-maker was operating in an environment that did not appear to match his decision-making style. He was a confident and experienced decision-maker, but gave the impression that he liked to have complete control over the decision-making process. In his role, he was required to work with a governing board, which may have at times, restricted his autonomy. His CSA report described him as a good communicator.

16. Changing major suppliers

This decision-maker appeared extremely cautious in his decision-making approach. This was supported by the CSA report which contained the following: “The analysis suggests that you may often be hesitant when it comes to making decisions”.

5.4.2 GROUNDED THEORY SUMMARY

The following data incidents relate to the impact the decision-maker has on the decision process. Unlike most of the other identified incidents, incidents concerning human behavioural influences were obtained from the post-interview notes and the CSA results. While the executives often identified aspects of their behaviour that contributed to their decision-making, neutrality and knowledge of the researcher/interviewer combined with the capability of the CSA, were more effective at eliciting relevant incidents. The incident table (relating only to the frequency of incidents appearing in the interview transcripts) is shown in Appendix F. A total of 111 related incidents were identified. The synopses above provide evidence of post-interview notes and CSA data. The following incident summaries incorporate the data obtained from these latter sources.

1. **Confidence (27 Incidents)** comprises those incidents within the data relating to the executives' confidence; in particular relating to their decision-making. Some executives demonstrated strong degrees of confidence, While others very clearly lacked in confidence when in came to decision-making.
2. **Experience (40)** relates to the amount of experience the executive has in the field or context of the decision problem. This includes their experience within the organisation, industry etc.
3. **Understanding (20)** is concerned with the executives' understanding of decision-making, and in particular, the process of structuring a decision problem. Some of the executives demonstrated a good understanding of the process, others seemed to lack any real understanding of pre-choice activities.
4. **Ability (6)** was mentioned by four of the executives. They stated that they believed their decision-making ability was critical to the success of the decision.
5. **Uncertainty (2)** was identified as being present in the decision-making of two of the executives; they both seemed excessively concerned with unknown outcomes of their respective decisions. This incident relates also to the ramifications of the decision, as is discussed in a later section.

6. Judgement (13) was an incident group that emerged from the executives' use of, or description of their reliance on, their intuition or "gut feeling".

7. Courage (3) was a term that was mentioned as being a required attribute of a good decision-maker.

Following the identification and classification of the incidents, the seven incident groupings were then grouped further to form concepts. The concepts that emerged were as follows (the incident groupings which they are formed from are shown in brackets):

1. Confidence (Confidence, Uncertainty, Courage)
2. Experience (Experience, Ability, Judgement)
3. Understanding (Understanding)

These concepts then became categories and phenomena, named: **Human behavioural influences**. This phenomenon related specifically to research question 1.3: What aspects of human behaviour influence the structuring process? How?

The summary story that resulted from the selective coding is that the manner by which a decision-maker structures his or her decision problems is influenced by three principal human behavioural influences: these are their experience in terms of their knowledge of the decision context, their confidence in making decisions, and their general understanding of the decision problem structuring process.

The following discussion presents the expanded story that emerged, drawing upon relevant incidents and data extracts.

5.4.3 UNDERSTANDING OF PROBLEM STRUCTURING

As has been previously mentioned, the participants' initial understanding of problem structuring was sketchy at best. The pre-interview information sheet (Appendix A) given to each participant was light on detail with respect to describing/defining decision problem structuring. All that was specified was that the study was concerned with pre-choice activities. It was however expected that most, if not all, participants would have at least a reasonable understanding of

the various steps within a decision process and what might be included within the pre-choice phases. This assumption was incorrect. Most considered decision-making simply as the making of choices from a set of existing, predefined alternatives. Little thought was given to the activities that generate those alternatives or the formation of the decision objectives or direction. This is not to say that the participants were not involved in such structuring activities, rather it was found that these activities were not seen as being part of the overall decision-making process; they were thought to have been undertaken before the commencement of the decision. For example, a number of those who talked of opportunity-based decisions described a process where they explicitly stated that they compared the opportunity with the existing strategy or direction of the organisation. In effect, they were developing decision objectives; it was just that they were a sub-set of the organisation's objectives. This was clearly an issue of perception, as what the participants perceived as being problem structuring did not necessarily equate to the researcher's perception.

Having determined the understanding (or lack of it) associated with the decision-making process, the interviewer provided a basic description of the problem structuring process to the executives. This was to ensure that they understood firstly that those activities which occurred before the choice phase were in fact part of the decision process, and secondly what those activities would generally involve.

In terms of the impact of the decision-maker's understanding of problem structuring on the structuring process, it appears to have a more generalised effect rather than influencing specific components of it (e.g. alternative generation). Those (few) individuals who were familiar with the pre-choice aspects of the decision process, were more likely to describe distinctions between the structuring activities, and to subsequently carry out the defining of objectives and the generation of alternatives (separately). While those with a lesser understanding still carried out their structuring in much the same manner, there appeared less obvious distinctions between the component activities. For example, the defining of objectives and the generating of alternatives is largely carried out simultaneously.

No existing literature could be found that reported on the impact of structuring process understanding on the execution of that process.

5.4.4 DECISION-MAKER EXPERIENCE

Executives generally have a level of experience that exceeds that of lower level managers. This was found through comparing the results of this study with a previous study that focused on the decision-making of managers (Dillon, 1998). This experience is not just confined to decision-making, but all aspects of management. Executives are also likely to have been on the “other side” of management (i.e. having been managed themselves) so offer a unique perspective. This was one of the reasons that the executive level decision-maker was chosen as the focus of this study - so that the significance of this experience, in terms of problem structuring process, could be measured.

Each participant was asked to consider what he or she believed was the value of their experience in their present decision-making activities. More specific questions were posed that related strictly to the structuring process. Furthermore, the relative decision-making experience of all of the participants was compared with the problem structuring behaviour they described. To demonstrate the extent of experience of those involved, the average age was 50, the average number of years spent in the their present organisation was 12 years and the average number of years spent in the present industry was 20.

Experience was found to consist of more than just previous decision-making activities. Experiences from both business and personal contexts were found to be important. For example, one participant felt quite strongly about his ability to judge personalities as being a life-long attribute he had acquired and an essential tool he employed in decisions where personalities of those involved were important. Other activities that were mentioned as contributing to the experience used to aid decision-making included: working for a different type of organisation, making personal decisions, and reviewing previous unsuccessful decisions.

Experience provides two obvious benefits to executive decision-making. Firstly, it was observed that as experience increases – so does confidence (discussed in the next section). This was elicited from the participants themselves and confirmed by comparing the apparent decision-making confidence of the most experienced decision-making executives with that of lesser experienced executives in the group. Secondly, another observed product of experience is speed in decision-making. Experience means that you can look at a potential problem solution and very quickly “tell if it feels right”. The more familiar the decision-maker is with the decision, the quicker he or she can go about processing it; experience minimises the need for decision familiarisation.

There are times however, where a decision-maker’s background can have negative effectives on problem structuring. One participant described the frustration he experienced in working in his present public sector role as opposed to previous roles within the private sector. The constraints present in the public sector were found to be more restrictive to this person than others who were used to them. It was not that he was unfamiliar with the new environment; it was that his familiarity of a previous environment framed how he viewed the present one.

The background of the decision-maker was only seen to be a real issue when that background contrasted with the working environment in which he or she was presently operating. The strongest feelings came from a public sector executive who had previously worked in a senior private sector role. In general, he found public sector decision-making to be more constrained, more political, less flexible and less rewarding. He found that in contrast to the private sector where good decision-making was praised, in the public arena bad decision-making was condemned. Such strong feeling generally only seemed to be evident in this case where the decision-maker came from a vastly differing background that appeared to contrast with that of their present decision, and of which they had only been part for a short time. In terms of the problem structuring process, in general it can be concluded that the background only appeared to be significant for those decision-makers operating in an environment much less restrictive than what they might have previously been exposed. For those individuals, even

though they might have been in their present role for many years, some of their risk averseness seemed to have been retained.

Another example of the negative effects of experience was in the case of a participant who was still making one type of decision that he began making twenty years ago. While his role within the organisation had progressed, he had retained responsibility for one crucial area of business. The nature of this particular area meant that while creativity, innovation and energy were required for this executive, his processes (as confessed by him) had become, to a degree, automatic and his decision-making had become somewhat repetitive.

Initially, decision-maker experience impacts upon the way in which they perceive a decision problem. An experienced decision-maker is more likely to be familiar with a given problem than an inexperienced decision-maker. He or she is also more likely to be able to relate the present decision problem to previous experiences (as per the Recognition Primed Decisions model (Klein, 1989)). So in that respect, experience influences decision problem perception. Moreover, that same problem perception in turn increases the experience of the decision-maker, which is subsequently borne out in the problem structuring process.

In terms of specific problem structuring activities, all are directly influenced by the decision-maker's experience. Understanding the problem domain in particular, aids in the collecting of decision information. That information is often contained within that experience. If it is not, it often comprises an understanding of where such information might be sourced from and how it might be best collected, as has previously been noted by Volkema (1983). General familiarity of the decision context also aids in the defining of objectives through an ability to use that familiarity to develop a set of objectives that are not only relevant to the decision problem, but are in strong alignment with the overall direction of the organisation (as it is assumed that the decision-maker is familiar with that also). The generating of alternatives is also enhanced by the decision-maker's experience; namely it permits alternatives to be devised that the executive knows are realistic and achievable.

The relationship between experience and confidence was expressed, either directly or indirectly, by all of the participants. Decisions that were familiar (in terms of both content and process) reduced the perceived risk of the decision. This risk reduction then, in turn, enhanced the confidence of the decision-maker. As is outlined by Volkema (1983), the decision-maker's experience also plays a role in determining the significance and impact of the external influences present. For example, an understanding of the nature, and implications of, certain political constraints might reduce the effect they have on the decision structuring process.

In terms of the structuring process, it was a widely held view amongst the participants that the specific subject of the decision was not always important – process was much more critical. It can be concluded from this (and further analysis supports this), that decision familiarity is more closely related to the decision-maker's association of the decision problem with a compatible, previously used decision process, than his or her familiarity with the subject of the issues pertaining to the problem, i.e. process was considered more important than context.

All decisions have certain contextual characteristics such as objectives, alternatives, uncertainty, and risk. The relative importance of these parameters for a given problem forms a model of the decision that the decision-maker can compare with others he or she has made in the past. Although the subject of the decision is the principal influence of these characteristics, the causes of the characteristics being, as they are, are not generally considered. Whether the decision involves, for example, the appointment of a new staff member or the investment in new property, it is those characteristics described above which influence the decision-maker more than what the decision is actually about.

In relation to the value of experience in the problem structuring process, the results of this study suggest a positive effect. This contrasts with work by the likes of Simon (1957) and March and Simon (1958), where quality in a decision outcome is associated with an objective process, while subjectivity and experience are associated with a lesser quality process. These contrasting views

reflect the difference between the (bounded) rational model of decision-making (this being central to the work of Simon (1957) and March and Simon (1958)) and the naturalistic, unaided processes on which this study is focused on.

5.4.5 DECISION-MAKER CONFIDENCE

It was surprising to view the range in levels of confidence exhibited by participants in terms of their decision-making. While the majority appeared confident in their ability to deal with the risks and other such pressures of decision-making, a number appeared uncertain of their abilities. Mostly, this conclusion was based on observations made by the researcher, rather than specific comments made by the participants and there was often hesitation in answering questions. These individuals were not only uncertain of their abilities, but also of whether they felt themselves to be suitable for decision-making. Confidence is described as being an essential decision-maker characteristic if conflict and delegation is to be successfully managed (Lee *et al.*, 1999).

When questioned on whether decision-making was an enjoyable part of being an executive, one (experienced) participant was unable to establish whether it was or not, and stated that he no longer got a “buzz” from having made a successful decision. He also added that he was no more confident in his decision-making now than when he started for the company twenty years ago. This was a peculiar finding as this participant’s principal role within his organisation was to seek out and make decisions. However, he added that he believed his decision-making had become automatic and was therefore less thoughtful and critical of his processes. His decision-making then had perhaps become, to a degree, unconscious.

Others appeared to feel it necessary to make excuses for what they perceived as being poor decision-making, in particular, poor problem structuring. Comments such as: “I know this is not how I probably should do it” were made regularly during the interviews. Several participants felt it necessary to inform the interviewer of this even though there was nothing to indicate that their decision-making was deficient or varied considerably from others. Others felt obliged to remind the interviewer of their lack of qualifications and suggested that as being

a reason for limitations in their decision-making ability. Even though most were qualified to bachelors level or above, qualifications did not appear to have any direct influence on the quality of the decision-making; it did however appear to make them more confident, overall.

Such defensiveness suggests a legitimacy issue. First proposed by Davis (1973), legitimacy, most widely discussed in the context of organisational legitimacy, “...is a generalised perception or assumption that the actions of an entity are desirable, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” (Suchman, 1995, p. 574). The attainment of a legitimate process or outcome might also be considered an influencing factor in decision problem structuring, especially in the public sector. In terms of legitimacy at the individual level, the measure/view of legitimacy is based on the individual’s view as to how his or her actions might influence how the organisation is viewed, i.e., their view on what they consider to be socially acceptable. This may be in reference to what external stakeholders expect of them, alternatively it may be based on the individual’s perceptions of what their peers within the organisation believe to be legitimate actions. Finally, it is possible that the study participants might believe certain actions might (or might not) be legitimate to the interviewer. The above example (previous paragraph) demonstrates the participants attempting to legitimise their structuring processes in terms of their (lack of) qualifications. Further examples of legitimacy issues are noted later.

Confidence is determined, in part, by the level of experience the decision-maker has, and the familiarity he or she has with the decision problem. This, in turn, permits the decision-maker’s confidence to impact upon the specific activities of defining objectives and generating alternatives. The defining of objectives often requires confidence as it is an unstructured task and one in which little “textbook” guidance is available. Confidence permits the decision-maker to develop objectives that are creative, proactive rather than reactive, and which might not be easily achieved. Confidence also contributes to the alternative generation through the identification of alternatives that “push the boundaries”, and by looking for alternatives in creative ways in a variety of places.

Each participant was asked to describe what he or she thought were attributes of a “good” decision-maker. Several described confidence as being an essential attribute; confidence firstly to implement their chosen decision, and secondly, to be prepared to defend it. The term courage was also used by several of the participants.

“I think you need courage in your decision. You have got to listen to everybody, but at the end you are the one who has to make the decision and that often takes quite a bit of courage...”

“You have to have a bit of courage to realise, to when to draw the line and say, that’s all the information I am going to get or that I need and then make the decision. I think that you have got the courage of your convictions to stand up and be accountable for that decision and to have the courage, to realise that if you make 100 decisions and get 98 of them right, you have done pretty well.”

5.4.6 COGNITIVE STYLE

Sections 2.15.2 and 4.7.7 present a background to the Cognitive Style Analysis (CSA), the objectives of its use and what it is intended to measure. Appendix G contains the raw cognitive style results.

The purpose of the CSA in this study was twofold. Firstly it was used as a recognised tool that independently (of the researcher) evaluated human behavioural elements of the participants. Furthermore, it was one of few such tools that produced specific output relating to decision-making behaviour. Secondly, it permitted triangulation of the subjective evaluations undertaken by the researcher.

Figure 5-6 provides a summary of the cognitive styles of the sixteen participants.

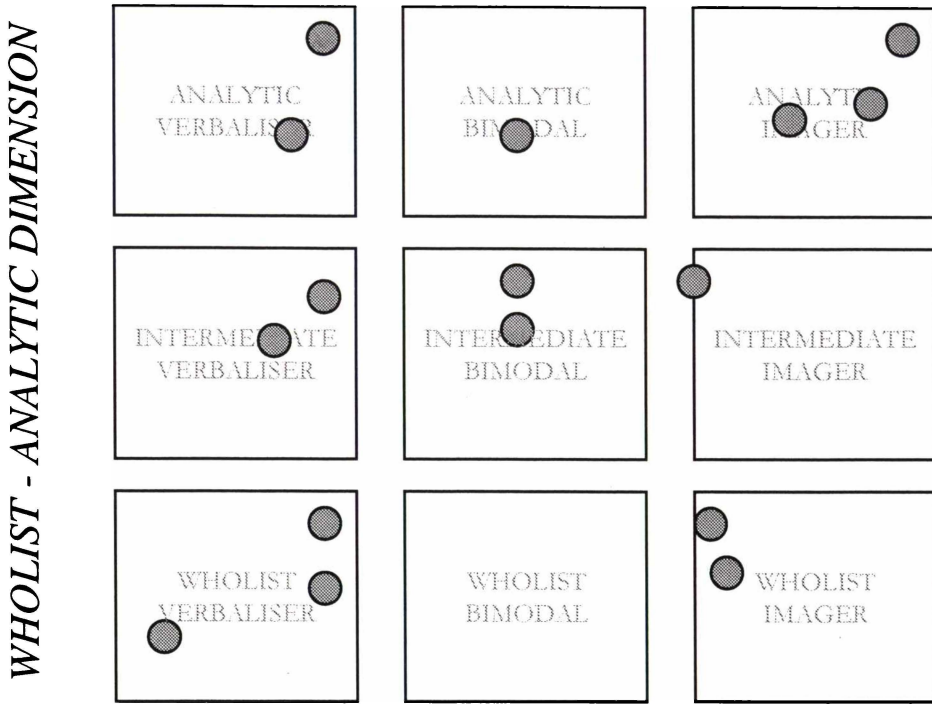


Figure 5-6 Summary of Cognitive Style Results

It can be observed in Figure 5-6 that the cognitive styles are relatively evenly distributed across the nine quadrants.

The Cognitive Style Analysis (CSA) was found useful in assessing data (which emerged from both the interviews and post interview analysis) relating to [the] human behavioural aspects of the problem structuring part of the decision structuring process. It was found that in most cases, concordance existed between the CSA and interview analysis; the exceptions identified will be discussed later.

The CSA was effective in identifying certain behaviours and skills. These included writing and speaking abilities, the executives approach to decision-making (hesitant, impulsive etc.) and the likely decision-making process used (e.g. generation of a range of alternatives followed by an analysis of these based on pro's and con's). It also provided an analysis of the individual participants' creativity, ability to work with others, and overall demeanour.

Given the nature of an executive's role, the ability to take a holistic approach to all their activities, including decision-making, would probably be viewed by most

as desirable. All but six of the participants emerged with Wholist or Intermediate (attributes of both Wholist and Analytic) styles. This suggests that the majority of participants were able to stand back from a situation and look at the bigger picture. A number stated this as an attribute of a good executive decision-maker. For the remaining six, the CSA suggests that it is more natural for them to break situations down into workable parts. While it is difficult to establish the cause of a particular cognitive style, a closer examination of these individuals suggests that for three of these six, their environments and/or backgrounds have had an influence. The remaining three were most likely analytical due to the nature of their jobs; their roles were highly analytical and their decision-making was almost exclusively numbers based, e.g. the allocation of limited financial resources. Also, one of these participants with an analytic style was a doctorally qualified scientist whose training might have had an influence on this style. Generally however, incorporating both the CSA results and the interviewer's interpretation of the participants, it is felt that most, if not all, were able to view situations holistically.

In terms of the Verbal – Imagery dimension, as previously noted, the spread across this dimension was generally even and an analysis of the raw results does not produce any significant findings.

In conducting a comparison of the CSA results for all participants with the researcher's evaluation of each, a number of inconsistencies were identified. Such inconsistencies were generally of two types. Firstly, however, the CSA reported several participants as being impulsive in their decision-making. Not all of these participants described processes that appeared impulsive. This is likely to have been due to the extent of any external constraints present that override the decision-maker's natural style. Also, for a few participants, the CSA indicated that they were likely to use a more structured process of decision-making than identified by the researcher. For example, one CSA analysis suggested that the participant preferred to generate a range of options and then evaluate them in terms of their pro's and con's. However, the process described by the participant was more closely aligned with Mintzberg *et al.*'s (1976) Garbage Can approach where decision-making was conducted in response to the

emergence of a potential solution. The cause of this disparity was not established. It is likely however, that the level of insight achieved by the CSA did not match the specificity of the questioning that occurred within the interviews. Whereas the CSA was intended to describe behaviour relating to a range of contexts, the question focused on an aspect of one such context; the decision problem structuring process with decision making.

Generally however, the CSA supported the data that emerged from the interviews as analysed by the interviewer. In particular the Wholist – Analytic dimension provided interpretations of the participants that closely matched that of the researcher.

5.4.7 A PROPOSED MODEL OF HUMAN BEHAVIOURAL INFLUENCES

Figure 5-7 diagrammatically presents the nature and impact of the identified human behavioural influences.

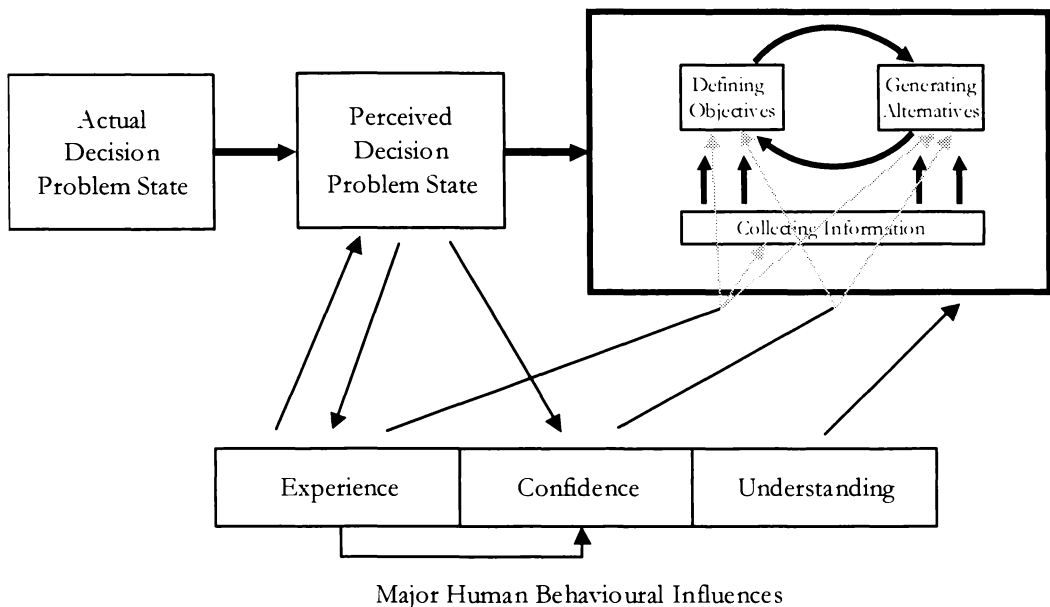


Figure 5-7 A Proposed Model of Human Behavioural Influences

The experience of the executives within the decision domain was found to influence both their perception of the problem, and the activities they employed in subsequently structuring it. An executive familiar with the context of the decision was likely to have a different perception of the problem than the

decision-maker for whom the issues were unfamiliar. For example, the executive who is heavily involved in tendering for industrial project management contracts generally has a good understanding of the industry, the contracts, and what is important in the tendering process. Furthermore, the perceived decision problem state contributes to the level of experience held by the decision-maker.

In terms of the structuring process, it has been found that experience can contribute to all of the three main structuring activities. Experience can assist in the collecting of information (much of which might be captured in that experience, rather than located externally) as that familiarity also relates to where that information might be sourced. In terms of the defining of decision objectives and the gathering of alternatives, experience can speed up the process, as many of the steps within these activities have been carried out before; allowing for some application to the present situation. Experience can have a downside though as there is potential for misframing though over reliance on (irrelevant) experience.

The understanding dimension relates to the understanding the executive has of problem structuring and the activities contained within. Executives who recognised the distinct activities of problem structuring and generally understood the associated requirements were clearly likely to have an advantage over those who had a lesser understanding. Benefit gained from such understanding was generalised rather than influencing specific structuring activities; the process in general could occur quicker through more decision-maker autonomy and a reduced reliance on outside help.

The final individual behavioural influence identified was that of confidence. Executives that appeared generally confident, not just in decision-making, but overall, were found to be inherently more aware of the activities contained within decision problem structuring. As a result, these individuals appeared more comfortable with the overall process. Confidence was also found to indicate the non-existence (or minimal impact) of other constraints (e.g. time, financial etc.). It is most likely that the non-existence of constraints permits the decision-maker to feel confident with the overall process. How the decision-

maker perceived the decision problem contributed to that confidence. In particular, confidence allows for the development of objectives and alternatives that are creative and forward thinking.

5.5 OTHER INFLUENCES

In addition to those influences/constraints described and observed in Sections 5.3 and 5.4, a number of others emerged during the interviews. These additional influences were not as prevalent as those previously described, yet warrant discussion nonetheless.

5.5.1 SELF IMPOSED CONSTRAINTS

The existence of so-called “self imposed constraints” was mentioned by a few of the participants. As an example:

“I rarely make a decision without having got the information that I require. And I rarely make a decision without reliable information and maybe that costs me in opportunities in some particular cases, but in view of the volatility of the market I am operating in, I would still prefer to get the information I need”.

Although the shortage of reliable information is what would in effect delay the decision process, it is the decision-maker’s wish for a certain level of information that is actually the constraint. This human element, associated with what was previously viewed as being external to the decision-maker, brings into question the role the decision-maker has in determining the size and impact of these influences. For example, in most of the decisions described, persons other than the decision-maker put the time constraints in place. But for a few, they were self-imposed. Which of the other constraints described above has the decision-maker influenced? It is not thought that the decision-maker plays a significant part in these external constraints; however the possibility does exist for them to impose constraints themselves. This is, again, an issue of decision-maker perception; how the executive perceives external influences, and his or her subsequent reaction based on that perception, might very well determine the role that influence plays in the structuring process, as well as the rest of the decision. For example, a decision-maker used to dealing with strict deadlines and time

constraints, might not view a decision problem structuring time constraint as being particularly restrictive. Conversely, another decision-maker might view the impact of that same constraint as being severely inhibitive and perform a much more Satisficing (Simon, 1957) type structuring process.

5.5.2 ABILITY

Interestingly, the ability of the decision-maker was the most commonly noted decision structuring constraint other than those described in the preceding sections. This is interesting as the participants were, in effect, critiquing their decision-making ability at a time when they had not been asked to do so. Some participants thought that being able to recognise their limitations was important, especially in the problem structuring phase. For that reason, many stated that their preferred mode of operation was to put in place the high level structure, have procedural aspects completed by a subordinate and then make the decision based on that structure; they preferred other, perhaps more able, individuals to carry out their prescribed structuring process. Others were more specific about their limitations. One (in contrast to above) believed that he lacked the ability to delegate decision activities. He was not necessarily untrusting of the abilities of his staff, he just felt asking his staff to manage the decision was adding additional risk to the decision. Although not directly related to structuring, another participant felt that he was not particularly adept at defending a decision having made it. This same decision-maker exhibited the greatest use of gut feeling in his decision processes, so there might be an association between process and the defence of the decision.

5.5.3 EXTERNAL ACCOUNTABILITY

Based on the observations of the researcher, it would appear that for those executives operating within the public sector, their decision processes have to be both robust, transparent and legitimate³⁸ with respect to their stakeholders. It was found that, for those working in local or regional government in particular, there exists a need to be constantly aware that there are often public lobby

³⁸ See section 5.4.5 for a brief note on legitimacy

groups and the media waiting for decision-making mistakes to be made. Also, other government agencies, in trying to be seen to be doing their job, are also often watching for mistakes to be made. As stated by one public sector executive:

“The other feature that influences this, and I think the decision process in local government organisations has to be a little bit more measured because the implications are a hell of a lot more greater, is its exposure to the public sector. It is like living in a fishbowl. We operate in the public sector environment; any other government agency can see what we are up to. And of course every three years the voters have their say.”

He also stated:

“In my experience in local government it is those situations in which you can easily dig yourself into a hole. And in my opinion if you are in a hole, stop digging. You will just make the hole deeper. I think the decision process in local government organisation has to be a little bit more measured because the implications are a hell of a lot more greater, it is more the exposure to the public sector.”

The effect such (outside) attention has on the structuring process is unclear. It certainly influences the decision-maker’s attitude towards risk; decision failure where external accountability is an issue is a most undesirable outcome. It is likely however, that the issue of external accountability is contained within the wider context of the public sector environment (see Section 5.3.6).

5.5.4 ORGANISATIONAL CULTURE

Closely related to the influence of internal politicking (Section 5.3.6), one executive described a culture within his organisation that hampered not just his, but all organisational decision-making. The organisation had a long history of making predictable decisions within an environment of little change. In recent times however, the operating environment had become increasingly volatile which caused the executive to increase the creativity (or in his words “imagination”) in the decision-making, company wide. Unfortunately, he felt that the organisation as a whole was unwilling to make such a change, and so he constantly felt constrained and encountered a lot of opposition when he tried to do things differently. There had been a history of doing things a certain way, and although he was the chief executive, the inability to change influenced his entire decision-making.

Such a culture might be considered to provide an environment of internal politicking in which the decision-maker feels constantly hampered. This is reflected, primarily, in terms of the problem structuring process, and in the development of objectives and alternatives, which are strictly aligned with that culture.

5.5.5 DECISION RAMIFICATIONS

It was not initially expected that much reference would be made to decision ramifications or consequences as a link between the outcome of a decision and the process of problem structuring. While this is not an unreasonable assumption to make, a number of participants made reference to the ramifications of the decision when discussing the structuring activities. Because of the nature of these comments, it is discussed here as a problem structuring influence.

One decision-maker stated that he often used the possible ramifications of potential outcomes (including the status quo) of a decision to help ascertain what was important in the decision (the objectives) and what needed to be considered in the structuring process. He would typically (with minimal structuring) identify several possible solutions/alternatives to a decision problem and then look at what possible ramifications (both good and bad) might occur as a result of the implementation of each. In evaluating these ramifications, often previously unconsidered issues might emerge that need to be incorporated into the early states of the decision process. In effect this process (which might be described as being part of the structuring) was simulating the decision. This might occur in a conscious and formal manner, or unconsciously, so as to quickly determine what issues might be important to the particular decision. Others discussed the importance of ramifications, in general terms, but usually when talking of the generation of alternatives. For example:

“I talked over the vacancy with the head of department, we talked about the ramifications of that position for the rest of the year...”

“If you are general then you have all the pieces in front of you, you have could a major impact on the total outcome...”

It would be interesting to uncover the extent to which decision-makers subconsciously consider the ramifications of likely solutions within the structuring process. It could be expected that such thought might go into the generation of alternatives, and perhaps even in the formulating of decision objectives. However, until now, the impact of ramifications on the actual structuring process has not been considered. For example, would a decision with particularly significant ramifications, e.g. the potential downfall of the organisation, lead to a structuring process with greater reliance on recognised tools or methods, or would a preference for experience and judgement be more likely in such situations? It should be noted however; for the ramifications of a potential solution to be considered, that solution (in the form of an alternative) needs to, obviously, first exist. Therefore any influence the ramifications might have on problem structuring in general, is likely to occur via their influence on the set of alternatives to be considered. Ramifications are also likely to be considered more fully in later decision-making activities.

Having now suggested that the ramifications of a decision might impact the structuring process, at least in the initial stages or via the evaluation of generated alternatives, we should now consider the reverse, i.e. what influence the structuring process has on the decision-maker's perception of the ramifications of a decision outcome. It was initially thought that the ramifications of a particular decision were unlikely to be influenced by the structuring process. Rather, it was thought that the choice phase had the greatest influence; ramifications or consequences can only eventuate once an alternative has been selected. However it has already been noted (Section 5.3.6) that in situations with a propensity for external political interference or those which are made within politically volatile environments, structuring is often undertaken as a sort of insurance should the implementation of a decision turn out to be unsuccessful. So in effect, structuring is used to either eradicate, or at least lessen, the ramifications of an unsuccessful decision outcome. Also, if a poor alternative generation process is employed, often a limited number or poor quality alternatives might be produced. In which case, a choice has to be made based on poor structuring. Moreover, the generation of alternatives is often based on the way the objectives are "framed", which in turn is influenced by the

“frame” of the identified decision problem. It would be fair to say that any good decision problem structuring process should involve the consideration of the likely ramifications of the generated alternatives; this would most likely be part of the attributes of the alternatives.

This again demonstrates the importance of the structuring process. The remaining decision activities are based upon the quality of the structuring process including the range of alternatives, the development of relevant and representative objectives, and the consideration of ramifications.

5.6 NATURALISTIC PROBLEM STRUCTURING PROCESSES

Q.2: What processes are employed in the structuring of decision problems?

The interpretation of what constitutes a decision process differed for the researcher and the majority of the research participants, at least initially. In being asked to describe the process followed in structuring a particular decision, the majority (again initially) described a process in much more abstract terms than required for this research.

Because of the brevity of some of the process descriptions, the interviewer often needed to intervene during the description of these processes so as to uncover the detail associated with them. Offering examples of problem structuring behaviour also helped in defining the level of detail that was being sought. Having done this, the processes described by the participants were at a level much more suitable for analysis and comparison with those existing in previous literature. Participants were also asked to try and consider why they acted as they did in structuring their decision problems. An analysis of this is included in the subsequent discussion.

The most noticeable observation was that not all of the unaided problem structuring processes described had distinct decision phases as per the models proposed by (among others) Simon (1960), Arbel and Tong (1982), and Davis and Cosenza (1993). Although the described decision processes were generally sequential, the boundaries that existed between the phases, such as in the above models, were often not obvious. This is not an unexpected discovery as few, if any, of the decision-makers were aware that such decision phases might exist. As has been previously outlined, participants were most familiar with the act of choice making; they did not consider, initially, that any other activities might be considered part of the decision process.

One executive described a decision-making process that could quite easily have come from a textbook. The process he described was one that had been prescribed to him as a senior manager within another organisation. He said:

“It was pretty much the decision-making model we used.”

The process he described was:

“I determine what the real problem is, and then I collect as much information as I can and that’s sort of going on at the same time those two things. Having got a clear idea of what the problem is, then really looking at the different alternatives, different solutions to solve that problem. There might be 10 ideas, some of them are crazy, some of them might be quite workable and then it’s really a process of elimination to decide which one I am going to go with and then preparing some sort of action plan about how to implement it. Invariably there is then some sort of formal or informal review as to how the decision went”.

No other participant described such a complete and formal process. The participant recognised it as being a good one, for whatever reason, and had chosen to continue to use it in later and differing decision contexts. This participant added that he felt that his experience, above anything else, gave him the confidence to go ahead and make decisions, even those in which the risk was high. It is likely however, that having a stable process that he feels comfortable and confident with will add to his overall decision-making confidence. Other described processes were generally more intuitive and less structured. It was the view of most participants that a decision process was simply a series of steps, often iteratively repeated. For example, one participant noted:

“...the sequence of the decision process, or the principles are probably pretty universal, but the emphasis you put on each of them can vary.”

Sections 5.6.3 to 5.6.5 investigate observed/described problem structuring activities in greater detail. The process is broken up into the three main activities involved: collecting information, defining objectives, and generating alternatives. The activities are then discussed (Section 5.6.6) collectively in terms of the overall problem structuring processes they form. These processes are subsequently contrasted with those appearing in the literature. In particular, the structuring processes identified by Mintzberg *et al.* (1976) and Nutt (1984) are considered.

Further to the subsequent discussion, Section 5.8 contributes to the understanding of the problem structuring process by comparing the described processes with behavioural elements presented in the wider, descriptive decision-making literature. A number of issues related to problem structuring processes are also presented within that section.

5.6.1 SYNOPSIS OF DATA RELATING TO PROBLEM STRUCTURING PROCESSES

Few examples of sequential processes were observed. Rather, decision-makers more commonly structured their decisions in an iterative manner. The following summaries provide a snapshot of the described problem structuring behaviour of each executive. The data for these summaries come, primarily, from the interview transcripts, but supported by data from the questionnaire and the post-interview notes.

1. Diversification into a new area of business

The manner by which this executive structured the described decision was unstructured and ad-hoc. He was most concerned with developing clear objectives; he felt that in doing this, the rest of the structuring would occur, to a degree, automatically. Most of the information he needed to gather was based on his experience, so did not need to be sourced externally.

2. Opening a new branch office

This executive found that his decision objectives were often quite obvious to him, and were based upon the direction of the organisation. He believed that having identified the decision objective, the alternatives would also become obvious.

3. Management of a flooding situation

This decision structuring process began with the collection of information to help with the identification of the decision objective(s). In doing so, potential alternatives emerged. Because this was a negatively viewed decision, no “ideal” objective existed, so several iterations of information gathering existed. Again, these iterations enabled the further alternatives to be identified. Part of the process involved an attempt to forecast the likely outcomes of decisions by simulating their implementation.

4. Entering into an international trading relationship

The identification of the primary alternative was the initiator of this decision. This alternative was used to develop the decision’s objectives. A large amount of information about the alternative was gathered so as to have a clear understanding of it.

5. Purchasing a new computer system

This decision was typical of most. Having identified the need for the decision, the objectives were established with the aid of data collection from both internal and external sources. This was then used to guide the identification of candidate alternatives.

6. Buying out a staff gratuity

This was an opportunity based decision, so the identification of the alternative was the initiator. Given that no other alternatives were to be generated, much of the structuring process was concerned with the gathering of information.

7. Entering a new market

This process was most concerned with the generation of alternatives. The problem was identified, followed by the generation of objectives, in response to the problem. The remainder of the process involved generating a range of alternatives that would fulfil those objectives.

8. Termination of a long term project due to escalating costs

This was a yes/no decision, with clear, pre-established objectives. These objectives were, however, refined as information was gathered during the course of the structuring.

9. Allowing a new operator to compete in a limited market

Again, this was a decision problem structuring process where the gathering of information was crucial. The alternative was the initiator of the decision, and the executive needed to establish some relevant objectives (based on higher level organisational objectives) to determine whether the alternative should be considered.

10. Satisfying competing demands for limited funds

This was a well structured problem where the objectives were clear and undisputable. It was simply a matter of generating a range of alternatives that met these objectives. Specific data/information was gathered from within the organisation to assist with this.

11. Purchasing a new company

This was another decision that was initiated by the emergence of an opportunity (alternative). Information was gathered then about that alternative so that it could be assessed fully.

12. Cutting costs in order to avoid major financial losses

Simulation was a major component of this structuring process. This simulation could be considered the generation of information about alternatives so that they are able to be more easily assessed in the choice phase.

13. Tendering for a major contract

This was a fairly well defined problem, and a straightforward structuring process resulted. The alternative initiated the decision, and additional information about the alternative was gathered to increase the decision-maker's understanding of it and its relationship with the existing objectives.

14. Appointment of a senior employee

The objectives of this decision were easy to establish. Therefore, much of the structuring involved gathering information about what type of alternatives were desired. This was followed by the generation of alternatives, and concluded with a comparison of those alternatives with the decision objectives.

15. Purchasing of high value commercial property

The executive stated that much of the structuring process involved carrying out various forms of analysis, on both the alternatives and the objectives.

16. Changing major suppliers

Having identified that a decision needed to be made, the executive went about establishing the objectives of the decision. This iterative process was combined with the gathering of information. In generating alternatives, some simulation was undertaken to assist with the formulation of alternatives.

5.6.2 GROUNDED THEORY SUMMARY

These synopses were based primarily upon the described decision structuring processes contained within the interview transcripts. The incident table, presented in Appendix F, shows the data incidents that were extracted from each of these transcripts. In summary, 129 distinct incidents of data relating to the structuring process were identified within the transcripts. Some were based on an executive's brief mention of a particular structuring activity; others were based upon a more detailed process explanation. For this reason, the weighting of each incident cannot be assumed equal.

As part of the open coding aspect of the grounded theory data analysis approach, these 129 incidents were categorised into seven higher level incident groupings. These are summarised below.

- 1. Defining objectives (30 Incidents)** was noted in all but two of the interview transcripts. The defining of objectives ranged from a formal process in which a strategy was established, against which decision success could be measured and alternatives generated, to those that were very informal and intended as a loose set of decision guidelines.
- 2. Analysis (10)** was mentioned by some of the executives. They described analysis in general terms, but primarily related to the activity of understanding the problem such that objectives could be established.
- 3. Generating alternatives (30)** was described by almost all participants. The activity typically was one of two types: either the generation of a range of alternatives for which to later assess, or the generation of a single alternative to go up against the status quo.
- 4. Gathering information (40)** was the most widely reported decision problem structuring activity. Information was gathered to assist with the defining of objectives, and in the generation of alternatives. It was also undertaken in the earlier task of gaining a better/clearer understanding of the decision problem.
- 5. Identification of decision requirements (4)** was a specific component of the objectives definition activity.
- 6. General process issues (6)** is a incident grouping that was established to “hold” non-specific, generalised structuring activities. Most relate to the defining of objectives.
- 7. Simulation (9)** was the name given to those activities that were concerned with attempt to establish the likely outcome of a particular decision. While more related to choice than structuring, some executives attempted to simulate the decision outcome to assist in the generation of alternatives.

In following the remainder of the grounded theory analysis process, as described previously, these incident groupings were reduced to produce more abstract concept groupings. These are:

1. Objectives definition (defining objectives, analysis, identification of decision requirements, general process issues)
2. Alternative generation (generating alternatives, simulation)
3. Information gathering (gathering information)

These three concepts formed the category and phenomenon termed: **Decision problem structuring process**, relating to the high level research question, 2: What processes are employed in the structuring of decision problems?

The story that emerged from the selective coding can be summarised as: The manner by which decision problems are structured is not strictly a process, where a process, by definition, is a set of sequential steps. There are three main decision structuring activities that occur iteratively and repeatedly during the act of decision problem structuring: the defining of objectives, the generating of alternatives, and the gathering of information to support these two activities.

5.6.3 COLLECTING INFORMATION

Information gathering was described as being one of the most time consuming components of the problem structuring process.

“...gathering the information before making a decision in some circumstances is quite a big part of that process.”

“...I think I make decisions that are defensible on the grounds that they were made with the best information available at the time. But saying that, you need to ensure that you get the right information, make sure it is correct, so if you have to go in front of the judge you can defend it.”

It was also seen as being one of the most important.

“You have to make the best decision at the time, given the information and the circumstances you have.”

“...if they haven't got the required information, I will say can you go away and get that information before we make a decision.”

“...I find that I like to have all the information available to me. I don’t always like collecting it, but I like being able to have that stuff on tap. I can’t be bothered with having to go collect information when a question is asked. I like to have it on hand. I would see my job as pushing to get that information provided in a useable form rather than sitting down and saying, let’s do a spreadsheet.”

Collecting information was also viewed as being an activity that did not have any particular start or end point in terms of the progression of the process, rather it was a continuously occurring activity used to support other aspects of the process.

Having received and achieved a preliminary understanding of a decision problem, the first thing that generally occurs is the obtaining of further information so as to better understand the problem. This involves gathering information from within the organisation and also from external sources as to what the actual problem is.

Reactive behaviour in terms of information collection was also described. For example:

“We sometimes do go out and hunt out information, we might ring clients, so we do some information gathering, it is more passive than active really. We typically start doing something when it hits us between the eyes, so we are not out there scratching for information, we wait for it to come to us.”

Another participant emphasised the variability of the data gathering process. He stated:

“...gathering the information before making a decision in some circumstances is quite a big part of that process. On the other hand it might just be a very small part.”

It was noted that many decisions by their very nature are not information intensive. This does not necessary imply that such decisions are less important or less complex than those which are information intensive, rather it is likely that the importance or complexity of a decision is not solely influenced by the amount of information that needs to be gathered. In addition, some decisions, although perceived externally as being information intensive, might require very little information gathering. This might be because the information is in the form of decision-maker experience, knowledge or intuition, and is therefore already “internally housed”. Alternatively it might be simply because the

information does not exist or other constraints restrict the decision-maker in collecting it.

While the information gathering process was considered by most as being a time consuming and often-difficult process, some described the information gathering process as being fairly straightforward. Instead, it was suggested by this smaller group that it was actually the planning and deciding as to what the information needs gathering that can be time consuming and difficult. This planning process is likely to include such activities as determining what information needs gathering to help develop the decision objectives, and identify relevant alternatives. It will also involve the determination of what information about alternatives needs to be collected and where that information might be sourced. Having established the information requirements, the actual collecting of it might then be allocated to subordinate staff.

One participant stated that it is assumed (in his case) that by the time the decision reaches him, often much of the information gathering has already been completed. It is reasonable to suggest that this is only likely to be the case for bottom up decisions (see Section 5.2.3). While this is a reasonable assumption to hold, there are risks associated with relying on others to have gathered what information you believe is important. Decisions that have been initially structured by the executive decision-maker and then passed to others for the data collection are less prone to such risks. This is generally because in such top-down decisions, the executive determines the process, whereas the subordinate participants are only involved in the more time-consuming and less important tasks. The majority of participants believed that they, as the executive, had the responsibility to have total control over the decision process. In fact most indicated that they would feel uncomfortable delegating the structuring of many of their decisions given the huge ramifications of making even a minor processing mistake. Several executives made note of the fact that they were the highest paid member of staff, in part because of their demonstrated ability for making good decisions and they believed that delegating anything but the basic activities would be seen as not carrying out their role fully. Additional human resources should only be used for the actual processing of a pre-defined process.

It was interesting to note however, that it was predominately the private sector executive(s) who had the strongest feeling on this issue. Perhaps reflecting the contrasting decision-making environments of the two sectors (including the variance in executive salaries), the public sector executives were clearly more comfortable when delegating decision structuring activities than those from the private sector. The transparency in process of public sector decision-making is perhaps another reason for this.

Although the focus of this study is not on decision outcome, likely outcomes seemed to be widely considered in the structuring process. An interesting comment made was that in structuring decision problems you need to make sure that you collect the right information, because if the decision is later found to be unsuccessful, then this information might be the only defence you have. This statement was made within the context of public sector decision-making, where transparency in process was seen as a defence if the decision was to “go bad”. Assuming the process is sound, this is likely to be a significant issue for this research. Decisions can prove to be unsuccessful for reasons outside the control of the decision-maker or the decision process, and ensuring the decision process (of which information gathering is an important part) is sound, can go some way to protect the decision-maker from unfounded blame.

Collecting information was described as being one of the most difficult aspects of the structuring process, especially in terms of the time it consumed compared with other aspects of the process. It was regularly described as being a time intensive activity and one that never seemed to be complete, at least until the final decision had been made.

Finally, it was noted that obtaining information raises a timing issue. It is apparent from the comments made by most participants that it is desirable to start early in collecting the required information so that it is fully gathered as close as possible to the point in time in which it will be needed. Information that is gathered too soon may (in some highly dynamic environments) become out of date before it is needed, and clearly information that takes too long to

collect will hold up the progression of the process and potentially impact the range of alternatives available and the overall success of the decision.

5.6.4 DEFINING OBJECTIVES

Of the three components of the problem structuring process, the defining of objectives was both least understood and, as a result, least described by the participants. It was found that the defining of objectives was widely considered to be something that occurred outside of the decision process. For what were initially considered important decisions, it was described as a process that was closely aligned, or even part of, the wider organisational strategic planning activities; it was widely suggested that objectives are pre-existing. This was the case for those decisions that were viewed positively and/or were opportunity based. For example, one executive described a decision concerning a new business venture overseas. The venture had been sought as a way of addressing one of the elements of the organisation's strategy; to actively seek overseas opportunities to widen the company's geographical base. Another involved the purchasing of a new business that had just come on the market. Having become aware of the opportunity, the appropriateness of its purchase was assessed in relation to the organisation's strategic direction; would its purchase form a good match with the high level objectives of the organisation? So for many such "strategic" decisions, decision goals or objectives were not explicitly defined, rather the overall direction of the organisation was used to guide the other aspects (e.g. alternative generation) of the problem structuring process. For more routine decisions, the objective definition process was even less recognisable and often more intuitive than that concerned with more important decisions. For such decisions, with less significant ramifications, it appears that objectives do not need to be as well thought through and are most likely to be developed intuitively and subconsciously.

Only a small number of participants discussed the formulation of decision objectives without being prompted by the interviewer, and for these individuals, their use of the word "objective" was done so, loosely. For example, one decision objective described was simply "to get the decision made". Thus, some

participants related decision structuring objectives with the completion of the decision process rather than within the context of the decision problem. The nature of formulation of decision objectives was found to be related to the level of overall formality associated with the entire decision process. Those processes that appeared more formal or less subjective than others had a greater likelihood of having a formal and defined objective definition phase.

What might be considered a “common” or generic process of how and when decision objectives are generated did not emerge from the interview data. Some generated them consciously whereas others did not. Some generated them at the beginning of the structuring process; others continually and iteratively developed and refined their decision objectives during the course of the structuring process being guided by the collection of information and the identification and measurement of potential alternatives. It would appear however that on the whole, objectives were used to define the type and nature of the alternatives to be generated, i.e. they were developed early on in the decision structuring process, rather than being developed after the identification of potential alternatives and then used to measure and filter them. The following interview extract provides an example of how the development of decision objectives was used to frame the structuring process and identify potential alternatives:

“We firstly decided that we wanted to expand the business to increase its turnover. Secondly we wanted to increase the business to increase its market area in terms of geographic area and thirdly we wanted to expand the business to provide an alternate market to give us a cushion against a downturn in this area or any other area. Having gone through the process of deciding what we needed to do, we then looked at the decision of where we wanted to expand and in doing that we considered the features of alternative geographical markets. So we firstly decided that this was the strategy and second where we were going to do it.”

It was clearly seen, and described by some participants, that identifying decision objectives, however formally, was the most efficient activity in terms of the time and other resources required to make the decision.

5.6.5 GENERATING ALTERNATIVES

All participants were familiar with the process of alternative generation and were able to describe processes or philosophies relating to the generating of alternatives in their decision processes. Several interesting issues emerged, however, concerned with the generation of alternatives.

A number of participants described decisions where an alternative emerged (for whatever reason). Subsequently one of the first decisions that was required to be made was whether it was possible to continue the decision without the introduction of additional alternatives. This was influenced considerably by the decisions associated significance/ramifications and it was also found that public and private sector environments had differing influences. In the private sector it is common that the emergence of an alternative might be what initiates the decision process in the first place. It is then necessary for the decision-maker to decide whether additional alternatives need to be generated. For many of the private sector decisions of this nature, no additional alternatives were deemed to be necessary. For example one participant said that (for one particular decision) the decision was too important to be confused by trying to add additional alternatives. In response to this comment, the participant was asked whether he considered variations of the single alternative, i.e. rather than generate distinctly new alternatives, generate similar ones based on the one alternative. He responded in the negative, again stating that the decision was one of yes or no, and that no other options would be considered. Mintzberg *et al.*, (1976) and Snyder and Paige (1958) also report on the existence of yes/no decisions.

Conversely, in the public sector the introduction of additional alternatives was widely reported and was undertaken for a number of reasons; firstly to ensure that what on the face of it appears to be the best solution, is in fact the case, secondly, as previously mentioned, to add transparency and legitimacy to the decision process in case of failure and resulting negative public exposure. Others simply stated that additional alternatives would be introduced so that it was not just a yes/no decision. It was thought (by the majority of participants) however,

that the decision process would be more complete if a “best” alternative was selected from several candidate alternatives. It was noted by one participant that he preferred to introduce “extreme” alternatives so that he could be one hundred percent certain that the subset of “serious” alternatives should not contain any others. It was also stated that the introduction of additional alternatives was employed so that the decision-maker(s) would not be blinded or biased by the first one.

The introduction of extreme alternatives has similarities with the concept of phantom³⁹ alternatives. Farquhar and Pratkanis (1993) discuss the inclusion of phantom alternatives with decision problem structuring. It is noted that the inclusion of phantom alternatives in the alternative generation process can both improve and worsen the quality of generated alternatives.

In terms of the negative effects, Corbin (1980) comments that decision-makers often do not follow a Satisficing approach to alternative generation, and even when an acceptable alternative has been identified, they are likely to (for a limited time) continue this search in case a better option might exist. Corbin believes that if this “acceptable” alternative is in fact an unrecognised phantom alternative, then the search for additional alternatives might end earlier than will have otherwise. The results of this research do support Corbin’s observations. It is difficult (again based on this study’s results) to see how a phantom might go unrecognised. Participants from this study are more likely to consciously introduce phantom alternatives so as to get a better feel of the boundaries of the decision problem.

Unlike the other decision problem structuring activities of gathering information and defining objectives, the generation of alternatives was mostly undertaken at a single point in time during the structuring process. Depending on the level of formality present, this could occur at any time. For the most formal of processes, or those most closely aligned with the type of methods/heuristics described in the literature, this would be once the decision objectives had been

³⁹ “...an illusory choice option – it looks real but for some reason is unavailable at the time a decision is made.” (Farquhar and Pratkanis, 1993, pp. 1214)

formulated. This understanding of the objectives would then guide the identification of the most suitable alternatives. Not having established the objectives in advance would likely result in a set of poorly matched alternatives and then later, a set of objectives that were based upon alternatives rather than vice versa. It is generally considered (e.g. Keeney, 1988) that objectives should precede alternatives.

Nutt (1993b) reports that the literature presents three types of alternative generation process (which he terms “uncovering ideas”). These “tactics” are termed: ready-made, search, and design. For example, the Garbage Can model (Cohen *et al.*, 1972) assumes the existence of ready-made alternatives, held by the organisation as fully developed solutions. Search tactics are those where existing solutions (but not held within the organisation) are sought from external sources. The third type of alternative generation tactic is named design, where new alternatives are devised for specific and unique needs. In his study of alternative generation processes, Nutt (1993b) observed that approximately one quarter of decisions used the ready-made alternative generation tactic. Search tactics were also found to be present, but were more sophisticated than those that Nutt had previously identified in the literature. This included the identification of a cyclical search tactic where decision-makers “...set out to learn about possibilities and to apply this knowledge to fashion more sophisticated searches. Each new search cycle becomes more sophisticated by incorporating what has been learnt in past searches” (Nutt, 1993b, p. 1082). However, within this group, design tactics (including methods such as Linear Programming) were seldom used.

In assessing the occurrence of these tactics, Nutt uncovered a new tactic. The “template” tactic incorporated elements of both the ready-made and search approaches. The template was found to be very much adaptable to the particular decision of which it was part. Because of this adaptability, this approach was found to be the most successful (measured in terms of decision merit, development time, initial adoption and, sustained adoption).

Alternative generation processes within this study were classified based on Nutt's three tactics. Many were difficult to classify, perhaps indicating an association with Nutt's (1993b) template tactic. Of those that could be related to the three tactics, Ready-made alternatives appeared most prevalent. In fact nine of the decisions incorporated alternatives that were ready made. It was noted that the cyclical search tactic was not specifically observed within the context of alternative generation. It should be additionally noted however, as is presented later (Section 5.6.6), that the generalised, overall process model of decision problem structuring derived from the study's result is cyclical in nature. This process model incorporates the defining of decision objectives and the generating of alternatives as the basis of the loop.

Given the complexity and variability of the template tactic, coupled with the often simplistically described processes of the study, it was difficult to note any firm association.

A significant component of the alternative generation process involves the collection of data relating to the alternatives, and most processes of this nature were found to be sequential. An alternative would be identified, whether through a conscious search or by other less structured means, and then the necessary information about it would be gathered. The next alternative would then be identified and so on. All of those who described in detail the generation of their decision alternatives appeared to employ this type of process. There was no evidence of a process where all alternatives were initially gathered, followed by the collection of data relating to them. There seemed a feeling that utilising the former method allows for the continuous building off the preceding alternatives; the more that is known about an alternative, the better it can be used to inform the identification and formulation of subsequent ones. This is also how alternatives are often generated in Multiple Criteria Decision-making (MCDA).

5.6.6 COMBINING ACTIVITIES TO FORM PROCESSES

Section 2.2 presented Simon's (1960) three phase trichotomy of the entire decision process. The basis of this model is that the decision process begins with intelligence gathering, followed by what is termed design (problem structuring) and concludes with the making of a final choice. It has generally been assumed (although not explicitly) that much of the observed/described decision-making behaviour has followed this model. For that reason, little discussion has appeared that considers the non-structuring phases; they are assumed to exclude any relevant behaviour. However for some participants, their decision-making was less structured than Simon's (1960) model and the divisions of intelligence, design and choice, were blurred. Further still, for some, the divisions did not exist.

As an example, one decision-maker described a process where a decision was made without any obvious formal pre-choice structuring. Even though his unconscious judgements were difficult to assess, it was found that it was only after the decision had been made that any sort of formal analysis was undertaken, and only because the decision-maker wanted to confirm that what he had decided was in fact the best decision and that no other superior alternatives existed. So in effect the decision process was a reverse of the traditional model; it was "back-filled" once the choice had been made. This behaviour is characterised by Bazerman's (2002) Confirmation Trap. Such a process might also have associations with the behaviour incorporated with the Garbage Can model (Cohen, *et al.*, 1972) where a formal, logical process is replaced with one of organisational anarchy, and solutions are matched to often previously unrecognised problems. Constraints such as limited time or lack of decision-making experience might force a decision-maker into using such an approach. It also provides the decision-maker with the opportunity to have a more expansive process (due to less direct constraints). Section 5.8.2 contrasts the observed structuring behaviour with the behaviour contained with the Garbage Can model (Cohen *et al.*, 1972).

Comparison with Mintzberg's Process

As discussed (briefly) in Section 2.12, the diagnosis, search, design, and screen routines of Mintzberg *et al.*'s (1976) model of decision processes, are considered to relate to the activities understood (within this study) as those that form the decision problem structuring process.

Diagnosis is concerned most with the understanding of the decision problem; "...the tapping of existing information channels and the opening of new ones to clarify and define the issues." (Mintzberg *et al.*, 1976), p. 254). While much of this might be associated with pre-structuring activities, diagnosis also has implications for the activity of defining decision objectives. In the reality of the decisions described during this study, it would appear that diagnosis is not an activity that ever ends. Throughout the decision process, especially the problem structuring components of it, information is constantly emerging (often as a by-product of other structuring activities) that permits the decision-maker to have a better understanding of the decision problem. In particular, the defining of objectives often adds light to the situation.

In terms of the search routine, Mintzberg *et al.* (1976) identified four types of search procedure used in the generation of alternatives: B, which is much like Nutt's (1993b) ready made tactic, and involves "...the scanning of the organisation's existing memory, human or paper" (Mintzberg, *et al.*, 1976, p. 255). Passive search involves waiting for unsolicited alternatives to emerge (similar to that of the Garbage Can (Cohen *et al.*, 1972)). Trap searching involves the use of "search generators" to stimulate the emergence of alternatives and finally, active searching incorporates the more traditional view of seeking out suitable alternatives.

As was noted previously, nine of the described decisions had predefined alternatives present. Such existence of alternatives relates to Mintzberg *et al.*'s (1976) passive search, which in effect is no search at all. Trap searching was used in a small number of the decisions. For example, the publication of Request for Proposal (RFP) documents or calls for tenders are common examples of trap searching. Active searching was present in two of the

decisions. One involved the constant search for land for which to add to the organisations property portfolio. At the time in which property was desired, a search would go out for alternatives, which would then be evaluated and selected from.

Comparison with Nutt's (1984) Decision Process Types

Rather than identifying a single decision process, Nutt (1984) uncovered a number of process types, as outlined in Section 2.11, these being: historical, off-the-shelf, appraisal, search, and nova. These process types do not outline specific, detailed steps, rather they provide conceptual descriptions of the various types of decision behaviour observed. They focus on the entire decision-making process, yet do pay specific attention to the structuring activities.

Historical processes are most evident within the context of public sector decision-making. “The sponsor visits an organisation or recalls an experience that offers a way to deal with the problem or further specify an opportunity” (Nutt 1984, p. 420). One example of such a historical process is the decision described by one executive relating to the annual distribution of funds to various, competing divisions of the organisation. As previously discussed, given the public nature of this decision, a desire was expressed by the decision-maker to try and follow (as much as possible) an established process. It was common to find decision-makers replicating what other similar organisations do, especially those where the public has viewed their decision-making in a positive light. As has been noted, use of such historical processes within the private sector was undertaken for efficiency purposes only.

Off-the-shelf processes are much like Mintzberg *et al.*'s (1976) ready made and also trap searches involving the search for and identification of the best available alternatives. With off-the-shelf processes, the nature of required alternatives is often first established and the specific need is advertised, although not necessarily explicitly. Alternatives then emerge, in response to this advertising. Nutt observed such processes with thirty percent of the users within his study. One of the private sector executives described a decision to purchase a new piece of software that would manage his entire retail operation. While he knew

of several solutions available, the enquiries he made to a range of suppliers and other system users soon registered his interest in such a system within the suppliers' industry; various suppliers then began approaching him with alternatives. Three of the described decisions definitely exhibited off-the-shelf decision processes; several others contained elements of them.

Nutt's (1984) appraisal process captures the behaviour associated with the Garbage Can model (Cohen *et al.*, 1972). Often a potential solution is identified, along with its value. However, the decision problem which it might address is not immediately obvious. Much of the processing therefore is concerned with establishing a match between the solution and a suitable decision problem. Several occurrences of such behaviour emerged from the present study. For example, the executive who decided to buy out the gratuity of his senior staff would not have done so had not a change in government policy permitting it occurred. Another example was that of a chemical testing firm deciding to purchase an expensive piece of equipment⁴⁰. Until a major competitor made him aware of its intention to purchase the equipment, the executive stated that he had never considered purchasing one himself. However, he noted that the competing firm was operating in another geographical location, so the market could potentially absorb the supply. He also believed that if he was to act quickly, he could actually obtain his piece of equipment before the competitor (who, he said, did not believe another company could afford the initial outlay and risk) and get access to the market first. Before deciding to go ahead, he needed to ensure firstly that he could afford it, that he had the necessary human resources to support this new area of business, and that there would be demand for the service. Nine of the sixteen described decisions showed evidence of such appraisal processes, although some more so than others.

Search processes are those that involve considerably more investigation than those previous outlined, if for nothing else, because the decision-maker is unsure of what is important in the decision and does not have a firm understanding of what he or she is looking for in terms of decision objectives and the relevant

⁴⁰ Note: this is one of several examples where the interviewee chose to describe "other" decisions he/she had made, in addition to the principle decision for which the interview was intended to discuss.

alternatives. Search processes are the least formal of Nutt's five process types and this informality implies a level of understanding by the decision-maker comparable with that described and observed during the course of this study. Such "uncertain" behaviour could be observed within all of the decision descriptions. A new model, presented later in this section, encompasses much of these search processes.

Nutt's (1984) final process type is the nova process. Nova processes are used to classify creative behaviour in the development of innovative solutions. "New ideas are created to challenge approaches used by organisations. These new ideas are sought without specific reference to the practice of others" (Nutt, 1984, p.439). Such behaviour is not likely to be prevalent within public sector decision-making, and was certainly not observed within this study. Even within the private sector there appears a reluctance to be too innovative in decision-making, and all of the decisions described exhibited some use of previous decision-making (as per the Recognition Primed Decisions model (see Section 5.8.1)).

Comparison with Nutt's (1993a) Structuring Types

As outlined in Section 2.11 Nutt (1993a) characterised one hundred and sixty three decisions as containing four types of structuring. These he termed: idea processes, issue processes, objectives-directed processes and reframing processes.

Idea Processes are closely related to the basic tenets of the Cohen *et al.*'s (1972) Garbage Can model (Nutt, 1993a). They generally involve only one solution (idea), which is initially identified, with much of the development comprising of "certifying" that the idea is acceptable. Nutt (1993a) found idea processes to be the most prominent of his four structuring types, and this research also found it to be more widely used than any other process types. Decisions: 1,2,4,6,11 & 13 (see section 5.2.1 for synopses) were such examples.

Issue Processes are those concerned with addressing concerns or difficulties. "Problems implied by the concern or difficulty are explored to extract solution cues." (Nutt, 1993a, p. 242). Kolb (1983) suggests that such a process is

effective if the actual problem is solved rather than symptoms of the problem. Nutt (1993a) found that issue processes could be observed in 26 percent of the decisions in his study. However, he also found that they were the least effective. Little evidence was found in this study of such processes (at least occurring in isolation); the extraction of solution cues however, was noted in a minority of the decision structuring processes.

Nutt (1993a) describes Objective-Directed Processes as those using the likes of missions, aims or goals to guide the structuring process. These missions etc., are generally high-level and so there often exists a degree of freedom in identifying a solution that achieves that mission, goal etc. Such freedom was observed in only one of the described decisions in this study. It was concerned with a decision within a private sector organisation, where the objective was to diversify into a new market as a means of protection against negative market forces in the present, single market. The executive described a process where a variety of options were developed and considered, all supposedly contributing to the achievement of the overriding goal. It is unlikely objective-directed processes would be widely observed in the public sector, at least in unaided decision-making. Nutt (1993a) observed objective-directed processes in 29 percent of cases, a much greater frequency than in this study.

The final structuring type observed by Nutt (1993a) was the Reframing Process. This involves carefully presenting a problem and solution as a means of demonstrating the need to act. This is not strictly a structuring process (although it is considered by Russo and Schoemaker (1990) to form part of the structuring process); rather it is an activity that might occur following a decision process to assist with its adoption. Reframing processes are likely to be common within the public sector where various stakeholders need to approve a decision. However as this was not the focus of the study, no evidence of such actions were observed in this study.

A Model of Described Decision Problem Structuring

What has become evident is that neither the literature, nor the results of this study, suggest that any recognisable, sequential, process of decision problem

structuring exists. The problem structuring phase of the decision process contains a number of activities, as previously outlined, but the presence of these activities can occur at various times, in various orders and may reoccur many times. Looking deeper at the described problem structuring activities uncovers a model of problem structuring that is based upon the iterative and cyclical defining of objectives and generating of alternatives, supported by continuous information gathering. The model is shown in Figure 5-8.

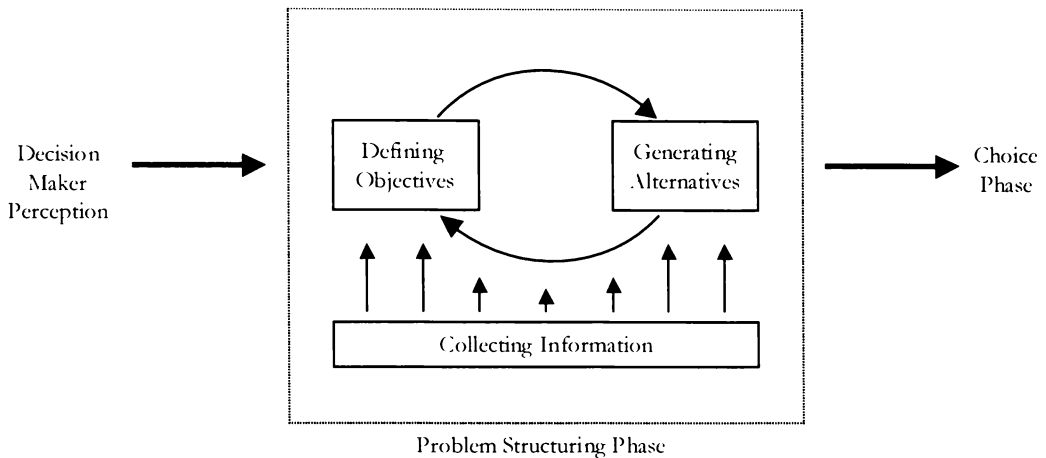


Figure 5-8 A Model of Decision Problem Structuring

Information gathering occurs throughout the problem structuring phase. This includes gathering information to help define objectives, from both within and outside the organisation. In terms of generating alternatives, information is gathered to firstly identify alternatives, and secondly to provide the necessary information about them so that subsequent evaluation can occur without the need for further, time-consuming data collection.

It appeared most common for the defining of objectives to commence before any alternatives were sought. However, in those cases where the emergence of an alternative was the enabler of the decision, the defining of objectives would often be used to measure the suitability of the alternative(s) and to confirm (or otherwise) that a decision was in fact needed, and that the alternative(s) identified thus far were potential solutions to the problem. Although some executives suggested that their problem structuring activities occurred sequentially, the behaviour described was in fact more of a cyclical nature, as shown in Figure

5-8. At no point in time during the problem structuring phase, was the alternative generation phase (consciously) terminated. Similarly, objectives were developed and refined throughout, as alternatives were being generated.

The cyclical decision problem structuring model presented in Figure 5-8 has similarities with that presented by Corner *et al.*, (2001) that indicates a cyclical oscillation between the development of alternatives and criteria. Differences exist in that Corner *et al.* believe that “entry into the loop” is determined by whether alternative focused thinking (AFT) (as observed by Nutt, 1993a) or value focused thinking (VFT) (Keeney, 1992) is used. Such influence was not found to be present in this study. Furthermore, the use of the term “criteria” may (incorrectly) imply a form of measurability of the alternatives based on those criteria. An analysis of the objectives defined in the decisions of this study, suggests that objectives are often subjective, and not always directly measurable (for example “to gain leverage of our existing areas of business”, “to receive a greater level of service in the provision of rating information” etc.). Evaluation of alternatives was mostly holistic where an overall subjective evaluation of the suitability of each alternative was undertaken. In support of this proposition, Section 5.8 outlines similarities observed in described problem structuring behaviour, with processes contained in the wider descriptive decision models of Satisficing (Simon, 1960), the Garbage Can model (Cohen *et al.*, 1972) and the Recognition Primed Decision model (Klein, 1989). These three models have all been previously judged as being holistic in nature (Dillon, 1998).

5.7 USE OF EXISTING PROBLEM STRUCTURING METHODS

Q. 2.1: What existing problem structuring methods are used in practice?

An important part of the study involved ascertaining the level of usage of existing problem structuring methods. The methods, as presented in section 2.13, are predominantly founded in the Operational Research (OR) discipline and while they have been widely reported to be beneficial to decision problem structuring, their level of unaided use has not been extensively reported.

The first stage in ascertaining the level of use (or in fact existence) of existing problem structuring methods, involved searching through the interview transcripts for occasions in which any of the prescriptive methods presented in section 2.13 were described by the participants. This included direct reference to the methods as well as a description of activities that might have been contained within them. From this initial survey of the data, no explicit use of any of the previously described prescriptive methods was identified. There was no evidence to suggest that any of the methods had been intentionally or even unconsciously used. This was investigated further using two approaches. Firstly, considering each method in turn, the interview transcripts were analysed to determine if any closely related processes could be observed. Next, the multi-levelled grounded theory data was analysed in the same manner to determine if, through the grounded theory coding process, any related prescriptive problem structuring behaviour might be recognised. This process was followed for each of the methods described in section 2.13. In addition, any processes that were described, which although not specifically relating to those presented in this thesis, yet appeared to be “prescriptive”, were also noted. The following discussion summarises the findings from the above analysis. It should be noted however, that findings were limited. Minimal association between the described

problem structuring processes and existing methods was observed, subsequently limiting the opportunity for discussion.

Given the limited data that was identified relating to this question, no decision synopses or grounded theory summaries are presented.

5.7.1 USE OF PROBLEM STRUCTURING METHODS

Apart from the occasional use of prescriptive sounding terminology, no process was described that indicated any use of the prescriptive methods presented in section 2.13; although it does not purport to be a complete account of all prescriptive methods containing some degree of structuring. The prescriptive methods presented all imply some form of sequentiality. The described and observed behaviour in this study comprises mainly parallel or iterate processing.

It would appear that the participants had either not been exposed to any of the prescriptive methods or if they had, had either chosen (deliberately or otherwise) to not use them, or had simply forgotten them. Participants were asked whether they had received formal decision-making training (examples of such training courses were provided for those who were unsure) and eight of the participants (50 percent) reported that they had. The most common forms of training were New Zealand Institute of Management (NZIM) courses or internal professional development courses run by members of senior staff. These eight executives demonstrated no greater level of understanding of prescriptive problem structuring methods (or any other decision-making methods) than the non-receiving participants, suggesting that either the training did not involve any significantly formal approaches or if it had, it had not made its way into decision problem structuring practice. It was difficult to question participants about their use of methods with which they were clearly unfamiliar and while most were aware that formal decision-making/problem structuring methods did exist, they had not felt the need to investigate them further. The comment was made that control of the decision-making process was desirable and such control was perceived to be under threat when using formal problem structuring methods.

Irrespective of the reason for their non-use, this result is significant and provides further evidence (in addition to existing literature) that the gap between problem structuring prescription and description is large. For whatever reason, the executives within this study are not using the supposedly “beneficial” problem structuring methods. Little evidence has been presented that suggest other similar individuals are using them either.

The tools and techniques for structuring decision problems used in decision analysis are outlined in Table 2-2. Corner and Corner (1995) found that decision trees and the objectives hierarchy in particular, were widely used when decision analysis was employed. Most participants discussed the significance of objectives in the decision-making process. However, no mention (apart from the use of brainstorming) was made of how such objectives would be managed; the use of any form of hierarchy structure was neither suggested nor implied. In fact no diagrammatic concepts were obvious; it seemed that many of the processes described were based upon the decision-maker’s intuition. The names associated with the tools above were not familiar to any of the participants.

The total absence of these tools in the results of this research suggests that decision analysis (or any reduced form of it) is not used by any of the participants. While the value of using decision analysis is well established, it again supports the wider postulation that experienced, often well-educated and trained executive decision-makers are relying on their experience and judgement when structuring decision problems.

It is not surprising that no evidence was found indicating the use of the problem structuring methods presented in Table 2-3, especially given that much of the problem structuring they purport to prescribe is based on the interactions between individuals when operating within group situations. A conscious and definite effort was made to relate the observed behaviour and structuring processes with the individual-based elements (where they existed) within these OR founded methods. For example, it was thought that aspects of Robustness Analysis (Rosenhead, 1980) such as multiple future scenarios might emerge,

especially in the often-volatile environments of public sector decision-making. This was found conclusively not to be the case.

The behaviour described in this study was definitely individual where the basis of the methods described in Table 2-3 is undoubtedly associated with group negotiation and management. These methods simply assume that achieving group consensus or agreement is the desired outcome of a problem structuring process.

5.8 A COMPARISON OF RESULTS WITH WIDER DESCRIPTIVE MODELS

Q. 2.2: Are empirical observations in this study consistent with wider descriptive theory?

In Section 2.5.1 descriptive decision-making was defined and described. It was noted that apart from a few exceptions (e.g. Nutt, 1984, 1993a, 1998a, 1998b; Svenson, 1979; Mintzberg *et al.*, 1976), that most of the work that has been presented on descriptive decision-making has been concerned primarily with the choice phase. In addition to this, section 2.11 discusses empirical work focusing on unaided (descriptive) problem structuring processes and again, these are discussed within the context of the entire decision-making process. A comparison between these wider, process based, descriptions and the general behaviour described by the participants is possible in addition to that of the general descriptive behaviour presented in Section 2.5.1.

Evidence of the use of descriptive “choice” models was not sought (as understanding choice behaviour was not the objective of this study). However, the use of more general descriptive behaviour was uncovered. In particular, the study found strong evidence of the use of previous decision-making (like that contained within the Recognition Primed Decisions (RPD) model presented by Klein (1989)) to guide the problem structuring process. In addition, the use of

Garbage Can (Cohen *et al.*, 1972) type processes was also identified. The behaviour presented in the literature that was most evident in the results was the use of Satisficing type behaviour (Simon, 1957). Without exception, but to varying degrees, all participants exhibited Satisficing behaviour.

Given the emergence of behaviour relating to these three descriptive models, a further review of the underlying theory of these concepts is presented in this section, in addition to the summary material presented in section 2.5.1.

Given that the study's focus on just one aspect of the descriptive decision making process, it is not necessary to present decision synopses for this section. Similarly, the grounded theory summary is also not shown.

5.8.1 RECOGNITION PRIMED DECISIONS

Almost all of the participants at some point made mention of the influence of previous decision-making within their problem structuring processes. For the typical public sector executive this was done (as previously mentioned) defensively so that in event of failure, certain precedents would have been followed. In terms of the typical private sector executive, prior decision-making was considered for efficiency purposes. Little value was seen in reinventing the wheel if not absolutely necessary. Because of the obvious significance of prior decision-making, in all facets of the decision-making process, further analysis of Klein's (1989) Recognition Primed Decision (RPD) model is warranted, especially with particular consideration of its significance for the problem structuring phase.

The RPD model contains four main components: recognising cases as typical, situational understanding, serial evaluation and mental simulation.

Recognising Cases as Typical: This entails looking at the problem and determining whether it has been encountered before. This involves comparing situational factors with factors of previous situations. Such behaviour was mostly found to be an intuitive and unconscious process. Few of the participants initially recognised this as being part of their structuring process.

However, in most situations, it was instantly recognised by the interviewer as being present and upon describing the process back to the executive, making specific mention of those occasions in which they compare the present decision with past, similar situations, they were able to recognise its presence. Others were more aware of such historical comparisons, including comparisons with decisions made by others:

“We look at things like precedents that have been set, some things have happened in other regions.”

“...but not just your experience, but maybe the experience of others who have encountered a similar sort of problem.”

“Yeah well that’s one that’s come from when I was with [company name]. It was pretty much a decision-making model that we used. There are other processes like fishboning and that type of thing. Simplistically that’s pretty much how I do it. Other times I make a decision just based on instinct or what I think is common sense.”

Situational Understanding: Once a decision has been recognised as being familiar, the decision-maker draws on prior experiences for guidance on how to proceed. In doing this, the decision-maker must recognise four different types of information: plausible goals, critical cues and causal factors, expectancies, and typical actions. Plausible goals are concerned with determining what is achievable. Critical cues and causal factors are important additional bits of information that may not be directly related to the problem, but may become so at a later stage. Expectancies are what prepares the decision-maker for action and provide cues for testing whether the situation is properly understood. Finally, every situation has a related set of typical actions for that situation or type of situation.

Again, like case recognition, much of the situational understanding occurred unconsciously. While it appeared that these types of information were present in the described structuring processes, specific evidence of each was more difficult to uncover. For example, goals were inherently present in all of the RPD processes; however, they were generally incorporated with critical cues and causal factors and expectancies. The existence of situational understanding demonstrated that the process-based components of the prior decision had been successfully applied to the present situation.

Serial Evaluation: “Serial evaluation refers to the assessment of options one at a time until a satisfactory one is found” (Klein, 1989, p. 56) and might be viewed as an extension of Simon’s (1957) Satisficing model. Whereas Satisficing posits that each alternative is assessed until an adequate one is found, serial evaluation has a group of alternatives ready prepared in an ordered “action queue”. This action queue has been sorted such that the first to be evaluated is the most typical option and is therefore highly likely to be selected. The existence of action queues has congruence with the decisional view of the Garbage Can model (Cohen *et al.*, 1972; see Section 5.8.2 for analysis), which considers the solutions (alternatives) to be the precursor to the identification of compatible problems. Serial evaluation does not prescribe that the available alternatives influence the formulation of the decision problem; it does however assume that such alternatives are already in existence (based on the situational understanding) and do not need identification; instead they require matching⁴¹.

The defensive nature of public sector decision-making is replete with predefined alternatives of the nature of those contained with RPD serial evaluation. One of the executives described his operating environment with the local government sector as being highly demanding in terms of decision problem structuring due to the large, diverse and often vocal nature of its stakeholders. He stated that no decision could be expected to satisfy the entire community. In order to address the likely discontent felt by some following such a decision, the existence of a process that (1) was not dissimilar to other successfully implemented decisions, and (2) the alternatives proposed were such that they had all been considered in these prior decisions, was employed where possible.

As was previous stated, private sector executives were more like to utilise RPD processes for efficiency purposes. As a result and also given the creativity afforded in private sector decision-making, serial evaluation was significantly less prevalent in the processes described by the private sector executives.

⁴¹ Lipshitz (1994) presents matching as a mode of decisional behaviour within his decision framework.

Mental Simulation: This is the process of imagining how an option will be carried out within a specific situational context. It involves visualising each step along the road to implementation of whatever the decision might be and beyond, and recording the expected or preferred action at those steps. Of all of the components of the RPD model, mental simulation is the least describable. It is assumed that such simulation must occur when assessing prior decision-making situations for their replicability in the present situation. However, given its nature, specific mental simulation processes were not described and were therefore difficult to identify from the interview data.

Several participants stated that they didn't consciously look back at previous decisions for guidance. Instead they believed that previous decision-making would contribute to their overall pool of executive experience.

5.8.2 GARBAGE CAN PROBLEM STRUCTURING

While primarily a model of organisational decision-making behaviour, the Garbage Can model (Cohen *et al.*, 1972) can also be related to individual behaviour. It recognises that multiple “actors” are often involved in what might otherwise be viewed as an individual process. Such a process should not be confused with the traditional model of a group decision, typified by a process dominated by group discussion, negotiation and the gaining of group consensus. As will be outlined in the subsequent discussion, it is a process where an individual “manages” the process, but does not exclusively carry it out.

Cohen *et al.*, (1972) developed the Garbage Can model in response to what they termed organised anarchies. Organised anarchies (purported to better describe the true nature of organisational decision situations) are characterised by three general properties: Problematic Preferences, Unclear Technology and Fluid Participation.

Problematic Preferences: Within an organised anarchy, it is difficult to assign preferences to a specific decision problem. This is due, in part, to the fact that the organisation consists of a loose, ill-defined group of ideas rather than a clear set of preferences. Such conditions were found to be present within most of the

participant organisations, this being deduced from a variety of comments made by the participants. For example, as outlined in Section 5.3, external influences, of all types, impact upon the decision structuring process. Several participants stated that the uncertainty of such influences was reflected in their overall decision-making environment. It was commented that nothing could be taken for granted and few assumptions could be realistically made.

Others felt that their organisations (of which they, as leader, must assume some responsibility) never seemed particularly well prepared for the making of a decision; when a decision situation emerged, a certain uncertainty of process and direction was present. This was often associated with risk aversity and a relative lack of confidence on the part of the executive.

The existence of problematic preferences was also supported by the fact that few of the organisations in which the executives were employed, had any sort of formal, or even informal, policies or procedures relating to decision-making. Those that did (all public sector and which were generally vague and lacking in detail) had greater external influences, thereby negating the benefit achieved from those policies.

Unclear Technology: The organised anarchy is characterised by its ambiguous operating procedures and a “learn from our mistakes” philosophy, the latter being mentioned by all participating executives. Furthermore, public sector executives also demonstrated the existence of such a philosophy in the problem structuring processes they described. In terms of ambiguous operating procedures, this was most evident within private sector contexts. It was typified, not necessarily by those situations where such procedures existed, but instead where the executive had difficulty in firstly recognising their existence, but also struggled in relaying the nature of them to the researcher. It would appear, on the basis of this study, that it is the participant’s lack of understanding of operating procedures, which permits such ambiguity to exist.

Fluid Participation: One of the most important characteristics of the organised anarchy is that decisions involve a number of people or participants. The involvement of these participants varies in the time and effort they devote to

problems or domains and this involvement can vary from one time to another. While the focus of this study was on individual decision problem structuring processes, in reality, such individualism did not exist. No organisation appeared to permit any significant component of the decision-making process to occur in isolation and be performed by a single decision-maker. Individual decision-making, including the specific process of problem structuring, could be typified by a process in which an individual had overall control and responsibility, perhaps performing what might be considered a decision ‘project management’ type role. The “individual” determines the process, manages his or her own resources, makes use of alternative resources if and when required, and incorporates the views and opinions of various stakeholders into the decision and its process. The input into the process of these external (human) resources is fluid, varying according to the demands of the decision “project” and the decision-maker. The following interview transcript extracts provide evidence of such fluid participatory conditions.

“So in a sense what happens is we set the goal posts into the playing field with myself talking through the issues with those key people and once those goal posts are in place I leave the playing field so to speak to leave them to run the game.”

“I have tended to be the one, on the big decisions to say, yes or I don’t know whether this is right guys, and the other guys respect my experience, so it has worked quite well. They do a lot more of the hard work now at the coalface doing things, evaluating things and I have been able to ease back. But it has been changing for several years now from a one man show to a number of people. We have been starting to realise more recently the difference between governance, management and ownership. It has all been glued together as one small group of people.”

“...a technical decision, we might make it as a team, but I will have final right of veto if you like. So we might make it as a team, but if I don’t want to do ABC then we wouldn’t do ABC.”

In addition to the organisational characteristics described above, the foundation of the Garbage Can model is Cohen *et al.*’s (1972) interpretation of the environment in which decisions are made within the organisation. They describe an organisation as a collection of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for problems for which they might be the answer, and decision-makers looking for work. In effect, the solutions become “Garbage Can” problems, for which solutions (traditionally viewed as problems) are sought.

The alternate use of terms such as problem, choice and solution are problematic when attempting to discuss the Garbage Can model alongside more traditional models of the decision process. Irrespective of the terms used however, much of what the model postulates can be related to the decision problem structuring behaviour and environments described by this study's participants. Evidence of the above Garbage Can concepts emerged from most (if not all) of the interviews. In terms of the basic tenets of the Garbage Can approach (problems are identified and matched to existing solutions), several occurrences of this were identified also. In fact some of the participants in describing the general nature of their decision-making and the nature of their business, described environments closely matching this view.

One participant described one of his roles as actively seeking potential contracts for the organisation. This aggressive searching would occur irrespective of the available capacity of the organisation for any such contract. Once a contract had been identified, the nature and desirability of it would be compared with the organisations present level of work. Various “reordering and reallocating of resources” scenarios (Garbage Can problems) would be run to determine firstly if the contract could be fulfilled, and then to determine what scenario would be most beneficial to the organisation given the nature of the contract and existing commitments. Such a process was not a deliberate approach to decision-making, instead it was the nature of the particular industry that imposed the Garbage Can model on its operation.

Another example was uncovered within a public sector context. As a result of legislative changes (decision influences on problem structuring), an opportunity emerged that the decision-maker felt prudent to take up. The legislation change permitted the executive to ‘buy out’ the gratuity of long serving employees in the form of a non-taxed one-off payment. The benefit to the organisation was that a number (as many as possible) of gratuities could be cleared rather than being held until such time as the employees were to leave or retire. The non-taxation issue permitted some financial savings to be made. The executive stated that it was particularly unlikely that such a decision would have been considered had the change in legislation (Garbage Can solution) not emerged.

Sceptical observers have commented that the observed anarchy or confusion within organisations may in fact instead be a symptom of the inadequacy of traditional choice theory when attempting to model normal business activity (Weick, 1976). The Garbage Can model is such that it adequately describes decision behaviour that does not involve the selection from a range of alternatives. Other observers have difficulties with the Garbage Can model as they assume that the primary results of a decision process is a decision and that the decision can be understood by an analysis of the process (March & Olsen, 1986). This is clearly not the case with the Garbage Can philosophy. For one to understand the way a Garbage Can decision is made he/she must first understand the organisation, for this has the greatest influence on the processes employed when making a decision, i.e., Garbage Can decision processes “contain” a strong contextual influence.

5.8.3 SATISFICING

Given the level of constraints present in the described decision processes, it was expected that the decisions would generally contain sub-optimal processes. This was confirmed by the data and the use of Satisficing (Simon, 1957) type behaviour was prevalent. While the Satisficing model is most widely discussed in terms of choice behaviour (e.g. Dillon, 1998; March, 1994; Tyszka, 1985), its basic tenets can be observed throughout the decision-making process. In general terms, Satisficing behaviour is characterised by actions that do not seek to produce an optimal decision outcome, but instead produce a satisfactory one based on exceeding some threshold. That threshold may be formally defined or it may be based on the decision-maker’s intuition. In terms of problem structuring processes, Satisficing is likely to result in objectives that do not fully represent the direction the decision should be taking, a reduced set of alternatives, and perhaps only the most accessible information will be sourced.

The level of Satisficing behaviour varied between the participants, as did also the focus of that Satisficing. For example, some chose to place greater emphasis on the generation of alternatives and the collection of information while spending less time on the identification and formulation of guiding objectives. Others,

and this often depended on the nature of the decision, preferred to focus on collecting as much information as possible on one or two alternatives without finding it necessary to generate other options. The following was typical:

“...when you are looking for trends and numbers, you have to go searching for it. Otherwise we are basing the decision on just some snap shot information, really we need to go back and have a look at the bigger picture. A lot of the time you are making decisions without all of the information so I sort of work on the 80/20 rule. 80% of my decisions are made fairly quickly – without all of the information but we will get it pretty right. You can get to the 80% real fast, but if you are going to go for the other 20% you re just going to procrastinate – so making a decision go for 80% and then figure out the other 20% later on.”

Other participants felt strongly that Satisficing should not find its way into their decision-making, at least for certain aspects of the problem structuring process:

“I rarely make a decision without having got the information that I require. And I rarely make a decision without reliable information and maybe that costs me in opportunities in some particular cases, but in view of the volatility of the market in an operating in, I would still prefer to get the information needed.”

Irrespective of executives’ intentions, Satisficing behaviour was observed in all described structuring processes (as well as the later choice activities). This reflects decision-making reality. Decision situations are inherently constrained, by the cognition, abilities and preferences of the decision-maker and the environment within which he or she is operating.

5.9 COMMON PROBLEM STRUCTURING ELEMENTS

Q 2.3: Do common elements of naturalistic problem structuring exist?

Following along from the present research, one possible research direction might involve ascertaining whether the problem structuring behaviour uncovered might offer opportunities for future prescription. The success of such prescription could be significantly enhanced if commonality in process was

found to exist between decision-makers and also between contrasting decision problems. This section describes such commonalities, as identified when comparing the results obtained in response to the previous research question.

5.9.1 COMMONALITY BETWEEN DECISION-MAKERS

As has been previously outlined, the biggest difference that was found that influenced the way executive's structure decision problems was whether they operated within the public or private sectors. While this difference caused many variations in process between the two modes, a number of commonalities between all executives were also uncovered.

All spoke of and demonstrated the need to distribute the decision-making effort within the organisation. Information gathering, in particular, was described as a problem structuring activity that that could be more efficiently and effectively managed though utilising a larger human resource base while still carrying out what is essentially an individual process. With the exception of perhaps one or two decisions where such distribution of process was not appropriate, the use of subordinate staff to carry out a predefined process was common. The executive typically played the role of process designer and manager. This reflected the executive's status within his or her organisation; they were in their executive level roles because of their ability to make "good" decisions. Here, goodness in decision-making is characterised by the implementation of a good process and with special emphasis on the design elements. A number of executives described a process where subordinates also carried out other aspects of the structuring process, although to a much lesser degree.

Although difficult (if not impossible) to model, all executives, through the judgements that they made, utilised experience gained in prior decision-making situations. This resulted in structuring processes that were difficult to describe by the decision-maker and subsequently difficult to model and compare by the researcher.

5.9.2 COMMONALITY BETWEEN DECISION PROCESSES

In addition to the analysis undertaken by the researcher, each participant was questioned as to whether they thought they employed a “common problem structuring process” as opposed to different processes for each decision. Whereas there was a small degree of support for having common elements, there was generally strong opinion for letting the nature of the particular decision determine/influence the process adopted in structuring it.

“The decisions that you make as a chief executive vary from one of major strategic consequence - we are going through our strategic planning process now and that involves a lot of people in the organisation and involves the board as well; to decisions to do with delegative authority - I have a higher delegative authority than you. You actually apply different decision processes for different decision-making.”

“...the principles in making decisions are the same, but different people in different circumstances will put a different weight on what components they use. For instance gathering the information before making a decision in some circumstances is quite a big part of that process. On the other hand it might just be a very small part, but a big part is considering what the implications are. So the sequence of the decision process, or the principles are probably pretty universal, but the emphasis you put on each of them can vary.”

“Some things I sit down and analyse from a financial viewpoint, there are other things that you might do just because it feels right. It is not a particularly analytical process.”

Given particular decision-making environments, some decision-makers believed that commonality in decision structuring processes was important:

“...a lot of the talk about the decision-making in local government is predicated by the fishbowl the we are operating in. So processes are usually the same in principle.”

The sole women executive decision-maker in the study described a common problem activity that is not process based, and additionally applies to aspects of the decision-making process outside of the problem structuring phase. She said:

“...I feel that I have got a natural level of timidity in me but I have also got that other ability to say, lets go for it. So those two things kind of sit inside me. One tries to outweigh the other. A lot of my time I spend looking at the big picture, the wider picture.”

5.9.3 IDENTIFIED COMMON ELEMENTS

Based on the above findings as well as additional results, we can now identify those aspects, which are likely to be present⁴² in the majority of unaided decision problem structuring processes.

Use of Judgement

Judgement and decision-making have often been considered as being the same (e.g. Drucker, 1982). However, it is the view of the author that judgement encompasses all of the non-rational, human behavioural elements of a decision process. Judgement comprises the more intuitive decision processes found in decisions without perfect information, where there are uncertainties involved, where effects of action have to be estimated, and where plans for an unknown future have to be drawn up (Lawrence and Elliott, 1985). Judgement has also been defined as the cognitive aspects of the decision-making process (Bazerman, 1990).

All of the study participants described processes that incorporated a large degree of judgement. This judgement incorporated intuition, gut feeling and expertise (experience). While the level of judgement in the problem structuring process varied from decision to decision and from decision-maker to decision-maker, it was inherent in all described problem structuring. In the literature, judgement is usually discussed in terms of choice behaviour; the use of judgement is likely to be required to substitute missing information. Its use was also found in the pre-choice phases. In fact it is likely that the use of judgement in the choice phase indicates that it has been equally prevalent in the pre-choice activities. A decision-maker's (unconscious or involuntary) use of judgement in a decision process is likely to result in its use throughout the process, not just in the choice phase.

In the described decision problem structuring, the use of judgement was most prevalent in relating alternatives (and their attributes) to the decision problem

⁴² Generalisable for executive level decision problem structuring within regional New Zealand at least.

and objectives. This was a process for which no obvious method (other than the use of judgement) was known.

Use of External Data

While, as just noted, the use of judgement was found to be an intrinsic part of the decision problem structuring process, no decision described was one that could be made through exclusive use of judgement and without the need to source external data. To supplement both judgement as well as more formal structuring processes, externally sourced data is required. This primarily includes information about potential alternatives. Brainstorming, for example, is aided by the use of cues or ideas that are found by looking at similar decisions as well as other sources. Knowledge of attributes of the alternatives is also necessary so that in subsequent choice, adequate information is available such that an informed choice can be made.

Decision Project Management

Casually speaking, the literature classifies decision-making into two main types: individual or group (of which organisational can be considered an extension). Individual decision-making is characterised in the literature as containing certain common characteristics (Harrison, 1999). Such characteristics include the desire for too much rather than too little information, slow decision processes and an inability to make full use of available information, for example. While the decisions described in this study conform to this definition, the existence of a single decision “actor” was not observed. Even with those decisions for which the decision was highly contentious and/or sensitive and for which strict confidentiality was required, external expertise from either within the organisation or outside (e.g. legal advice) was required such that the structuring could be best performed.

The executive has overall control of any decision process with which he or she is involved. Irrespective of how little he or she does, and how much others do, the responsibility almost always lies with him or her. For this reason, and given the financial consequences of many of the decisions structured by the executive, it is the executive who determines the process to be followed. The defining of this

process by the executive can vary in terms of the formality associated. It may be as abstract as informing a subordinate that a decision is required. E.g. “the objective is X, please identify a range of alternatives (Y) from which I can select.” The executive is not actively involved in the detail of the structuring process, yet has defined the nature of it. Alternatively, the executive may be heavily involved in the development of the decision objective, the brainstorming and the formulation and assessment of potential alternatives while others are used only to gather required information.

Adaptive Problem Structuring Processes

The enormity of internal and external influences on the typical decision problem structuring process has previously been outlined (see Sections 5.3 and 5.4 respectively). Many of these influences however are opposing and contradictory. For example in the public sector environment, the influence of the “fishbowl” nature of decision-making and the need to be transparent in the decision structuring process, is in strict contrast with the widely observed human behaviour of relying on intuition and gut feeling in the defining and structuring of a decision process. Clearly, some concession must be made. It is perhaps not unexpected for the clear-cut example provided above, but in all cases described by the executives, it was the human behavioural influences that lost out. Irrespective of how in-built such human behaviour is reported to be, external environmental influences such as time, financial and political constraints are never lessened in order to accommodate the intuitive elements of the decision structuring process; the decision-maker has to be “adaptive” to the environmental influences with which he or she is faced. Simon (1990) aptly stated “Human rational behaviour is shaped by a scissors whose two blades are the structure of task environments and the computational capabilities of the actor” (p. 7). Evidence of such adaptability to environmental influences was found when the decision structuring processes of each participant was compared with the researcher’s post-interview assessment of their general decision style/approach and also their cognitive style, as identified in the Cognitive Style Analysis (CSA) test. A number of the executives produced cognitive styles that suggested that their decision-making incorporates a level of reliance on their

experience and judgement (e.g. Wholist, Verbaliser) or for a number of those individuals, that suggested behaviour was not borne out in their described decision behaviour; their environment simply did not permit this to occur. This was most evident in the public sector.

Further analysis of this phenomenon leads one to suggest that the effect of environmental influences is likely to be inherent, particularly in the public sector, but also in large organisational settings. The number of stakeholders increases as an organisation's size increases and so on the whole, the level of autonomy available to the executive is reduced. Contrast this with the situation of a small to medium sized enterprise where the executive might be the managing director (having a stake in the organisation) and may therefore be willing to make greater trade-offs between his or her internal beliefs with those that are externally imposed.

So all of the decisions described demonstrated a level of adaptability or flexibility so that various influences, whether they be expected or otherwise, could be incorporated. No decision structuring processes appeared to be so rigid, that any of the influences present could not be incorporated.

5.10 RELATING PROBLEM STRUCTURING BEHAVIOUR TO PARTICULAR DECISION TYPES

2.4: Are some problem structuring processes best suited to particular types of decisions?

As previously outlined, the participating decision-makers discussed various types of decisions that they made. These included opportunity and threat based decisions, foreseen and unforeseen decisions and, bottom-up and top-down decisions. In addition, the public and private sectors were also found to produce

different decision types. The type of decision was also found to influence the nature of the structuring process. The most noticeable differing problem types and the resultant structuring processes were those existing within the contrasting public and private sectors.

The following subsections compare the described decision problem types with the employed structuring processes to determine what link(s) might exist between them.

5.10.1 PUBLIC VERSUS PRIVATE SECTOR PROBLEM STRUCTURING

It has been noted already in this thesis that the observed decision problem structuring process contrasted those decisions made within the public and private sectors. It is difficult to assess to what extent this contextual aspect influences the problem structuring process and behaviours observed in this study, however it can be concluded that the influence is significant. In terms of the problem types, private sector decision problems are typically more commercially focused than those made in the public sector. As a result, the decisions described in this study suggest that the need for timeliness in the entire decision process is often greater in the private sector.

The public sector environment demands a greater level of transparency in process than the private sector. As a result, all public sector decision-making behaviour observed was considerably more cautious and the decision processes were generally more detailed. The phases in the overall decision-making process (Intelligence, Design, Choice (Simon, 1960)) were more obviously present than the majority of the private sector decisions and the divisions between the phases were noticeably distinct. For example, one executive has a simple, yet well defined process of structuring decision problems. It is a two-phase approach in which, initially, the most important aspect of defining the scope and objectives of the decision problem and establishing the nature and order of subsequent decision structuring activities is undertaken. Having established the boundaries of the decision structuring process, he can then decide whether he will continue with the structuring himself and then carry out the subsequent choice phase, or

alternatively, delegate the remainder of the structuring, with his initial definition forming the scope and prescription on what is required. The perceived importance of the decision (ramifications, etc.) would be used to assist in making this judgement. The remaining part of the structuring process involves the identification of potential alternatives and the gathering of the required information.

Irrespective of who completes the structuring process, there is an obvious segmentation of activities. Figure 5-9 provides an interpretation as to how (in the case of one executive) the decision structuring process might be viewed.

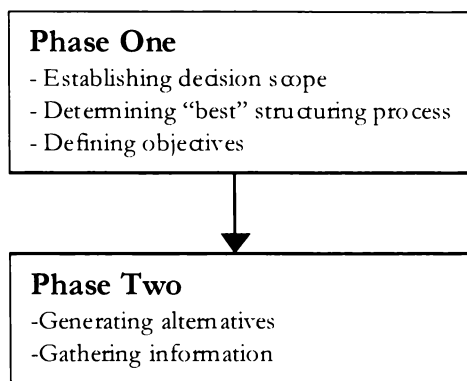


Figure 5-9 Example of an Observed Public Sector Decision Problem Structuring Process

This model closely matches the first two “key elements” of Russo and Schoemaker’s (1990) decision-making model in which these elements are termed framing and gathering intelligence. This model is developed further in Figure 5-10 such that it reflects all of the described public sector decision structuring behaviour.

As previously mentioned, the typical private sector problem structuring process was found to be considerably less ordered. Intuition, gut feeling and judgement appear to play a far greater role than with the typical public sector executive. For this reason, it is difficult to generalise the private sector decision problem structuring process. It is a process that is very much based upon the nature of the particular decision, the experience of the decision-maker, the executives’ attitude towards risk, and the significance of the various constraints present.

5.10.2 CONTRASTING MODELS OF PUBLIC AND PRIVATE SECTOR DECISION PROBLEM STRUCTURING

The condition that displayed the greatest influence on the problem structuring process was the sector (public or private) in which the executive was operating. The structuring behaviour of those in the public and private sectors differed so much, that it is likely (under suitable conditions) that the sector could easily be determined simply by observing the problem structuring processes.

Incorporating all of the previously identified elements of the proposed model of decision problem structuring, two variations of that model can now be presented that exhibit the difference between decision problem structuring within the public and private sectors.

Presented below are graphical representations of decision problem structuring that was found to occur, based on the result of this study. The model of public sector decision problem structuring is shown in Figure 5-10 while the private sector equivalent is shown in Figure 5-11.

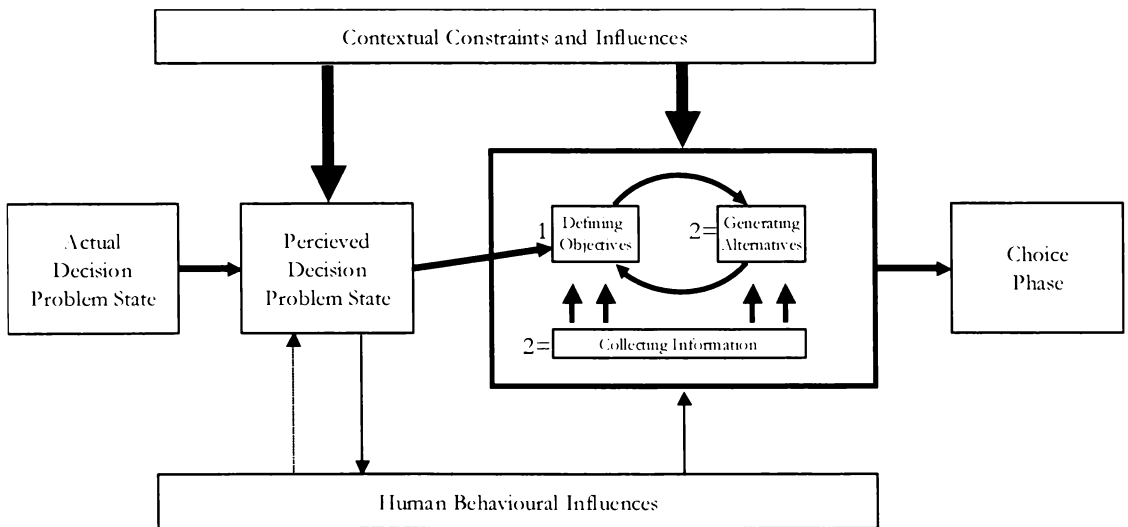


Figure 5-10 An Influence Model of Public Sector Decision Problem Structuring

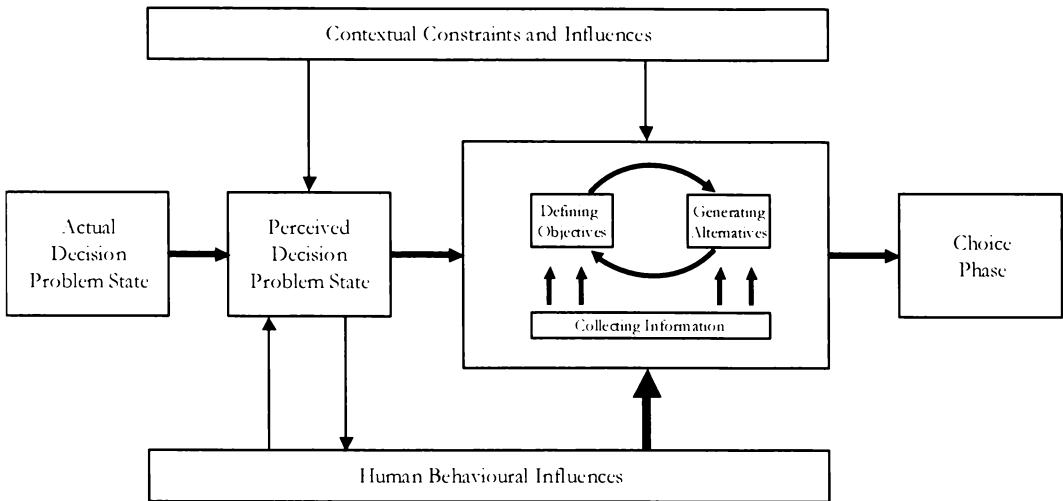


Figure 5-11 An Influence Model of Private Sector Decision Problem Structuring

The most obvious feature of the public sector model is the inclusion of sequentiality (as indicated by the numbering of the structuring activities) in the structuring process. This is described below.

As shown in Figure 5-10, the study results provide evidence that contextual constraints and influences play significant roles in the problem structuring of public sector decisions. This is represented in the model by the size of the arrows (indicating the strength of the influence). Because of the constrained and inflexible nature of the decisions made in this environment, the inherent human behavioural aspects that might otherwise be influential do not have the opportunity to be so. In terms of actual problem structuring process, the public sector executives were the only decision-makers who were able to describe activities that had any form of sequentiality, i.e. a process in the true sense of the word⁴³. The most common public sector problem structuring process would begin by the defining of objectives (shown as number “1” in Figure 5-10). Following this, alternatives are defined and information is collected simultaneously (shown as “2=” in Figure 5-10). The collection nature and frequency of this information collection is, in part, determined by the requirements of the alternatives being generated. The nature of the emergence of the typical public sector decision is shown in the left of Figure 5-10. Such a

⁴³ “...a series of actions or events...” (The Chambers Dictionary, 1998)

decision generally emerges from within the organisation, i.e. bottom-up, it is unforeseen, and as a result, the resulting action is reactive to it.

In contrast to that of the public sector, the contextual aspects within the described private sector decisions were not found to be particularly influential; several executives made it quite clear that constraints of limited finances or time would not be allowed to influence their decision-making. Conversely however, given the unregulated nature of private sector decision-making, there was found to be much greater opportunity for human behavioural influences to be incorporated. Confidence, in particular, played a major role in the private sector decisions described. Unlike the public sector model, no obvious (sequential) process could be observed. The activities of defining objectives, generating alternatives and collecting information occurred in no particular order. The typical private sector decision can be described as top-down, foreseen and proactive.

5.10.3 OPPORTUNITY VERSUS THREAT BASED DECISION PROBLEMS

As was noted in Section 5.2.3 decisions can be classified as being necessitated by either an opportunity or a threat. Such differentiation was found to have an influence on the structuring processes employed by the decision-maker.

Opportunity based decisions were generally those in which a decision was initiated by the emergence of a solution (as per the Garbage Can model (Cohen *et al.*, 1972)) rather than the more traditional model (e.g. Simon, 1960). Such opportunity decisions were more prevalent in the decisions described than threat based. Of the 16 described decisions, 11 (decisions 1,2,4,6,7,9,11,13,14,15,16 in section 5.2.1) emerged in the form of an opportunity, four (3,5,8,12) were threats, and the remaining one (10) contained was a decision that was not in response to any specific opportunity or threat.

The opportunity decision type often resulted in a structuring process that placed less emphasis on the generation of alternatives. The most typical process was one in which having become aware of the potential opportunity, the likely

outcome from implementing it (which would have to be researched initially) would be considered and compared with the overall direction or strategy of the organisation to ensure that it would not detract from wider goals. Having done this, additional alternatives may or may not be generated. The need for further alternatives (to ensure that what appears to be a good solution, is indeed so) appeared to be a measure of the decision-maker's attitude towards risk (which is also influenced by other environmental influences) and also how well it supports the strategic direction of the company. Time constraints also play a significant role, as many opportunity-based decisions have a narrow window of opportunity before it expires.

Threat based decisions were found (in the limited number of examples provided) to be addressed by more traditional decision-making processes. A threat, by its very nature, has the potential to be extremely damaging to the recipient organisation and so is viewed seriously and the processes employed in structuring the decision problem are generally focused towards minimising such risk.

The following process description (of the entire decision-making process, not just problem structuring) is a synthesis of the various processes described by the participants when faced with threat based decision situations. Often what is first undertaken is what is termed “damage limitation”; some short-term act that might help limit the effects of some “worst case scenario”. This is followed by a comprehensive investigation of the problem and the underlying causes/symptoms of it. This action may be perceived as being part of Simon's (1960) intelligence phase and Russo and Schoemaker's (1990) framing element. Having established a good understanding of the problem, alternatives (described as “potential solutions”) are sought. The generation of these alternatives occurs in an informal, Satisficing (Simon, 1957) manner. As soon as an alternative is found that is seen to address the threat, the process is completed and the decision is implemented. So in effect, the duration of the structuring process is determined by the time it takes to identify a suitable alternative.

5.10.4 TOP-DOWN VERSUS BOTTOM-UP DECISION PROBLEMS

Top-down decisions were generally defined and given an associated structuring specification so that subordinate decision-makers could carry out the structuring unaided, much like the process presented in Section 5.10.1 as used by a public sector executive in delegating his problem structuring activities. The prescribed process was therefore generally more formal than what it would have been had the executive completed the structuring on his or her own. As in the public sector case described earlier, the top-down prescribed process will generally incorporate the alternative generation and data collection for a well-defined decision objective.

For bottom-up decisions, the nature of the problem was often quite different. Having identified the need for a decision, the subordinate would put together a definition of the problem and a suggested remedy (alternative). This would then be given to the executive who would either accept the structuring and solution proposal or would impose his own structuring process on it. This would typically make use of what effort had already been made and better align the decision with organisational objectives and perhaps seek out a wider range of alternatives from which to choose. This has similarities with the Theory of Constraints, Negative Branch Reservation (NBR) sub tool which is used to gather feedback on possible futures/solutions.

5.10.5 FORESEEN AND UNFORESEEN DECISION PROBLEMS

The difference in the problem structuring processes of foreseen and unforeseen decision problems was not found to be significant, yet the differences that were observed appear to be related to the time available for planning the decision process.

Decisions that were described as being foreseen were often made incrementally over a period of time. The executive often perceived much of this process as not being part of the overall decision process; instead it was seen as preparing for

the decision. The decision process was associated mostly with the final choice making activities. This was an observation that was made, not only in the description of processes based on unforeseen problems, instead it was widely observed throughout the investigation. The greater the duration of the decision process, the less able the participants appeared to be in describing the nature and content of that process. In addition, they had less overall understanding of the steps undertaken in the problem structuring aspect of the decision process. Foreseen decision-structuring processes were more likely to include an initial objectives definition phase followed by extensive alternative generation than with unforeseen decisions, again due to the inherent time constraints in unforeseen decision problems.

Unforeseen decisions are likely to result in the use of a more defined decision structuring process. Time constraints are more of an issue than in foreseen decisions and as a result, the entire decision process is more recognisable by the decision-maker when attempting to describe it. Its process, although later describable by the executive, is likely to be more intuitive than formal often with Satisficing behaviour incorporated.

5.11 OTHER INTERESTING OBSERVATIONS

The focus of this research has been primarily on understanding the processes involved in the unaided decision problem structuring of executives. Based on an evaluation of the grounded theory data analysis results, it can be concluded that the research design was more than adequate in addressing the research questions.

As has been previously noted, the use of the grounded theory data analysis approach often uncovers other interesting results that, while not directly relating to the research questions, may be of value or interest to the general research area. As most of these “Other Interesting Observations” have been outlined in discussing the research questions (but without specific reference to them as research outcome in their own right), they are only briefly summarised here.

5.11.1 LACK OF UNDERSTANDING OF DECISION PROBLEM STRUCTURING

Even though all participating executives had received a copy of the information sheet (shown in Appendix A), the overall level of understanding of the decision-making activities that occurred in preparing a decision for choice was alarmingly poor. All demonstrated (through the detailed descriptions of decision processes) that they undertook (to varying degrees) structuring processes; few however were able to pinpoint those aspects of their process that related specifically to the focus of this study. It is likely that this lack of understanding can be attributed to the informal, intuitive nature of their unaided decision problem structuring as opposed to the formal, rational description (based on existing literature) that was provided to them both prior to and during the interview.

5.11.2 MULTIPLE PARTICIPANT INDIVIDUAL DECISION-MAKING

The famous phrase “No Man is an Island” from Meditation 17 by John Donne (Norton, 1962) appears particularly apt when considering the basis on which individual decision-making occurred with the context of this study. The decision structuring processes described by the executives were all individually based, i.e. were such that an individual could carry them out. The executives however, carried out none of the described processes on his or her own; the individual processes were typically devised by the executive and carried out by multiple decision participants. Persons other than the executive variously performed all aspects of the decision structuring process, although the level and nature of their involvement depended very much on the nature of the decision. The executive’s role in the structuring process was one of team leader, project designer and project manager.

5.11.3 EXECUTIVE DEFENSIVENESS

As previously noted (see Section 5.4.5) many of the participants felt it necessary to legitimise their actions and a number felt it necessary to defend their problem structuring behaviour. Some appeared to be embarrassed with what they

perceived to be poor decision-making processes. This was particularly the case with those who had a greater reliance on their judgement than what they personally believed was acceptable. Feeling was strongest for public sector executives; private sector decision-makers believed this reliance on their judgement was unavoidable and was in fact used to measure their effectiveness as a leader.

A minority of the participants appeared to treat their decision problem structuring as some sort of classified organisational secret and were reluctant to describe and justify their behaviour. It would appear on reflection, that these individuals (of which there were only two) were using this as a front for perhaps a lack of understanding of their problem structuring behaviour or (as mentioned above) a perception that their decision-making was not of a nature that they felt the interviewer expected to hear from a person in their position. None of the questions were intended to be intimidating or particularly difficult but it seemed these participants might have felt uncomfortable in being asked to describe processes which they had difficulty in recalling.

5.11.4 DECISION SUCCESS

Measuring the success of the described decisions was not one of the study objectives; it was made clear to the study participants, that in selecting their decision to describe, that the final success of it was not important. However, at the end of each interview, the participant was asked whether they thought that their decision was successful or not. Each, without exception stated that the decision had been a success (although some stated that it took some time for that success to be achieved).

It is difficult to ascertain what might be drawn from this. Even though participants were given the opportunity to describe unsuccessful decisions, it seems that, under such conditions, they are unlikely to do so. Successful decisions are more memorable, and the participant will always feel for comfortable in describing them. Future research needs to consider ways to gather data relating to the structuring processes of unsuccessful decisions.

5.12 INFORMING PRESCRIPTION

It is premature to suggest that the results of this study have provided sufficient insight into the unaided decision problem structuring processes of executives to suggest that the development of prescription, based on these results, is possible. This study has uncovered elements of description not previously reported in the literature (e.g. decision-maker's perception, the various internal and external influences), and these elements have been incorporated into a model of executive decision problem structuring, as summarised in Section 5.13. This model remains to be tested beyond the domain of the present study; therefore drawing any form of conclusions about wider decision problem structuring behaviour would, at this stage, be unwise. Should this study be replicated (to test the proposed model) within alternate contexts using contrasting modes of research and data collection and produce results supporting those found in this study, then the development of some form of decision problem structuring prescription might be possible.

Such prescription would need to accommodate:

Various decision types and states

Not all decisions are the same, either in terms of the nature/context, nor the level of existing structure present. Prescription needs to be accommodating of such variance so as to maximise its possible application.

Non-sequential processes

It is quite evident from the results of this study that few decision structuring processes follow a step-by-step sequential process. Instead, problem structuring appears to be the association of several principal activities that occur both iteratively and concurrently. Prescription needs to be flexible to allow certain activities to occur at differing times.

The inherent cognitive elements of unaided decision-making behaviour

The noticeable gap between what decision-makers are observed to do and what existing methods prescribe is primarily a result of the human behavioural elements of unaided decision processes not being accommodated in these methods. Such accommodation is clearly difficult, but should be a goal of all prescription.

The impact of various external influences

A number of external influences were identified during the course of the study. Many of these were found to have a significant impact on the structuring process. While these influences cannot always be removed, they can potentially be managed so that their impact on the decision process, and subsequent outcome, is minimised.

The decision-maker's perception of the decision problem

For a variety of reasons, the decision-maker can view a decision problem differently from how others might view it. This perception may or may not be an accurate interpretation. Value could be gained from prescription that encourages the decision-maker to look at the decision problem in particular ways and from a variety of perspectives so that the likelihood of attaining a true or full interpretation of the problem can be maximised. Mabin and Davies (2001) support this view and believe that the use of multiple frames will help avoid the potential frame blindness that can occur when a decision maker takes a too narrow view of the problem.

The delegation of aspects of the structuring process

While the decision structuring process is clearly of significant importance to the overall success of the decision, it is primarily the design of the structuring process that requires most competency. Subordinates can carry out many of the implementation activities of the structuring process and this was widely observed in the study. In general, existing prescription does not explicitly state the role multiple participants can have in its use. Such enhancements to prescription could improve the effectiveness and efficiency of structuring methods.

This represents a significant challenge.

5.13 AN INFLUENCE MODEL OF EXECUTIVE DECISION PROBLEM STRUCTURING – A SUMMARY

A model of executive decision problem structuring, as emerged from the study results, is presented in Figure 5-12. This model combines all of the models presented earlier (see Figure 5-5, Figure 5-7, Figure 5-8, Figure 5-10, and Figure 5-11) Central to this model is the many influences that exist throughout the problem structuring process and environment.

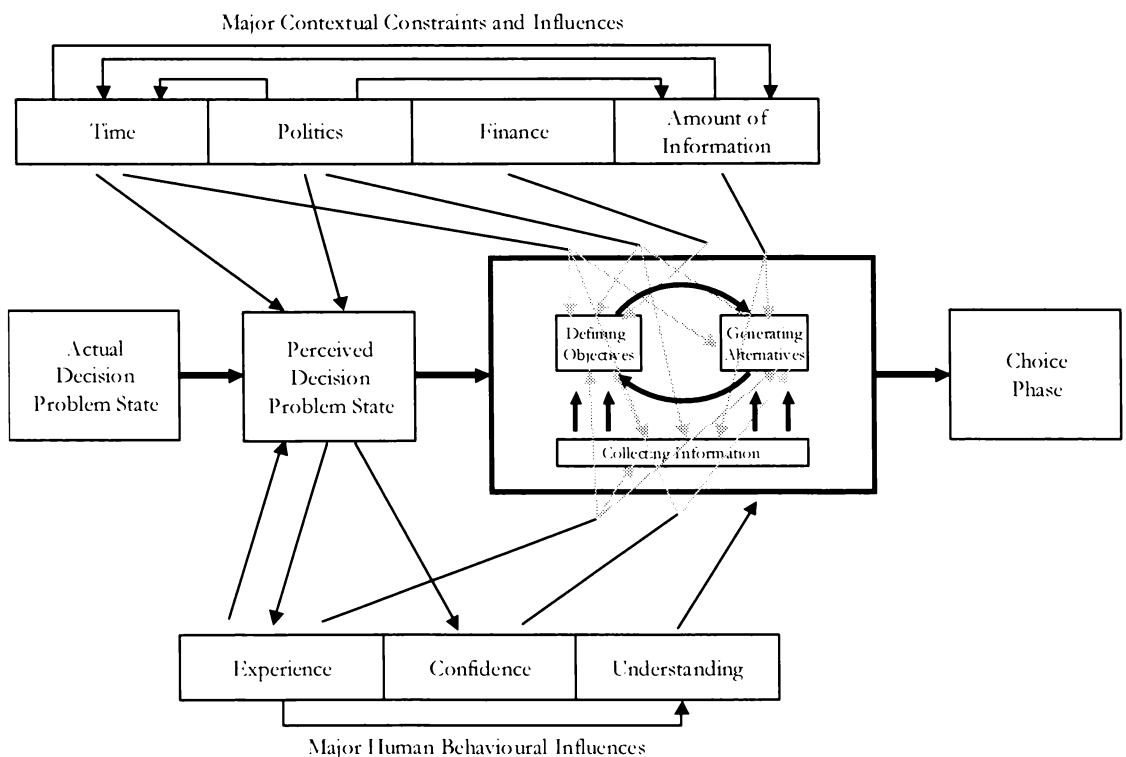


Figure 5-12 An Influence Model of Executive Decision Problem Structuring

Using Simon's (1960) model of decision-making to frame the scope of the study, we are concerned with those activities contained within the design phase of the decision process; problem structuring is used to "design" a decision problem

such that choice is possible. A well-defined decision problem initiates the structuring process while a readiness for choice is what terminates the process.

Decision Emergence

It was found that decision problems can emerge or become known in a number of ways. The nature of this emergence was observed to have a profound influence on the decision-maker's perception of the problem and his or her subsequent actions in structuring it. Based on the study's results, three decision emergence characteristics were identified. It can be proposed that decision problems can emerge within the organisational hierarchy either from the top-down or the bottom-up. Their emergence can be as a result of proactive behaviour within the organisation (i.e. an active search for a decision problem) or alternatively problem structuring might be reactive. Related to this, the emergence of decision problems can be either foreseen or unforeseen. For any given decision problem, its emergence can generally be described as a combination of the above characteristics (e.g. top-down, proactive and foreseen).

Decision-maker Perception

Having recognised the existence of a decision problem, the first activity undertaken by the decision-maker involves forming an understanding of it. The outcome of this process is the decision-maker's perception of the decision problem and its state at that time. This perception might differ from the actual state⁴⁴ of the problem. The difference might be caused by the external influences of time or political interference. It might also be based on an inherent human behavioural influence, i.e. experience, which may cause them to view/frame the problem differently from other individuals who have differing levels and types of experience. It is this perceived decision state, not the actual state that forms the basis of subsequent problem structuring activity.

Problem Structuring Process

The actual process of decision problem structuring is not strictly a process given that the activities contained within do not necessarily occur sequentially. To

⁴⁴ The state of the decision if not influenced by any external or internal influences or biases. The recognition of the actual state is a theoretical condition that would rarely, if ever, be achieved in practice.

avoid confusion, the term “process” is used irrespective of this. Three main activities form the basis of the problem structuring processes identified in the study, these being: defining objectives, collecting information and, generating alternatives. These activities were found to occur at all times during the process, with the defining of objectives and generating of alternatives being the main activities. These two activities were found to generally occur iteratively rather than sequentially and were supported, when required, by the collection of information.

Problem Structuring Influences

As well as contributing to the perception the decision-maker has of the decision problem, contextual and human behavioural influences impact upon the activities contained within the problem structuring process, some also impact upon other influences. Contextual influences (time, politics, finance and, amount of information) can cause both the objectives and alternatives to be poorly defined; it can also result in a reduced set of (satisficed) alternatives and an abbreviated information collection phase. The impact that human behavioural elements (experience, understanding and, confidence) have on the process is similar to the contextual influences.

The existence of time constraints was found to impact on whether the amount of information was constraining or not, and vice versa. In addition, political influences were found to impact on the significance of time and information based constraints. Finally, the experience of the decision-maker impacted on their confidence.

It was found that the external, contextual influences were significantly more powerful in terms of their effect on the decision problem structuring process than their human behavioural counterparts; especially in the public sector. The aspects of human behaviour that had negative effects on the decision structuring process had to be accommodating of the external influences, rather than vice versa. For example, one executive was clearly a cautious and analytical decision-maker and, under permitting conditions, would take more time than most in

structuring a non-trivial decision. However, this natural tendency was often quelled under conditions constrained by time.

5.14 CHAPTER SUMMARY

This chapter has presented and discussed the study results that address the research questions presented in Section 4.4. Where possible, the discussion of results is presented such that each section addresses one of these questions.

The manner in which decisions (requiring structuring) emerge was first described. In addition to the identification of various decision types, the nature of the awareness of a decision problem was found to vary. Decisions were found to emerge either top-down or bottom-up, they could be foreseen or unforeseen, or alternatively, decision-makers could be proactive or reactive in acquiring a decision problem.

The various types of problem structuring influences were next discussed. Influences (constraints) were generally of two types: those external to the decision-maker or alternatively, internal to the decision-maker. External influences identified as being significant included: time, amount of information, financial constraints, political constraints and decision ramifications. Internal influences (termed as human behavioural influences) included: the decision-makers' understanding of problem structuring, their problem structuring experience, their confidence, and to a lesser extent, their cognitive style. In addition, self-imposed constraints, decision-making ability, external accountability and organisational culture were found to have a lesser (but significant) influence on the described processes.

The next section (Section 5.6) presented and discussed a summary of the unaided problem structuring processes that were demonstrated by the participants. Although many of the processes described were unstructured or semi-structured, they were discussed in terms of the three main components of problem structuring: defining objectives, generating alternatives and, collecting information

Section 5.7 reports that none of the prescriptive methods outlined in section 2.13 were identified within the described problem structuring processes. While aspects of them were found to exist, in general, observed behaviour had nothing in common with existing prescription.

Section 5.8 compares the described behaviour with that contained within the wider descriptive literature. It was found that behaviour resembling that contained within the Satisficing model (Simon, 1957), the Garbage Can model (Cohen *et al.*, 1972) and the Recognition Primed Decisions model (Klein, 1989) was commonplace.

Section 5.9 investigated the level of commonality that existed between the various processes of the described behaviour. It was found that those aspects common to all problem structuring processes include: the use of judgement, the use of external data, some form of decision project management by the executive, and finally, all processes appeared to be adaptable to their environments.

Based on the results presented in Sections 5.2 and 5.6, an attempt was made to relate aspects of the problem structuring process to particular decision types. As presented in Section 5.10, it was found that, in particular, problem structuring behaviour of private sector executives contrasted with that of those from the public sector.

Section 5.11 presented a summary of “other interesting results” that had been included in wider discussion, yet did not directly relate to any of the research questions. Issues discussed included: the inherent lack of understanding of decision problem structuring by the executives, the use of multiple participants or actors within the individual decision-making process and, the defensiveness of executives.

The chapter next presented a brief note (Section 5.12) on how the results of this study may (eventually) be used to aid prescription. The aspects of behaviour found to be central to unaided problem structuring behaviour are presented as an annotated list.

The final section in Chapter Five (Section 5.13) presents a proposed influence model of executive decision problem structuring. The model is based upon the results presented throughout the chapter and emphasises the significance of external and internal influences as well as the ongoing, downstream effects of these.

6 SUMMARY, CONCLUSIONS AND IMPLICATIONS

6.1 INTRODUCTION

This study has sought to uncover the nature of unaided problem structuring behaviour within the context of executive decision-making. Sixteen executive decision-makers operating within a confined geographical region of New Zealand were interviewed, surveyed and tested to determine what processes they follow in carrying out decision problem structuring and also, to ascertain what causes them to behave in such a manner. Decision-makers from the public and private sectors were equally represented in the study.

Having now presented and discussed the study results, some overall conclusions can now be made on what was uncovered during the course of the study. These conclusions are presented in Section 6.3. To introduce these conclusions, the results of each (sub) research question, as presented in Chapter Four and later discussed in Chapter Five, are firstly summarised (Section 6.2). Following these summaries and the research conclusions is the presentation of the implications of the study. These include implications for theory as well as implications for practice. Encompassed within the discussion of research implications are research opportunities uncovered by this study. These include the extension of the present study into other contexts (e.g. US executives) and the potential for providing computerised support to the problem structuring process.

6.2 SUMMARY OF RESULTS

Chapter Five presented and discussed the results of this study, based upon the seven research questions. The following subsections summarise these results in the order of the research questions proposed in Section 4.4.

6.2.1 IN WHAT STATE ARE DECISION-MAKERS 'RECEIVING' DECISION PROBLEMS?

No literature could be found to guide this part of the investigation; it was assumed that previous work had not considered the emergence of the decision problem to be important to the subsequent structuring activities.

The decision-maker's perception of a decision problem emerged as being a significant variable in the decision problem structuring process for the study participants. The perception of the decision state was based upon the actual state (see Section 5.13 for a definition of "actual"), but moderated by environmental influences or constraints along with any pre-held cognitive biases of the decision-maker. It is this perception of the decision problem on which all subsequent structuring activities were based. The impact of this perception on the structuring process is outlined later.

It was found that the nature of an executive's awareness of a decision problem varied. Three (major) dimensions were identified. Firstly, a decision could emerge either top-down, being identified by the executive (and then often delegated to subordinates), or it could emerge from the bottom-up, where subordinates observe the need for decision problem structuring and subsequently inform the executive. The second dimension related to the expectedness of the decision. All of the described decisions could be classified as either foreseen or unforeseen. Finally, and related to the expectedness dimension, the executive's identification of a decision problem (and the resultant recognition of the need for decision structuring) was found, in most cases, to be a result of either reactive or proactive behaviour. Certain combinations of dimensions were found to dominate. For example, bottom-up, unforeseen, reactive decisions typified most of public sector decisions. Conversely, private

sector decisions were more likely to be characterised as top-down, foreseen and proactive.

For the narrow study domain, perceived decision problems are a product of: the actual decision problem, the nature of their emergence (top-down, unforeseen, etc.), any external influences present, and the inherent cognitive bias of the decision-maker. Acknowledgement of such influences can offer some justification for the semi-rational decision processes that are widely reported in the literature.

6.2.2 WHAT ENVIRONMENTAL CONSTRAINTS/INFLUENCES ARE PRESENT?

The preceding section noted the significance of external influences in the way in which the emergent decision problem is perceived. Various external/contextual influences were identified in the described decisions. These influences were similar to those identified in the literature. McConnell (2000) identified time, information and financial constraints as being common to many decision situations. Others (e.g. Dearlove (1998)) have also reported on the incidence of political constraints in executive decision-making.

All of these above contextual influences were found to be present in the decisions described in this study. Time constraints were the most widely recognised by the participants to the degree that time was considered to play a greater role than any other effect. The impact of time-based influences was found throughout the structuring process including the decision-maker's perception of the decision problem. Time constraints often resulted in poorly defined decision objectives and a reduced set of (often poorly generated) alternatives.

Decision problem structuring can be hampered by too much information as well as too little. In fact, participants generally considered that too little information was simply part of the problem, i.e. the reason for a decision being required in the first place, and not necessarily a "constraint". On the other hand, excessive information, or information overload, while not widely present in the described

decision, was reported by many of the participants as being inhibitive, as was too little information and poor quality information. The effects of excessive information in activities such as defining objectives and generating alternatives were described as being particularly significant when time was also an issue. The reverse could also be considered likely; time constraints are only present when the level of processing required exceeds the time available to carry it out.

Financial limitations were admitted by all of the participants, although some (private sector) executives did not think that limitations in capital should inhibit the process of a decision in which major benefits are present. Financial constraints were not found to have any (direct) influence on the described structuring process. However they were restrictive in terms of the range of alternatives that could be generated. However, it was noted that the executive's knowledge of financial constraints might have been an indirect influencing factor in all of the structuring activities.

Political influences identified in the results were of two main types, external political interference (e.g. central government restrictions) and internal politicking. Both types of political interference were present in the majority of described decisions, although external political interference was more prevalent within the public sector. Political influences appeared to impact the entire structuring process. Knowledge of them was found to significantly bias the decision-maker's perception of the decision problem and the structuring, and politically biased objectives often resulted.

6.2.3 WHAT ASPECTS OF HUMAN BEHAVIOUR INFLUENCE THE STRUCTURING PROCESS? HOW?

With the exception of work by the likes of Haley (1997), prior research on the influence the decision-maker has on the decision process was extremely sparse. As a result, this aspect of the investigation was most certainly exploratory.

Three main decision-maker influences were identified: the decision-maker's understanding of the decision problem structuring process, their experience

(incorporating mainly their knowledge of the problem domain), and the decision-maker's confidence.

Quite obviously, a decision-maker who understands, at least in part, the nature and significance of problem structuring activities is likely to exhibit (and subsequently describe) differing behaviour to those with a lesser understanding. For instance, a number of participants needed to have problem structuring defined and described whereas others were aware of the concept and its role within the overall decision-making process.

The decision-maker's understanding of the decision problem domain (contained within their experience) was found to impact their decision structuring process both in terms of their perception of the decision problem and also the activities contained with the actual structuring process. Having some prior knowledge of the issues meant that the decision-maker appeared to focus more on the details specific to that decision problem such as contextual influences, rather than trying to make sense of an unfamiliar problem.

6.2.4 WHAT EXISTING PROBLEM STRUCTURING METHODS ARE USED IN PRACTICE?

Sections 2.13 presented the popular problem structuring methods uncovered in the literature. These methods expect a rationality and sequentiality in process that is not demonstrated in unaided decision structuring behaviour. Overall, only minor conceptual similarities were observed. It is acknowledged that a study of a different group of executives might uncover behaviour that exhibits greater use of these prescriptive approaches. For instance, as previously noted, Clark and Scott (1995) found widespread use of OR/MS tools by those who had been exposed to them. However in terms of this study's results, a significant gap between description and prescription is present.

6.2.5 ARE EMPIRICAL OBSERVATIONS IN THIS STUDY CONSISTENT WITH WIDER DESCRIPTIVE THEORY?

The described decision structuring processes were compared with numerous descriptive decision-making models appearing in the literature. Many of these models (e.g. Lexicographic model (Tversky, 1969) and Elimination by Aspects model (Tversky, 1972)) focus solely on the choice phase of the decision process. Others (e.g. Image Theory (Beach and Mitchell, 1990) and the Recognition Primed Decisions model (Klein, 1989)) also contain structuring elements. It was observed that the behaviour described had strong associations with Klein's (1989) Recognition Primed Decisions model, Cohen *et al.*'s (1972) Garbage Can model and Simon's (1957) Satisficing model.

The Recognition Primed Decision model (Klein, 1989) purports that much of unaided decision-making behaviour involves comparing current decision situations with decisions previously made. This was uncovered in many of the described decision structuring processes, although few of the executives were consciously aware of it - it was generally contained within unconscious and intuitive processes. The use of previous decision experiences was used in the public sector for the purposes of transparency, defensibility and legitimacy, and in the private sector for efficiency purposes.

The fundamental axiom of the Garbage Can model (Cohen *et al.*, 1972) is that decision problems are generated in response to perceived opportunities rather than vice-versa as traditional theory states. In many of the decisions described during the course of this study, participants described events leading up to the decision where some perceived opportunity was identified, followed by a process of evaluating whether it would be possible to take advantage of that opportunity. If a matching decision problem could be "devised", then normally this initial investigation would be followed by a more in-depth decision process where potential outcomes of adopting the opportunity would be contrasted with the likely effects of assuming the status quo. Garbage Can decision-making, while common throughout the study, was more prevalent in the private sector where

decision-making was seen as an essential element for organisational development and growth. In addition to such Garbage Can emergence of decision problems, alternative focused thinking (e.g. Nutt 1993a) appeared to be widespread. Executives appeared more comfortable when considering alternatives as opposed to values or objectives.

Satisficing (Simon, 1957) encompasses the commonly observed, semi-rational behaviour where sub-optimal solutions are adopted. Such behaviour occurs as a direct result of the external and human behavioural constraints present in a decision situation. Satisficing behaviour was uncovered in each of the decisions described by the study participants. Satisficing is ubiquitous throughout the decision structuring processes and included the acceptance of a poorly defined decision problem, a compressed objectives definition phase and most often, the generation of a reduced set of alternatives without a full understanding of the likely impact resulting from the implementation of the alternatives.

6.2.6 DO COMMON ELEMENTS OF NATURALISTIC PROBLEM STRUCTURING EXIST?

Two aspects relating to commonality were uncovered when conducting comparisons of the various decision descriptions. Commonality was identified between different decisions as well as when comparing different decision-makers. Elements that were found to be regularly common when making these comparisons were: the use of judgement, use of external data, decision project management rather than decision-making, and structuring processes that were adaptive to the particular decision.

Judgement is considered in this study to comprise all of the non-rational, human behavioural elements of the decision process. It is necessitated by the existence of various constraints and is closely related to the concept of Satisficing (Simon, 1957). Judgement was present in all decision situations, indicating the constrained nature of decisions made in typical organisational environments.

Having understood the reliance on judgement in the described decision structuring processes, it should be noted that no decision was found to rely

exclusively on judgement, i.e. all decisions made use of external data. This external data was used mostly for generating and defining alternatives.

It was interesting to note that evidence of what is widely understood to be individual decision-making behaviour (such as that described by Dearlove, 1998) was not widely evident in the study results. Instead, the individuals under study played roles more consistent with that of a project manager, i.e. they managed the decision process rather than exclusively carrying it out. This management involved the allocation of certain aspects of the structuring process. For some executives, this delegation only involved the outsourcing of information gathering. For others it involved the prescribing of a process for others to carry out. It can therefore be hypothesised, based on the results of this study, that minimal executive level individual decision-making occurs. Instead, decision management appears common.

Perhaps not surprisingly, given the existence of the various constraints identified earlier, all of the processes described exhibited a level of adaptability to the particular decision problem. Every participant made mention of aspects of the decision situation that had necessitated some adjustment to the described decision structuring process.

6.2.7 ARE SOME PROBLEM STRUCTURING PROCESSES BEST SUITED TO PARTICULAR TYPES OF DECISIONS?

In order to make sense of the study results, an attempt was made to relate certain problem structuring behaviour(s) to particular decision types or situations. The decision types with contrasting structuring processes most evident in the study were the public and private sector decisions, opportunity and threat-based decisions and, top-down and bottom-up decisions. Certain behavioural associations can be made based on these decision types.

The largest identified behavioural differences were uncovered when comparing the public and private sector processes. The public sector environments, in general, demanded a greater level of transparency of process. To address this,

decision-makers often make use of previous (successful) decision situation(s). Furthermore, the processes that they followed were generally more easily documented and understandable by the researcher. The public sector problem structuring processes also exhibited more obvious degrees of segmentation. There appears to be much more of an initial objectives definition phase than the private sector processes. Having defined the objectives, the alternatives are then generated. In the private sector, structuring involves a greater degree of intuition/judgement and as a result, the described behaviour is more difficult to generalise.

In general, opportunity or Garbage Can (Cohen *et al.*, 1972) decisions place less emphasis on the generation of alternatives than those that could be considered threat based decisions. The identification of the opportunity automatically introduced an alternative; the resulting decision was then simply to accept that opportunity or not (i.e. continue with the status quo). When threat based decisions were recognised, the executive would be much more likely to try and find a range of alternatives until a satisfied solution had been found.

Top-down decisions were those that the executive first became aware of (rather than his subordinates). The nature of the problem structuring process for top-down decisions was generally defined by the executive and then delegated, in various forms for the actual carrying out of those processes to occur. Often with bottom-up decisions, the subordinate would carry out some initial structuring. This might include developing a problem definition or it might also involve identifying some initial decision alternatives.

6.3 CONCLUSIONS

In assessing the results as presented and discussed in Chapter Five, and later summarised in Section 6.2, and comparing this with the research gap (Chapter Three) and the principal research question(s) being address (Section 4.4), we can now present some significant conclusions regarding the manner of, and reasons for, unaided executive decision problem structuring behaviour. These conclusions are presented below.

The understanding of decision problem structuring and the reliance on judgement and intuition in the structuring process

Executives were found to be largely unaware of the concept of problem structuring and surprisingly, had a poor understanding of the structuring activities that preceded the more familiar choice activities. It was possibly for this reason that all of the processes described were undertaken automatically and unconsciously and none were found to contain, or be influenced by, any form of prescription.

Problem structuring activities were initially described as being things that the participants believed occurred prior to decision-making i.e. the decision process was thought to only encompass final choice making. The activities of problem structuring are generally more complex and consume far greater resources than the later choice activities, and are likely to be a major contributor to such poor understanding. Another cause of this lack of recognition of problem structuring as a component of the decision-making process is that many of the decisions commonly faced by the study participants were pre-structured (often by subordinates on the instructions of the executive). Alternatively they were of a trivial nature in which any structuring required was generally informal and based upon the decision-maker's intuition or gut feeling. So for a number of their decisions, they simply were not involved in structuring to a significant level.

Even for some of the more non-trivial decisions, a level of unconsciousness was present in the structuring process, particularly when identifying decision

objectives, and much of the processing occurred informally and intuitively; of a “recognition primed decisions” (Klein, 1989) nature.

Influences on the perception of the decision problem

The executive decision-maker’s perception of the decision problem was often different to the actual decision problem. A number of internal and external influences can cause the decision-maker’s interpretation of the problem or the state of the problem to be biased, resulting in a structured decision problem that might be quite dissimilar to that of the pre-structured decision problem. In addition, the manner by which the decision-maker becomes aware of a decision problem is also influential.

Identifying the actual decision problem is in itself an issue of perception. In the view of the decision-maker, the problem that they see is the actual problem. This perception is however impacted upon by a variety of internal and external influences. The author posits that the actual problem is free of all these influences. The actual problem can be determined by identifying all of these influences and then removing their likely impact in terms of the perceived problem to uncover the underlying problem. For example, consider a decision concerning the purchase of a piece of land for subsequent development. The actual decision problem could simply be “should we purchase the land?; does it meet our requirements?” Instead the decision-maker views the property as one that might exceed budgetary constraints, it might only be on the market for a limited time, there might potentially be other parties interested in purchasing it. In addition, there could be legal or planning constraints that might limit the downstream use of the property. Human behavioural or cognitive attributes of the decision-maker also influenced the nature of the perception of the problem. This was found to include experience in making similar decisions and also the understanding of the decision structuring process.

The decision problem structuring process

The process of decision problem structuring by executives is iterative and cyclical with minimal sequentiality involved. The process incorporates Satisficing and use of previous decision experience. The process contains just principal

activities: (1) the defining of objectives, (2) the generation of alternatives and (3) the collection of information. Activities (1) and (2) occur iteratively, supported, where required, by activity (3).

Having recognised and understood the decision process, the structuring process begins with either defining decision objectives or generating relevant alternatives. The more formal the decision process, the more likely it is to begin with some form of objectives definition, i.e. Value Focused Thinking (e.g. Nutt, 1993a). Those structuring processes that appear less formal are often initiated by the identification of suitable alternatives, i.e. Alternative Focused Thinking (Keeney, 1992). Irrespective of which of these activities occurs first, they subsequently occur either iteratively or simultaneously, as the need arises. Generally as decision objectives are developed and refined, the set of potential alternatives also needs to be adjusted. Similarly, as new alternatives are identified, the decision objectives are often adjusted. This latter case is common in alternative focused thinking or Garbage Can decision processes. The third activity is that of information gathering. This occurs on an as needed basis to support the other two activities. The information collection activity applies only to the structuring activities and differs from the information gathering that might be used in the intelligence phase of Simon's (1960) model.

Influences on the problem structuring process

Executives operate in a highly constrained environment. These constraints or influences significantly impact upon the processes carried out during the structuring of decision problems. While time, finance and other such external influences are widely recognised, decision-maker influences are the least understood, yet the most influential.

External constraints such as limited time are generally tangible and measurable. They are externally imposed and can often be managed or have their effects minimised. They are also the influences that are most easily identified by the decision-maker. In contrast, influences of an internal human behavioural nature are generally difficult to recognise and more significantly, are difficult to address. As a decision-maker, the influence that you personally impose on the decision

process is difficult, if not impossible, to recognise when unaided - much like the difficulty you have in hearing your own accent. Human behavioural influences are slowly built up over many years such that they become inbuilt and habitual.

Both types of influence impact the activities identified to form the basis of the decision problem structuring process. Poorly defined decision objectives can result, as can a limited set of alternatives that have been poorly identified and developed. Often a single alternative is considered and adopted without the consideration of others. Influences can cause the decision-maker to address a simplification or merely symptoms of the actual problem resulting in errors of the third kind⁴⁵. In terms of information gathering, executive decision-makers who are constrained are likely to search for and accept only easily obtainable information.

Garbage Can decision problem structuring

Based upon the study results, it would appear that a significant proportion (11/16) of decisions are made in reaction to an identified opportunity. Thus, the Garbage Can model of decision-making appears not only to be applicable to the structuring process, it appears to be widely used as well.

Traditional decision theory postulates that a decision process is a response to an identified problem. The outcome of the process is a solution to that problem. This study uncovered widespread use of non-traditional, Garbage Can type decision-making where potential solutions (to as yet non-existent problems) were the initiators of a decision process. The structuring process of such decisions would, in the first instance, involve ascertaining whether the solution might in fact be “usable” i.e. does a problem exist or could one be engineered so that the solution (described as an opportunity) could be taken advantage of. If a problem could be identified, then the standard structuring process (as identified in this study, see Section 5.6) would then result. Often however, only two alternatives would exist (i.e. the solution and the status quo). Sometimes other alternatives would be generated to ensure that the emergent solution is in fact as good as

⁴⁵ The incorrect identification of the problem and a subsequent treatment of the wrong problem (Clemen, 1990; Raiffa, 1968).

might have been initially perceived. In all Garbage Can decisions, having identified/engineered a decision problem, decision objectives would be developed and further information about the solution would be sought.

It was stated above that the Garbage Can model is “used”. This has some implications. Decision-makers do not consciously or intentionally set out to “use” the Garbage Can model; it simply “happens”. It is the Garbage Can aspect that initiates the decision and this has a major influence on the subsequent structuring activities.

Non-use of problem structuring methods

The results of this study suggest that the use of existing problem structuring methods, or any prescriptive method for that matter, in the process of unaided decision problem structuring is uncommon. Much of this appears to be due to the fact that the decision problems observed in this study were both more complex and more heavily constrained than the type of problems existing prescription is reported to address.

Fifty percent of participants stated that they had received some form of external decision-making training. The nature of this training varied and it can be assumed that the vast majority of this training was of a general nature. None reported any previous exposure to the problem structuring methods presented in section 2.13. The behaviour of these “trained” decision-makers could not be differentiated from that of those that had not received any training. Therefore, it is assumed that the training received by the participants was either of a significantly broad based nature so as not to have included any specific reference to problem structuring activities nor the existing methods that might be used to aid it, or the type and nature of the decision problems that the executives described were such that the decision-makers were unable to relate the decision training to the many diverse decisions that they faced. Alternatively it might be considered feasible that the experience each of the participants had built up, served to override this training. Finally, it should be noted that the apparent lack of recognition of the use of prescription by the participants might not necessarily imply that the training had been ineffective and not subconsciously made its way into their

decision-making. A perceived lack of decision-maker control that could result from using a prescriptive method might offer an alternative reason for an aversion to using prescriptive approaches.

Decision project management and the delegation of structuring activities

Individual decision structuring processes are often performed by multiple participants. The executive assumes the role of a decision project manager and designs and takes ownership of the process, delegating those activities he or she feels are not deserving of their time.

Whereas the study uncovered what can be interpreted as individual processes (i.e. could be carried out by an individual) they were rarely carried out by a single participant. The executive participants appeared to have overall control of their described process of problem structuring and this included the design/development of the process all the way down to the implementation of it. However, there were generally other parties involved in the process that performed the vast majority of the information gathering.

Every decision is different and each calls for a different level of executive involvement and subsequently, some decisions permit more delegation and use of subordinates than others. Only the most personal or confidential/contentious decisions require exclusive executive input. Most of the structuring process, however, is consumed (in terms of time) by investigative activities. The carrying out of these activities by the executive is uneconomic and is therefore delegated, where appropriate.

6.4 STUDY IMPLICATIONS

Potentially, the results of this study have theoretical implications for a variety of academic fields and disciplines. The identification of these implications has also uncovered several areas of future research that may be beneficial in understanding and enhancing decision problem structuring behaviour. These implications and future research opportunities are outlined in Section 6.4.1).

The study has also uncovered some practical implications for executives (in particular) and also managers involved in decision problem structuring. There are a number of findings from this study that practicing decision-makers might consider when structuring their decision problems. The consideration of these might lead to better decision outcomes as a result of improved structuring processes.

6.4.1 IMPLICATIONS FOR THEORY

The results of this study have a number of theoretical or research implications in seeking to form an understanding of unaided naturalistic behaviour of executives when structuring decision problems. As well as the emergence of a number of new questions, other issues have been identified that call for further investigation. Moreover, the study has also uncovered issues that suggest reassessment is required in terms of what existing problem structuring research appears to consider important or relevant. Rigorousness

The Decision-maker's Perception of the Decision Problem

Although not explicitly stated, existing research appears to make the assumption that the decision problem, as viewed by the decision-maker, is the actual decision problem. This study has identified that a decision-maker's perception of a decision problem can differ to that of other decision-makers. Knowledge of such perception variance has implications for all research concerned with the solving of problems in which a single decision-maker is the only interface between the actual problem and the subsequent decision process and outcome. Research needs to consider, firstly, that such variance can exist, but also consider ways of incorporating, or at least managing it within future theoretical developments. It also presents an opportunity for empirical work to better understand the nature and causes of such perception variance. This might take the form of experimental research in which variables can be isolated and assessed in terms of their impact on the decision-maker's perception.

Human Behavioural Influences

Closely related to the above issue of problem perception variance is the whole issue relating to the impact that the decision-maker has on the decision structuring process. This study has found human behavioural influences (such as experience, confidence and understanding of the decision process) impact not only the perception of the decision problem but also the actual process of problem structuring. None of the existing problem structuring literature (either descriptive or prescriptive) places any significant consideration on the nature and impact of such influences. To truly represent that nature of unaided decision-making of any sort, descriptive theories of decision-making need to incorporate human behavioural influences. To achieve this, the specific nature of their influence needs further investigation, and this offers an opportunity for future empirical research, perhaps with an experimental focus. In terms of the prescriptive methods of decision problem structuring, as well as the more generalised decision-making methods, far greater recognition needs to be made of the problem types that these methods assume. Included in this is the assumption of rational decision-making with minimal, if any, behavioural bias.

Externally Imposed Influences

External influences (such as time, politics, limited finance and amount of information) are generally tangible and measurable. Moreover, they are widely reported (by decision-makers) to play a significant role in the process and eventual outcome of almost all decisions made. In addition, they are widely recognised and understood by decision-makers. However, like the human behavioural influences, external influences have not been widely considered within existing descriptive or prescriptive models. Existing prescription and (but to a lesser degree) description presents a simplified picture of decision problem structuring that understates the complexity of decision-making in naturalistic settings where such influences are present. One exception to this generalisation is the TOC method which is based, conceptually, around the elimination of organisation constraints. In general, however, future research needs to pay greater consideration to contextual effects of decision-making.

Enhancing Prescription

The study has identified that the typical structuring process comprises three main activities: defining objectives, generating alternatives and gathering information. Few others (e.g. Corner, *et al.*, 2001; Russo and Schoemaker, 1990) have presented a similarly concise model. One benefit of this model is that although it does not offer an accurate and detailed description of any particular decision problem structuring process, it does offer a conceptual representation of most, if not all decision structuring situations. The rarely used problem specific prescriptive methods of decision problem structuring could benefit from attempting to gain a wider, yet shallow coverage as opposed to the present narrow, but deep coverage (Mabin and Davies, 2001).

Prescriptive research should place greater consideration on the usability of prescription and strive for generalised, incremental improvements to decision problem structuring rather than attempt to “force” individuals to adhere to strict rational processes so as to achieve “optimal” decision outcomes.

Broadening of Present Research

This study has looked at the process of decision problem structuring from a perspective different from that which already appears in the literature. In addition, many existing empirical descriptive studies have focused on the “managerial” decision-maker (e.g. Dillon, 1998; Nutt, 1984). This study has intentionally taken a much narrower focus in studying those decision-makers who are also leading their organisation. The results therefore need to be cautiously considered in the first instance and verified in wider contexts.

There is potential value in repeating the present study but for different contexts in different countries/cultures, different industry types, different organisation sizes, different decision-maker backgrounds etc. There is so much we still don’t know about decision-making behaviour; for example, what influence do religious beliefs/culture have? Does an increase in experience infer a better or worse decision structuring process? Are the results observed here only applicable to executives? These, along with many other questions, should serve to support, or

refute, the process of problem structuring identified in this study. In addition to this, consideration of various decision types could be valuable.

Individual Processes Involving Multiple Participants

The literature presents a clear differentiation between individual and group decision-making where group processes are typified by those that incorporate elements of negotiation, conflict and consensus building. In contrast, individual behaviour generally assumes that such forces are not present and that just one person performs the process. This study reveals that this is not the case and that individual processes are distributed amongst multiple participants, under the control of the executive or principal decision-maker. Although there are multiple participants involved, typical group issues, such as those mentioned above, were not identified in this study. The identification of multiple participant individual processes has implications for both individual and group decision research. Individual decision research needs to consider the process of task delegation and decision project control, whereas group decision-making research needs to be aware that multiple participants in a decision process does not imply that they are all equal stakeholders, or have differing perspectives and viewpoints on the problem and the process being carried out; they may simply be carrying out instructions.

Measuring the Importance of Decision Problem Structuring

Most decision-making researchers acknowledge the importance of decision problem structuring and the key role it plays in the overall decision-making process. As has been outlined already in this study, problem structuring permits a better understanding of the decision problem and, hopefully, a more satisfactory outcome. What is not fully understood is how important/valuable problem structuring might be. For example, what would be the difference in decision outcome in two identical decision situations made between two similar decision-makers where one chose to rely on his judgement whereas the other chose to employ a problem structuring method or heuristic? What impact does a minor variance in problem structuring process have on downstream activities and eventual outcomes?

This study has sought to identify relationships between certain decision problem types, or the nature of the awareness of the problem, and specific problem structuring behaviour (see Section 5.10). The time given to this issue (in this study) does not do justice to what is an extremely important area of research and one in which further work may advance the problem structuring field immensely. It would be beneficial to understand those aspects of the decision structuring process that are most important when it comes to eventual decision success or failure. What aspect(s) of the structuring process should be given the most serious attention? What aspects are less critical and therefore can be emphasised less when particular constraints (e.g. time) are present?

Computer Aided Problem Structuring

The significance of the computer age in terms of decision-making activities has been argued for several decades. However, it seems that many computer-based support tools have merely been the automation of existing tools, and this does not just apply to executive decision-making or decision problem structuring. If this is indeed the case, then it must be accepted that the computerisation of existing methods is likely to only significantly benefit those already using these methods in their non-computerised form. A potentially fruitful area of research would therefore be to evaluate the likely benefit of developing computer based tools to support individual managers or executives based on what they presently do, as opposed to what prescription believes they should do. In doing so, a fundamental concession would be required; that being an acceptance on the part of the research community that what executives or managers are “descriptively” doing should not be changed, instead it should be “enhanced” through making the process more efficient, streamlined or whatever. In particular, the provision of computerised support for decision problem structuring could have significant benefit to decision practitioners. Kirkwood’s (1987b) call for such research has, so far, gone largely unanswered.

6.4.2 IMPLICATIONS FOR PRACTICE

A number of issues have been raised that are noteworthy for practicing decision-making executives and managers.

Executive decision-makers need to be aware that the decision problem that they see might be perceived differently by others, and subsequently the process (and outcome) employed might not receive widespread support either within the organisation or outside. Therefore, the executive needs to recognise that there may be other interpretations of the decision problem, in fact they may be viewing it quite differently from others. The decision-maker needs to ensure that he or she has made every attempt to gain the best possible understanding of the actual decision problem. This potential mis-interpretation is often a result of the many external influences present in decision problems. It can also be due to the specific attributes of the decision-maker in terms of his or her experience, his or her understanding of the decision process etc. These human behavioural or cognitive attributes of the decision-maker can also impact the later structuring activities and the decision-maker is likely to benefit from better understanding the nature and impact of these.

In terms of the many external influences that are present in typical decision situations, the greater the decision-maker's knowledge of them, the greater the opportunity they have for accommodating or managing them. A number of constraints have been identified as having direct influence on the problem structuring process. Some of these constraints (e.g. limited finance, experience etc.) must be accommodated within the decision structuring process. Others, if identified early enough (e.g. time, internal politicking), can be addressed so as to minimise their likely impact on the structuring process. Unexpected constraints have a greater impact than those that are expected so the executive decision-maker should consider all likely perception and process inhibitors at the outset of the structuring process. Also, the impacts of these constraints are often indirect and ongoing and involve aspects of the structuring process not immediately related to the influence. For example, a limitation in time might be found to restrict the time available for gathering of information. That in turn

might cause the defining of decisional objectives to be carried out with substandard information. This in turn might result in alternatives being developed for a set of objectives that do not accurately represent the actual decision problem. The decision-maker's awareness of such down-stream effects should serve to minimise their impact.

An awareness of the various types of emergent decision problems and the nature of the structuring activities that best suit these problems should enable decision-makers to be more efficient in their decision structuring. Simply knowing that some processes are better suited to particular decision problem types is invaluable and executive decision-makers could benefit from such knowledge.

Finally, executive decision-makers will benefit from a basic understanding of the general components of the decision structuring process, including the nature of and relationships between the activities of defining objectives, generating alternatives and gathering information. Knowledge of these will assist in the overall understanding of the decision problem structuring process and its purpose (Russo and Schoemaker, 1990).

6.5 FINAL COMMENTS

This study has investigated the nature of unaided decision problem structuring by executives. A model of decision problem structuring has emerged that encompasses much of the uncovered behaviour. While this model is to a small degree confirmatory of what has been previously presented in the literature, it does offer a new and fresh view on the problem structuring behaviour. It comprises a process that is relatively simple, yet is made complex by the many internal and external influences that act upon it. It is therefore termed “a model of influence”.

A number of conclusions have been presented that build upon existing decision problem structuring research, as well as wider decision-making research. In addition, opportunities for further research that builds on this study are offered.

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APPENDIX A: INFORMATION SHEET GIVEN
TO EACH PARTICIPANT

An Investigation into the Problem Structuring Processes of Managers – Participant Information Sheet

Objective

The objective of this study is to gain a good understanding of the way in which managers structure decision problems. Structuring is the process that occurs once the need for a decision has been identified, but before an actual choice is made. Activities that are often included within structuring include: determining objectives, collecting information, and identifying alternatives.

Your Role

I wish to discuss with you the way in which you structure decision problems. This will principally come about through the discussion of a recent, non-trivial decision you have made. We will compare this with other decisions you have made. I wish to identify those processes you employ within the structuring of a decision problem. This will all take place during a single interview of one hour duration. I will require some background information prior to that (this will be in the form of a simple questionnaire). I will send you a report of our interview, so that you can read over the conclusion I have drawn from it and make any alterations or additions.

Research Outcomes

Your contribution will form an integral part of my Ph.D. research in the department of Management Systems. In addition to this, I hope to have my work published in academic journals. I also anticipate presenting this work at local and possibly international conferences. I am conducting this study in the hope that further work might result from it, both by myself, and others.

The Benefit to You

In addition to the valuable information I will gather from talking with you, there are significant and real benefits for you also. As part of the analysis of your decision-making I will produce an individualised report that summarises the processes you use, your cognitive style and an evaluation as to how they compare with others in the study. I will also supply you with a summary report of my overall findings. I am also happy to offer decision-making advice if required.

Confidentiality

Any information disclosed will remain confidential. Your interview will be recorded for transcription, after which it will be deleted. The transcriptions will be coded so that your name or any other obvious reference to you cannot be found and will be stored in a locked filing cabinet.

Declaration

If you agree to take part in the study, you have the right to:

1. Refuse to answer any particular question, and to withdraw from the study at any time.
2. Ask any further questions about the study, which occur to you during your participation.
3. Be given access to a summary of the findings from the study when it is concluded.

Contact Details

If you have any further questions or queries, please feel free to contact me in any of the following ways:

Post: Freepost 472 Department of Management Systems University of Waikato Private Bag 3105 Hamilton	Phone: 07 838 4466 ext. 6056 or 025 296 6656 Fax: 07 838 4270 Email: sdillon@mngt.waikato.ac.nz
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My supervisor, Assoc. Professor John Buchanan can be contacted at the same address or via ph: 838 4470 or email: jtb@waikato.ac.nz

APPENDIX B: PARTICIPANT QUESTIONNAIRE



The University of Waikato
Te Whare Wānanga o Waikato

Waikato Management School
Te Raupapa

Please answer the following questions as honestly as possible. You are free to not answer particular questions if you so wish

Gender: Male Female

Age range: 20-30 31-40 41-50 51-60 60+

Number of staff responsible for: <10 11-20 21-30 31-40 41-50 50+

Time spent in present organisation: <1 year 1-5 years 6-10 years 11-20 years +20 years

Time spent in present industry: <1 year 1-5 years 6-10 years 11-20 years 21-30 years +30 years

Other industries worked in (where applicable): _____

Formal qualifications (where applicable): _____

Have you received any formal decision-making training (NZIM courses etc.)? Yes No

Please indicate your level of agreement with the following statements:

Strongly Disagree Neither Agree Nor Disagree Strongly Agree

Appendix B

You conduct extensive information searches before making any decision

You enjoy making decisions

You follow a formal decision-making process wherever possible

You trust your intuition or gut feeling

Your company has policies/documentation concerning decision-making

Your company prefers group decision-making over personal decision-making

Most of your decisions come to you pre-structured, i.e. all required information has been collected and a decision is ready to be made

Information overload is typically characterized by a perception that you have more information than you need or have time to process. Do you usually experience information overload? Yes No

If you answered yes to the above questions, the feeling is: Very intense Intense Moderate Mild

In your opinion, what are the three main reasons why people feel information overloaded? Please provide a brief explanation?

APPENDIX C: QUESTIONNAIRE RESULTS

Personal Information																			
Gender	M/F		M	M	M	M	F	M	M	M	M	M	M	M	M	M	M	M	
Age Range	Years		41-50	51-60	41-50	41-50	41-50	51-60	60+	51-60	60+	31-40	41-50	41-50	31-40	41-50	51-60	41-50	
Number of Staff Responsible for			50+	50+	50+	11-20	<10	50+	11-20	50+	<10	<10	50+	11-20	41-50	50+	50+	11-20	
Time spent in present organisation	Years		11-20	<1	6-10	+20	<1	11-20	11-20	20+	20+	1-5	1-5	1-5	6-10	1-5	20+	6-10	
Time spent in present industry	Years		21-30	21-30	11-20	+30	<1	30+	11-20	30+	20+	1-5	1-5	1-5	11-20	21-30	30+	6-10	
Organisation Type	Public (PU) or Private (PR)		PR	PU	PU	PR	PR	PU	PR	PU	PR	PU	PR	PR	PR	PU	PR	PR	
Qualifications																			
Certificate Qualification	✓					✓			✓	✓	✓	✓							
Diploma	✓						✓					✓		✓	✓	✓	✓		
Bachelors	✓			✓				✓		✓		✓	✓	✓	✓	✓	✓	✓	
Graduate	✓		✓	✓								✓	✓			✓			
Doctorate	✓		✓																
Formal DM Training?	✓				✓		✓			✓		✓	✓	✓			✓	✓	
Likert Scales			Avg	SD															
Extensive Information Searches	1-7	4.75	1.51	2	5	3	6	6	5	6	4	6	6	5	6	4	6	1	5
Enjoy making decisions	1-7	6.31	0.71	7	6	7	5	6	6	7	6	5	6	7	7	6	7	6	7
Formal decision making process	1-7	5.38	0.71	5	6	4	5	6	5	5	6	5	6	5	7	4	5	6	6
Intuition and gut feeling	1-7	6.00	0.71	7	5	6	6	5	5	6	6	7	6	6	7	6	6	6	6
DM policies/documentation	1-7	4.25	2.07	2	6	2	5	4	6	1	6	3	6	5	2	4	6	7	3
Prefer group decision making	1-7	4.75	1.60	4	6	2	7	4	6	4	4	4	5	5	5	4	5	6	5
Decisions come pre-structured	1-7	4.00	1.49	3	2	4	2	6	5	5	3	3	5	6	2	3	3	6	6

APPENDIX D: PARTICIPANT DESCRIPTIONS

Participant One

Gender (Male/Female):	Male
Age Range (Years):	41-50
Number of Staff Responsible for:	100
Time Spent in Present Organisation (Years):	11-20
Industry:	Private Sector – Chemical Testing
Time Spent in Present Industry:	21-30
Highest Qualification:	PhD
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Analytic Imager

Participant one is the most qualified of all the participants. He is also entrepreneurial having established and built up what is now a large and successful business. Participant one enjoys both the challenge and risk associated with decision-making. As a stakeholder and also CEO of his organisation he has the flexibility and confidence to make substantive decisions without the added pressure of being accountable to others. He was happy to describe less successful decisions and was able to think insightfully as to the processes he followed when structuring decision problems and also the reasons behind that process. Given that he is one of the founders of the company, he still gets involved in many of the day-to-day decision as well as those of a scientific nature. He is also heavily involved in strategic decisions.

Participant Two

Gender (Male/Female):	Male
Age Range (Years):	51-60
Number of Staff Responsible for: Time Spent in Present Organisation (Years):	75 <1
Industry:	Private Sector – Utilities
Time Spent in Present Industry:	21-30
Highest Qualification:	Post Graduate
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Intermediate Verbaliser

This participant is internationally qualified both in his field of work, but also general management. While the organisation had previously been a public sector organisation, participant two described and demonstrated behaviour that was definitely of a commercial, competitive nature. Given the organisational structure and the requirements of transparency and accountability, the participant is constrained in terms of creativity in decision process. He is able to think objectively about his decision-making and appears to have a questioning type of nature. This latter characteristic was evident in the interest he took in this study. His decision-making is strictly focused on issues of a strategic nature. He is not involved in staffing issues.

Participant Three

Gender (Male/Female):	M
Age Range (Years):	41-50
Number of Staff Responsible for:	57
Time Spent in Present Organisation (Years):	6-10
Industry:	Public Sector – Local Government
Time Spent in Present Industry:	11-20
Highest Qualification:	N/A
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Intermediate Imager

This participant operates within the public sector, but has a private sector background. This became quite evident in his evaluation of his management and decision-making style. He also appears to, at times, find the public sector model quite frustrating. Participant three is quite an astute manager and has instilled within his staff a certain culture that was not evident in similar organisations (both in this study and previous (Dillon, 1998)). This participant has received some formal training in decision-making and for this reason, seemed to take a particular interest in the present and past research. Participant three is involved in staffing decisions, resource consent decisions and also those relating to the making of recommendations to council.

Participant Four

Gender (Male/Female):	Male
Age Range (Years):	41-50
Number of Staff Responsible for:	15
Time Spent in Present Organisation (Years):	>20
Industry:	Private Sector – Property Development
Time Spent in Present Industry:	>30
Highest Qualification:	Certificate
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Wholist Verbaliser

Participant four is the only participant who openly stated his dislike of decision-making. This was particularly remarkable given that his particular role within the organisation involves significant decision-making (the searching for and purchasing of commercial property.) His supposed dislike of decision-making is more likely to be attributed to the fact that he has spent more than 20 years in the same organisation, much of that time spent doing the same task. Participant four also demonstrated a significant lack of confidence in answering some of the questions, yet his responses were always concise and relevant. Decisions regularly made by participant four include staffing decisions, decisions concerning the purchasing of property, the on-going development of the organisation and decisions concerning how much they charge to construct buildings.

Participant Five

Gender (Male/Female):	Female
Age Range (Years):	41-50
Number of Staff Responsible for: Time Spent in Present Organisation (Years):	6 <1
Industry:	Private Sector – Company Representation
Time Spent in Present Industry:	<1
Highest Qualification:	Diploma
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Analytic Imager

Participant five was the only female interviewed. While she only manages a small organisation in terms of staff and turnover, it is one of the most important in its geographical area as its primary role is to act on behalf of hundreds of other organisations. Much of this representation is used in negotiation with central and local government. In terms of decision-making, this participant underestimates her abilities significantly and felt it necessary to outline her “perceived” limitations at several points during the interviews. She was in fact one of the most responsive participants to be interviewed. She has a good understanding of her decision processes and was able to describe these concisely. Given the small number of staff participant five is responsible for, the decisions she is involved with are often relatively low level. She takes responsibility for almost all decision made within her organisation.

Participant Six

Gender (Male/Female):	Male
Age Range (Years):	51-60
Number of Staff Responsible for:	150
Time Spent in Present Organisation (Years):	11-20
Industry:	Public Sector – Regional Authority
Time Spent in Present Industry:	30+
Highest Qualification:	Bachelors
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Wholist Imager

This participant appears to be quite a caring, hardworking and proud leader. He chose to describe a decision in which he took a proactive stance in a human relations matter. After many years, he appears to have adapted well to his environment. He seems to thrive on the administrative elements of his role and takes on many tasks which similar leaders would delegate. This might be interpreted as lacking trust in his peers; alternatively it might be a sign that he takes responsibility for his role and all the tasks that are associated with it. He was able to clearly describe his philosophy on management and decision-making. The decisions that participant six is involved in are vast. He has a substantial budget that he must annually allocate. He is the legal employer of all of his organisation's employees, so is heavily involved in human resource decisions.

Participant Seven

Gender (Male/Female):	Male
Age Range (Years):	60+
Number of Staff Responsible for:	15
Time Spent in Present Organisation (Years):	11-20
Industry:	Private Sector – Transportation
Time Spent in Present Industry:	11-20
Highest Qualification:	Certificate
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Intermediate Bimodal

Given this participant's age and experience, he could best be characterised as a traditional leader. He has a wealth of experience in a variety of industries which has formed his management and decision-making style. He is a fairly autocratic type of person and is best suited to individual decision-making. In terms of process, his preference is to develop decision such that he can put forward a well-founded argument for consideration by the board. Participant seven is a soft spoken but clearly confident person. He appears to have chosen to involve himself in many areas of decision-making within the organisation, many of which he could quite easily delegate.

Participant Eight

Gender (Male/Female):	Male
Age Range (Years):	51-60
Number of Staff Responsible for:	212
Time Spent in Present Organisation (Years):	20+
Industry:	Public Sector – Regional Authority
Time Spent in Present Industry:	30+
Highest Qualification:	Bachelors
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Intermediate Bimodal

This participant provided one of the most complete descriptions of his decision-making process. One of the older and more experienced participants, participant eight is able to work within the public sector environment knowing clearly the limits of his responsibility and ability. He used several examples to demonstrate and justify his approach to the making of decisions. He is quite familiar with general decision-making practice and even provided the researcher with a recording of a speech made by one of the world's most historically (although not well known) famous decision-makers given at an overseas conference he attended. He is clearly comfortable with the responsibility he has in the making of significant (and often life threatening) decisions. Given his specific role within the organisation, many of his decisions have major environmental implications. He is often forced to make major decisions without the information he would desire. He also makes decisions concerned with staffing and general management matters.

Participant Nine

Gender (Male/Female):	Male
Age Range (Years):	60+
Number of Staff Responsible for:	10
Time Spent in Present Organisation (Years):	20+
Industry:	Private Sector – Transportation
Time Spent in Present Industry:	30+
Highest Qualification:	Certificate
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Wholist Verbaliser

This participant had considerable difficulty in describing his decision-making. He has worked in the same company for over 30 years and during that time has developed a method of management that has intuitively and automatically evolved (as the industry evolved) such that he found it particularly difficult to describe. He knows his industry like the back of his hand therefore finds

decision-making relatively easy due to his wealth of knowledge of the subject domain. He is a quiet yet confident person who was able to describe many decision-making situations he had experienced during his working life. He also has a clear, yet simple philosophy to both work and life in general. His decisions are more low level than most of those carried out by other participants. He appears to like getting involved with day-to-day activities such as talking with suppliers and customers; activities he was primarily involved in earlier in his career.

Participant Ten

Gender (Male/Female):	Male
Age Range (Years):	31-40
Number of Staff Responsible for:	5
Time Spent in Present Organisation (Years):	1-5
Industry:	Public Sector - Health
Time Spent in Present Industry:	1-5
Highest Qualification:	Post Graduate
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Analytic Imager

Participant 10 is the youngest contributor to the study and has had a rapid rise to his present executive level position since finishing postgraduate study. His position is quite unique in that while the number of staff he manages is quite low, the level of responsibility (in financial terms) is larger than most other participants. Having been exposed to a number of formal decision-making models and his analytical decision-making environment, his decision-making process is heavily orientated towards the quantitative. Little opportunity exists within his decision-making for gut feeling and his decision-making is generally cautious and thoughtful. This participant's general nature appears to closely match his decision-making style and he appears to be of a type that would rarely lose control or be flustered. Participant 10 is involved in fairly repetitious and

structured decision-making. He is simply a manager of large (by New Zealand standards) budget that needs to be allocated across many competing centres.

Participant Eleven

Gender (Male/Female):	Male
Age Range (Years):	41-50
Number of Staff Responsible for:	2800
Time Spent in Present Organisation (Years):	1-5
Industry:	Private Sector – Agriculture
Time Spent in Present Industry:	1-5
Highest Qualification:	Post Graduate
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Analytic Bimodal

This participant is responsible for the largest number of employees of all of the participants. He has the task of heading an organisation that operates within an extremely competitive market. He seems to possess a level of confidence that could only be held by a person of his stature and level of success. To the uninitiated his decision-making might appear haphazard, however he has developed a considerable level of decision-making experience that allows him to make quick judgements on a variety of issues. Because of the nature of his decision-making, formal processes do not exist. Given the size of the company (large by New Zealand standards) his decision-making is restricted to issues of a strategic nature.

Participant Twelve

Gender (Male/Female):	Male
Age Range (Years):	41-50
Number of Staff Responsible for:	16
Time Spent in Present Organisation (Years):	1-5
Industry:	Private Sector – Sport
Time Spent in Present Industry:	1-5
Highest Qualification:	Bachelors
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Analytic Verbaliser

Participant 12 has management and decision-making experience in a range of private sector industries – a number of which are technology based. His understanding of decision-making (including his own) is superb. One of the decision processes he described could have easily come out of a common decision-making text. This ‘prescriptive’ approach had been developed within a previous job. His present role puts him in the position of having to present, and subsequently defend, to a board structure, a number of decisions he and his subordinates make. For this he needs to offer clear, transparent documentation of the process by which his decision has arrived. Participant 12 is involved in a variety of decisions ranging from the day-to-day decision to major decisions. These include strategic decisions and financial and marketing decisions.

Participant Thirteen

Gender (Male/Female):	Male
Age Range (Years):	31-40
Number of Staff Responsible for:	45
Time Spent in Present Organisation (Years):	6-10
Industry:	Private Sector – Manufacturing
Time Spent in Present Industry:	11-20
Highest Qualification:	Bachelors
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Intermediate Verbaliser

This participant moved into his executive role by what almost appears to be by accident, given that he was initially employed by the company as a technical specialist. It would appear that his knowledge of the business's operations and large customers has allowed him to gradually move into this senior role. Given that he has received no significant training in management, his style appears to reflect his more technical background and he described many of the issues he has faced from such a technical viewpoint. He is generally quite aware of the processes he follows in making decisions although again the decisions he described were of technical natures rather than more general management issues. Many of his decisions are concerned with the preparation of tender documents or the management of large construction projects. To a lesser degree, he is also involved in decisions concerning strategy related issues.

Participant Fourteen

Gender (Male/Female):	Male
Age Range (Years):	41-50
Number of Staff Responsible for:	160
Time Spent in Present Organisation (Years):	1-5
Industry:	Public Sector - Education
Time Spent in Present Industry:	21-30
Highest Qualification:	Post Graduate
Formal Decision-making Training (Yes/No)	No
Cognitive Style	Analytic Verbaliser

Like most of the participants, experience is what makes participant 14 an effective decision-maker. He demonstrates all the characteristics of an executive best suited to operating within the competitive private sector and so is openly frustrated with many of the limitations that are placed on him within the public sector. He is an energetic and enthusiastic person with an obvious interest in many things. He has strong views of his and similar roles and is his own harshest critic. He is familiar with his decision-making processes and believes these have developed over time to best suit the combination of his style and the environment within which he has to make decisions. This participant is most involved in the making of funding allocation decisions. He also regularly makes staff appointment decisions.

Participant Fifteen

Gender (Male/Female):	Male
Age Range (Years):	51-60
Number of Staff Responsible for:	460
Time Spent in Present Organisation	20+
(Years):	
Industry:	Private Sector – Manufacturing
Time Spent in Present Industry:	30+
Highest Qualification:	Bachelors
Formal Decision-making Training	Yes
(Yes/No)	
Cognitive Style	Wholist Imager

This participant has been involved with his company for most of his working life, and in fact has led the company for a significant part of that time also. He appears to bring to his role an equal mix of work and life experience, and formal qualifications. This combination seems to produce a well-balanced decision-maker who is able to measure the significance of a situation and react to it accordingly. He is able to identify those decisions that he is best dealing with, and also those that don't warrant his time and can be better dealt with by subordinates. He appears to be quite proud of the 'father figure' he has established as himself within his large organisation. He also appears to be a person who can relate to those of differing levels within the organisation, and sees talking with all levels of staff as a valuable component of his role. His decisions are primarily strategic in nature.

Participant Sixteen

Gender (Male/Female):	Male
Age Range (Years):	41-50
Number of Staff Responsible for:	16
Time Spent in Present Organisation (Years):	6-10
Industry:	Private Sector – Retailing
Time Spent in Present Industry:	6-10
Highest Qualification:	Bachelors
Formal Decision-making Training (Yes/No)	Yes
Cognitive Style	Wholist Verbaliser

Participant sixteen was an inquisitive participant as it turned out that many of the questions that were being asked of him related to post graduate studies that he was presently involved. He is a mild mannered person who gives the impression of being a person who might crack under excessive pressure. Having said that, he has established himself in his position and appears to have nothing but complete respect from his staff. He used the interview to think thoughtfully about his decision-making and was able to provide some insightful comments. He appears to operate in an environment which given its competitiveness, does not permit much variation in terms of decision-making process; what has been successful in the past is rarely changed. His decisions cover a variety of issues including the appointment and training of staff, marketing and promotions, and the type and number of product lines to carry at any one time.

APPENDIX E: EXAMPLE OF GROUNDED THEORY DATA ANALYSIS APPLICATION

The following is a brief example of how the data is obtained from the interview transcripts. It demonstrates how the adaptation of the grounded theory analysis coding procedures is used to produce data that directly relates to the research questions.

The example uses a short extract from one interview. This extract has been chosen as it does not contain any identifiable reference to the participant or his/her organisation. This example is simply intended to clarify the processes employed. Because of its brevity, the set of incidents, concepts and categories etc is only a fraction of those that emerged from the entire data analysis.

Transcript Extract

The following transcript extract is used to demonstrate the coding procedures employed.

Yeah I think what I do is, I sort of think – what’s the real problem here? Often something comes and lands on your desk and the immediate thing to think is lets do this, this and this, but if I give it a bit of time and think what is the real problem here? What’s the real issue? So having identified that I then tend to go through a process of collecting information and sometimes I collect more information to find out what the real problem is – I determine what the real problem is, and then I collect as much information as I can and that’s sort of going on at the same time those two things. Having got a clear idea of what the problem is, then really looking at the different alternatives, different solutions to solve that problem. There might be 10 ideas, some of them are crazy, some of them might be quite workable and then it’s really a process of elimination to decide which one I am going to go with and then preparing some sort of action plan about how to implement it. Invariably there is then some sort of formal or informal review as to how the decision went. Yeah so it is collecting the

information, defining the problem, coming up with alternatives and solutions, deciding which one is best and then just going for it.

Open Coding

The first step in open coding is to identify incidents. Incidents identified in the example extract are highlighted and numbered below.

(1) what's the real problem here?
 (2) something comes and lands on your desk (3) immediate thing
 to think (4) if I give it a bit of time (5)
 what is the real problem here? (6) What's the real issue?
 (7) go through a process (8) collecting information
 (9) collect more information (10) real problem
 (11) real problem (12) collect as much
 information (13) same time
 (14) what the problem is,
 (15) different alternatives, (16) different solutions
 (17) some of them are crazy, (18) might
 be quite workable (19) a process of elimination (20) decide
 (21) preparing some sort of action
 plan (22) implement it.
 (23) review (24)
 collecting the information, (25) defining the problem, (26) coming up with
 alternatives and (27) solutions, (28) deciding (29)
 going for it.

The identified incidents are then given relevant descriptive names as shown below.

- | | |
|--------------------------|---------------------------|
| 1.Problem identification | 16.Solution evaluation |
| 2.Problem awareness | 17.Alternative generation |
| 3.Initial thoughts | 18.Alternative generation |
| 4.Use of time | 19.Filtering process |
| 5.Problem identification | 20.Choice |
| 6.Problem identification | 21.Planning |
| 7.Process description | 22.Implementation |

- | | |
|---------------------------|---------------------------|
| 8.Information gathering | 23.Decision review |
| 9.Information gathering | 24.Information gathering |
| 10.Problem identification | 25.Problem definition |
| 11.Problem identification | 26.Alternative generation |
| 12.Information gathering | 27.Solution generation |
| 13.Dual processing | 28.Choice |
| 14.Problem identification | 29.Implementation |
| 15.Alternative evaluation | |

The next step is to group related incidents into concepts. The list of concepts is presented below. The original incidents are shown in brackets.

- A.Problem identification/definition (1, 2, 5, 6, 10, 11, 14, 25)
- B.Information gathering (8, 9, 12, 24)
- C.Alternative generation (15, 16, 17, 18, 26, 27)
- D.Time (4)
- E.Gut feeling (3)
- F.Simultaneous activities (13)
- G.Choice phase (19, 20, 28)
- H.Planning (21)
- I.Implementation (22, 23, 29)

The last stage of open coding is to form more abstract category groupings of related concepts. These are shown below including (in brackets) the original incidents that are included within them.

- I.Problem identification/definition (1, 2, 5, 6, 10, 11, 14, 25)
- II.Information gathering (8, 9, 12, 24)
- III.Alternative generation (15, 16, 17, 18, 26, 27)
- IV.Constraints (4)
- V.Cognitive issues (3)
- VI.General structuring processes (13)
- VII.Post-structuring (19, 20, 21, 22, 23, 28, 29)

Axial Coding

In axial coding, the categories and their associated properties are related to each other to identify relationships and to associate them with the study's research questions. This generally only involves a renaming or classifying of categories. These are now termed as phenomena. The categories contained within each are presented in brackets.

The identified phenomena are:

- Problem identification/definition (Problem identification/definition)
- Process (Information gathering, Alternative generation, General structuring processes)
- Constraints (Constraints)
- Cognitive issues (Cognitive issues)
- Post-structuring (Post-structuring)

Relating these to the research questions we get:

Q.1.1: In what state are decision-makers 'receiving' decision problems?

ASSOCIATED PHENOMENON: Problem identification/definition

Q.1.2: What environmental constraints/ influences are present?

ASSOCIATED PHENOMENON: Constraints

Q.1.3: What aspects of human behaviour influence the structuring process? How?

ASSOCIATED PHENOMENON: Cognitive issues

Q. 2.1: What existing problem structuring methods/ heuristics are used in practice?

ASSOCIATED PHENOMENON: Process

Q. 2.2: Are empirical observations in this study consistent with wider descriptive theory?

ASSOCIATED PHENOMENON: All phenomena

Q. 2.3: Do common elements of naturalistic problem structuring exist?

ASSOCIATED PHENOMENON: All phenomena

Q. 2.4: Are some problem structuring methods best suited to particular types of decisions?

ASSOCIATED PHENOMENON: All phenomena

While the phenomenon, Post structuring does not directly address questions 1.1, 1.2, 1.3 or 2.1, it does offer significant contextual data for questions 2.2, 2.3 and 2.4.

Selective Coding

Selective coding is the final stage of the coding process and involves the development of stories from the phenomena identified. Selective coding is best achieved when substantial data exists and so for that reason, the story presented below is particularly limited – it is based only on the short extract of the single interview. Given that the “core” categories used to formulate the stories were previously identified (as phenomena) during the axial coding, all that is required to complete the selective coding is to write a few sentences for each “core” category such that the story might then be formulated. Descriptive sentences derived for the “core” categories are presented below. Research questions 2.3 and 2.4 cannot be addressed with the data obtained from the single transcript.

Q. 1.1. Decisions usually “appear” from another party/person.

- Q. 1.2. Increased time allows for a better understanding of the real decision problem.
- Q. 1.3. Use of gut feeling is often a first response to a decision situation.
- Q. 2.1. The identification of alternatives and solutions are not viewed the same.
- Simultaneous processing occurs during problem structuring.
- Problem structuring is viewed as being a collection of decision steps – which themselves are part of the wider decision process.
- Q. 2.2. Gut feeling in problem structuring does not appear to be as predominant as in the later choice phase.
- Q. 2.3. *Can't address with a single interview transcript.*
- Q. 2.4. *Can't address with a single interview transcript.*

APPENDIX F: GROUNDED THEORY

INCIDENT TABLES

The following tables present the incidents that were identified for each of the “relevant” research questions, as described in each subsection of Chapter Five. Incidents emerged primarily from interview transcripts, but also from interview notes, CSA data and questionnaire responses. The values displayed in each table relate to the frequency of occurrence of each incident type emerging from the interview transcripts only.

Decision	1	2	3	4	5	
	External information/ pressure	Internal Information/ pressure	Decision Maker perception	Situational Monitoring	Staff Unhappiness	
1	3	3	4	1		
2	2	1	2			
3		1		1		
4	1		1	1		
5		1	3	2	2	
6	6	2	3	1		
7		1	1	1		
8	7	1	3	2		
9	1	1	1			
10	1	1		1		
11		2				
12	1	4	4	2		
13	1	3	1			
14		2				
15				4		
16	2		7			Total
	25	23	30	16	2	96

Incident Table One: Decision Emergence

Decision	1	2	3	4	5	6	7	8	
	Information	Time	Finance	Internal Politics/ Lobbying	External Politics/ Lobbying	Other External Events	Subordinate Problems	Decision Ramifications	
1		2	1	2					
2	1	1	1			1			
3	5			2	6			4	
4	1	1	1			3			
5	3	6	2	2	1				
6	1	2		3	2			2	
7				1	1				
8		1		3	9	1	5		
9	1	1		1	1	1			
10	2	1	1	2	5	1		1	
11	1				3				
12	2	1	2	3					
13	1	1	1						
14	5	1	1		4			1	
15	4	1	1		2	1			
16	5	1		1	1				Total
	32	20	11	20	35	8	5	8	139

Incident Table Two: Contextual Constraints and Influences

Decision	1	2	3	4	5	6	7	
	Confidence	Experience	Understanding	Ability	Uncertainty	Judgement	Courage	
1	4	2	1			3		
2		1						
3	2	2	2	1		3		
4			1			1		
5	2	1	1			1		
6	2	2	2				1	
7		1				1		
8	3	4	1					
9	1	1						
10		4	4					
11	2	3					1	
12	3	6	5			3		
13	1	3		1				
14	2	3				1		
15	4	5	2	1	1			
16	1	2	1	3	1		1	Total
	27	40	20	6	2	13	3	111

Incident Table Three: Human Behavioural Influences

Decision	1	2	3	4	5	6	7	
	Defining objectives	Analysis	Generating alternatives	Gathering information	Identification of Decision Requirements	General process issues	Simulation	
1	2		2	1				
2			1	1				
3	1	1		2		1	2	
4	3		3	2				
5	2		1	2	1			
6	1	1	1	3				
7	3		5					
8	1	1		2		1		
9	2		1	3				
10		1		1		1		
11	3	1	1	1	1			
12	3		8	11		2	3	
13	1		1	1				
14	1		4	5		1	1	
15	3	4	1	1	1		2	
16	4	1	1	4	1		1	Total
	30	10	30	40	4	6	9	129

Incident Table Four: Decision Problem Structuring Processes

APPENDIX G: COGNITIVE STYLE ANALYSIS (CSA) RESULTS

Participant Age	WA Ratio	VI Ratio	WA Speed	VI Speed	WA Correct	VI Correct	WA Style	VI Style
49	1.94	1.38	5.17	4.00	100	100	A	I
52	1.17	0.96	5.69	4.22	95	92	I	V
47	1.25	1.09	3.55	3.90	95	94	I	I
49	0.88	0.96	2.51	2.60	95	94	W	V
45	1.56	1.13	5.03	3.67	98	98	A	I
53	0.99	1.13	5.03	3.67	98	98	W	I
66	1.04	1.06	4.46	2.98	100	92	I	B
59	1.14	0.99	3.74	3.10	90	90	I	B
65	0.89	0.81	4.79	2.77	100	88	W	V
31	2.78	1.41	2.64	2.80	98	83	A	I
46	1.63	1.06	5.44	3.79	100	94	A	B
46	1.51	0.95	2.74	2.61	98	92	A	V
38	1.10	0.84	3.10	2.39	93	90	I	V
48	3.37	0.98	2.78	2.33	100	98	A	V
59	1.01	1.10	2.84	1.69	90	96	W	I
47	0.97	0.97	6.28	3.28	93	90	W	V

APPENDIX H: SAMPLE INTERVIEW

QUESTIONS

Based upon the research questions being addressed by the study, the following are examples of the types of questions used within the interviews. The usage and format of these questions varied for each interview depending on the degree to which they were addressed in the process description given by each participant. This is by no means a complete list; other lines of questioning were pursued depending on the flow of each interview.

1.1 In what state are decision-makers 'receiving' decision problems?

- How do decisions you are involved in typically emerge? Are they identified by you? Somebody else? If so, from who?
- When you receive a decision from somebody else, is the all the information you require present? Do you have to gain further information? From who? Whom?
- Do you like decisions to come to you partially structured?

1.2 What constraints/influences are present?

- Do you find collecting information before making a decision is relatively easy? if not, what inhibits your ability to collect the information you require? Are these organisation constraints?
- Are any of the following significant in your decision-making? Time constraints, Political intervention, Limited funds or other resources? If so, what?
- Are there any other constraints/influences present, that you think influence you when you are structuring decision problems?

1.3 What aspects of human behaviour influence the structuring process? How?

- Do you enjoy making decisions?

- Do you feel that you are suited to decision-making? Why? Why not?
- What do you think are the attributes of the ideal decision-maker?
- Do you find that you act different under different situations (e.g. stress, time constraints, etc.)?

2.1 What existing problem structuring methods/heuristics are used in practice?

- Do you or your organisation use any formal methods or approaches for making decisions? Explain
- Have you received any formal decision-making training? Explain
- Do you use what you consider to be a formal method for structuring your decision problems? Explain, or do you prefer to rely on your judgement and experience?
- Do you think your problem structuring could be improved by using a “textbook” method for structuring decision problems”

2.2 Are empirical observations in this study consistent with wider descriptive theory?

- No questions possible here

2.3 Do common elements of naturalistic problem structuring exist?

- Do you find that there are certain things you do when structuring decision problems that you do regardless of the type of decisions? If so, what are they?

2.4 Are some problem structuring methods best suited to particular types of decision problem?

- Do you find that the manner in which you process a decision is determined by the nature of the decision?
- What aspects of the decision provide the greatest influence? How does your decision-making change based upon that?