STRUCTURED ARTICULATION OF KNOWLEDGE: THE INFLUENCE OF QUESTION RESPONSE STRUCTURE ON RECIPIENT ATTITUDE

A thesis
Submitted in partial fulfilment
of the requirement of the Degree
of
Doctor of Philosophy
at
The University of Waikato

by
HEATHER JAYNE BIRCHAM-CONNOLLY

The University of Waikato
2007

ABSTRACT

Business today is faced with discontinuity and unpredictable change, which makes many of the structured processes of yesteryear redundant or obsolete. Process-based transactions are being replaced with technology and increasingly organisations are recognising the importance of proactively managing their knowledge transactions, to remain competitive. While research on knowledge sharing is gaining the attention of researchers, almost invariably their focus has been on the factors influencing knowledge transfer at the macro-level in large multi-national organisations. Few have attempted to unravel the complexities of individual-to-individual micro-level knowledge sharing and those that have, for the most part have directed their investigations towards exploring factors that enhance or impede the source individual sharing their knowledge, rather than the recipient's receiving of knowledge. While questioning is implicit in knowledge sharing there are assumptions that underpin the structure of a question and these assumptions affect both the source and the recipient.

This study investigates how the structure of a question posed to a source individual when eliciting knowledge, influences the attitude of a recipient individual towards the knowledge they receive from the question response. Drawing upon theoretical assumptions that underpin question structure, three hypotheses are posed to compare binary, open-ended and directed question responses. To test the hypotheses a progression of three independent studies were performed using laboratory and field experiments. The first study conducted in a laboratory, used a contrived scenario case as the knowledge context and the second study replicated this experiment in the field. The last study conducted in a single organisation, used real organisational knowledge as the knowledge context.

Recipients of shared knowledge were found to be more favourably disposed towards question responses that were structured in a complex manner; open-ended and directed question responses were more favoured than binary question responses.

There was no difference in recipient attitude between open-ended and directed question responses and recipient attitude towards the shared knowledge was found to be positively related to their intention to use the knowledge in the future.

These findings are of significance as they illustrate the importance of structuring questions in a manner that is consistent with recipients of the shared knowledge being more favourably disposed towards the knowledge they have received. In an environment of ambiguity, complexity and uncertainty where decisions are non-programmed, strategic and imperative to the competitiveness of the organisation, no longer is the binary 'Yes' or 'No' compliance or audit style question, with its implicit assumptions, sufficient to elicit knowledge. It is important to recognise that often we do not know what we need to know until it is shared by someone. Further, when shared knowledge is cognitively processed with our current knowledge base, the new knowledge is likely to facilitate more informed decision-making. The more favourably disposed the recipient is towards the knowledge the more likely it is that they will use it in the future; knowledge is transferred.

ACKNOWLEDGEMENTS

This study would have not been possible without the generous funding received from the Bright Futures Top Achiever Doctoral Scholarship and the Women's Federation Merit Scholarship. These scholarships provided the opportunity for the author to present aspects of this thesis at various conferences throughout the world and subsequently receive feedback from those actively researching in the knowledge management field.

Appreciation is due to Dr. Stuart Dillon who graciously took on the role of sounding board and provided wisdom on direction, especially when frustration levels were high. I am grateful for the insightful knowledge provided by Dr Michael O'Driscoll during the early stages of this thesis. I would also like to acknowledge and thank all the individuals who participated in the three studies, especially the employees of Resene Paints Ltd.

To my two supervisors who came on this journey with me - Dr. James Corner and Dr. Stephen Bowden - thank you for your knowledge, encouragement, insight and understanding over the course of this thesis. I found our debates fruitful as well as entertaining and I hope that I brought much enjoyment to your supervisory roles.

I would finally like to thank my family and friends for putting up with my demands during the last four years. My sister Elise who read some of my earlier work I am most grateful, as I am of my brother Peter, who almost lost my entire thesis on his corrupt computer and then reminded me that I needed to backup - continuously. Mum, your support is implicit in everything I do and I thank you very much. My husband Mark, who joined me once I had already committed to this journey, your encouragement was there throughout the good times and the bad, and for that I am utmost grateful. Finally, special thanks must go to my father. I thank you dad for all your wisdom, knowledge and the endless hours you spent editing. What we have both implicitly known and applied for so long has finally been documented.

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INTRODUCTION

1.1 Background

In today's knowledge driven economy, the acquisition, use and leveraging of knowledge can be an important component of success. No longer do organisations have the luxury of conducting business in the stable environments of yesteryear, now they have to work in an environment that is dynamically evolving. Complex interactions where "people deal with ambiguity – there are no rule books to follow" (Johnson *et al.*, 2005, p.24) are the norm and organisations need to become highly adaptive, smart and agile as they equip themselves to face complexity, uncertainty and change (Clarke & Clegg, 1998). The tacit interactions of the employees that comprise the organisation need to be nurtured (Johnson et al., 2005). The knowledge of employees becomes the "most strategically important resource" (Grant, 1996, p.376) that an organisation possesses, a principal source of competitive advantage (Nonaka, 1991; Spender & Grant, 1996), which should be proactively managed.

Merely possessing "valuable knowledge somewhere within an organisation does not mean that other parts of the organization benefit from this knowledge" (Szulanski, 2000, p.10). Knowledge has little value to the organisation unless it is "supplied to the right people at the right time" (Teece, 2000, p.38). The owning of knowledge does not necessarily equate with competitive advantage (Darroch, 2005) and it is the interactions between the individuals that comprise the organisation that forms the basis of competitive advantage (Argote & Ingram, 2000; Nonaka, 1991; Spender & Grant, 1996). The challenge organisations face is how to manage the process of knowledge sharing so that those that require the knowledge for decision-making have access to it in a timely manner.

Uncertainty is an implicit part of the decision-making process (Simon, 1991) and shared knowledge provides the recipient of knowledge with an opportunity to gain new insight into issues and generate new knowledge. When shared knowledge is processed into a recipient's current knowledge base the newly created knowledge enhances a recipient's capacity to act (Choo, 1998), potentially facilitating better informed judgements and decisions. The more relevant the knowledge is to a recipient's decision-making requirements, the more likely it is that they will use this knowledge (Schulz, 2003) and once applied and used by a recipient, knowledge is considered to have been transferred (Argote & Ingram, 2000; Darr & Kurtzberg, 2000).

While research on knowledge sharing and transfer has rapidly gained the attention of researchers, almost invariably their focus has been on the factors influencing knowledge transfer at the macro level in large multi-national organisations (Bjorkman *et al.*, 2004; Gupta & Govindarajan, 2000; Tsai, 2002) or between organisations (Hansen, 2002; Lane & Lubatkin, 1998; Simonin, 1999, 2004). Although there is a substantial body of research on information and knowledge sharing that can be found in the psychology, philosophy and organisational theory fields, only recently have knowledge management researchers of the 20th and 21st century begun to empirically unravel the complexities of micro-level, individual-to-individual knowledge sharing. For the most part, their attention has been directed towards exploring the factors that impede or enhance the source individual sharing their knowledge, rather than the factors that influence the recipient's receiving and internalising of knowledge. The recipient is the key to successful knowledge transfer (Davy, 2006) as it is the recipient who judges whether or not the transfer of information has met their objectives (Wilson, 2002). Some consider this aspect of the sharing process to be under-researched in modern knowledge management literature (Dixon, 2002).

In spite of the lack of research into the recipient of shared knowledge, some factors are considered influential. For example, an organisation's culture can be conducive to sharing and also accepting of the knowledge of co-workers, which can reduce issues associated with the not-invented-here syndrome (Katz & Allen, 1982), but the

recipient must also be willing and motivated to accept shared knowledge (Gupta & Govindarajan, 2000). Issues like trust (Huemer *et al.*, 1998) and the reputation of the source (Szulanski, 2000) may influence a recipient's motivational disposition and an individual's cognitive style affects how they seek out knowledge (Ford *et al.*, 2002; Taylor, 2004). Even more fundamental is the requirement for knowledge to be effectively articulated by the source before the recipient can internalise it (Cummings & Teng, 2003). Some consider that further research on questioning as an initiator for knowledge sharing is required (Cooper, 2003).

1.2 The Research Question

The purpose of this study is to investigate whether or not the structure of a question influences the knowledge sharing process. This research is motivated in part by the findings of Okhuysen and Eisenhardt (2002) who found active questioning to be a superior intervention method in new knowledge generation than just passively requesting knowledge to be voluntarily shared. Active questioning initiates knowledge sharing in that it informs the source individual that someone wishes to inquire of their knowledge base. There are, however, fundamental assumptions that underpin the structure of a question (Foddy, 1993), which should be considered from the perspective of both the source and the recipient. For instance, closed questions assume that the recipient already has substantial information about the source individual's knowledge (Vinten, 1995) and can therefore process the question response. Open-ended questions assume that the recipient does have not complete knowledge and is therefore mining for the unknown (Foddy, 1993). Directed questions assume that open-ended questions fail to provide the source with the context required to ensure that the response meets the expectations of the recipient (Knippen & Green, 1999).

This research examines how the assumptions implicit in a question structure influences the recipient of the shared knowledge, more specifically how they affect a recipient's attitude towards future use of the shared knowledge. It seeks to address the following research question:

> Does the structure of a question to which the source of the knowledge responds influence the recipient's attitude towards the knowledge they receive?

Before describing how the research question will be examined, two underpinning assumptions must be clarified.

1. A source can share their knowledge by responding to a question and a recipient can internalise this response, process it and create knowledge. Implicit in the foregoing is the notion that information is the vehicle for knowledge sharing (Blumentritt & Johnston, 1999); the source individual articulates their knowledge and it is transformed into information, which is then communicated to the recipient and reconverted back into knowledge once internalised with the recipient's current knowledge base.

2. Responses to a question are structured in the same manner as the question; the question structure determines the question response structure, e.g. binary questions permit only a binary response and open-ended questions only an open-ended response.

1.3 Methodology

There are two fundamental perspectives to the researching of human subjects – phenomenology and positivism (Hussey & Hussey, 1997). Phenomenology posits that social reality cannot exist or be observed without the interactions of the researcher with this reality, whereas positivism posits that social reality exists external to the researcher and knowledge is formed from observing this external reality. This subjective-objective approach provides a simplistic uni-dimensional method for a researcher to position their beliefs on whether or not human beings can be studied externally, but some contend that the environment in which a subject exists should also be considered (see Burrell & Morgan, 1979).

The research undertaken in this thesis investigates whether or not question response structure influences recipient attitude. More specifically, it investigates the notion that differing question structures may influence recipient attitude towards the shared knowledge in a variety of ways. For instance, question responses structured in a binary format may influence recipient attitude towards the shared knowledge in a different way to question responses structured in an open-ended format. The research question implies a causal relationship between question response structure and recipient attitude, one that can be rigorously tested. To test this causal relationship a positivist or functionalist perspective is applied as this approach supports the objective testing of the posed relationship and generation of new knowledge is external to the subjective views of the researcher. Experiments are used to test how varying question response structures influence recipient attitude towards knowledge received.

The relationship between question response structure and recipient attitude is tested in three progressive experiments. The first experiment examines the relationship in a laboratory environment, controlling the knowledge context to be shared. The second experiment replicates the design of the first experiment, but in the field. The last experiment also conducted in the field, tests the relationship between question response structure and recipient attitude using a single organisation and a knowledge context specific to that organisation. Recipient's attitude towards the shared knowledge contained in the question responses is collected using self-administered questionnaires. Finally, the experiments only examine documented question responses and there is no reciprocity between the source and the recipient. The next section outlines the remainder of this thesis.

1.4 Thesis Outline

The next chapter analyses the literature that underpins this thesis. First, knowledge is defined in the context of knowledge management and the organisation and then knowledge sharing is examined, followed by a review of the factors that influence the source and the recipient in the knowledge sharing process. Questioning can initiate a

source to share their knowledge and the chapter concludes by analysing the literature on questioning, with specific emphasis on the assumptions that underpin question structure. After the literature review, Chapter 3 describes the research gap examined in this study and presents the research question and theoretical research model. The principal hypotheses are also described and justified.

Chapter 4 outlines the research methodology followed in this study and provides background detail on the research method used to collect data. The chapter begins with a discussion of the theoretical perspectives that underpin social science research and states the position of this author. Then the research method selected and experimental procedures are analysed, and surveys as a data collection method described, followed by a discussion of the progressive three study approach taken to investigate the research question and test the posed hypotheses.

Chapters 5, 6 and 7 present the three individual studies undertaken to test the main hypotheses. Chapter 5 describes the design of the first experiment conducted in a laboratory environment and using a scenario case before the findings are presented and discussed. Chapter 6 describes the design and findings of the second study, a replication of the laboratory experiment design but undertaken in the field. The findings from the third study, which tested the hypotheses in a single organisation with real company specific knowledge is described in Chapter 7.

The results from a comparative analysis of the relationship between question response structure and recipient attitude across the three experiments are detailed in Chapter 8. This chapter also reiterates the experimental effects of the supported hypotheses and summarises the results from a number of additional hypotheses tested in Studies Two and Three. Chapter 9 discusses the overall implications of the findings, inclusive of why certain question responses were least favoured, the influence of the knowledge context and the question of whether or not there is a best question response structure. Finally, Chapter 10 concludes the thesis by summarising

the overall results and providing a discussion of the contributions that this study has made both to academic theory and business practice.

— CHAPTER TWO —

LITERATURE REVIEW

"The art and science of asking questions is the source of all knowledge"
-Thomas Berger (1924-)

2.1 Introduction

Perhaps the most perplexing aspect of knowledge in the business context is that it originates from individuals, but is realised through products or services promoted by organisations. In a business environment where many regard the knowledge of an organisation as a resource that gives rise to competitive advantage (McEvily & Chakravarthy, 2002; Spender & Grant, 1996), it is not unreasonable to suggest that an organisation should exploit to best advantage the knowledge of its employees. For this to occur employees articulating and sharing their knowledge within the firm is a prerequisite. Whilst it is generally recognised that the sharing of knowledge is considered important, the body of empirical evidence is still small; much of the research undertaken has centred on examining knowledge transfer, the role of technology and best practice, particularly in large multi-national firms. Generally research using multi-national firms rarely focuses on the organisation as a whole rather teams and departments are the unit of analysis. Furthermore there is less research that examines sharing specifically at the individual level and those that have worked in this area appear to have focused on the source individual and their attitude towards sharing, or the foremost contextual variables that enhance or impede sharing. The recipient and factors effecting their acceptance of the shared knowledge is considered by some to be under-researched (Dixon, 2002).

This chapter examines the literature that forms the theoretical foundation for this thesis. The next section begins with a discussion of what constitutes knowledge and more specifically defines knowledge within the context of the knowledge

management literature. Then the significance of exploiting knowledge within the organisation is outlined with specific reference to competitive advantage, followed by a brief description of the elements that comprise the knowledge management process within an organisation. The literature is then narrowed more specifically to the theme of knowledge sharing/transfer and a discussion of the research that pertains to the source individual who shares knowledge and the recipient individual who receives the knowledge takes place. Particular consideration is given to the major contextual variables identified in the conceptual and empirical literature as potential influences on the source individual when sharing their knowledge and on the recipient individual when receiving shared knowledge. Finally the literature on questioning is examined in an attempt to provide some background as to why questioning is important within the realm of knowledge sharing.

2.2 Knowledge

If you ask almost any individual to share their knowledge on a subject most will find this task easier than if asked to define exactly what 'knowledge' is. While the dictionary defines knowledge as "knowing; all that a person knows; all that is known; and an organised body of information" (Oxford Dictionary, 1988), this definition could be considered to be simplistic, naïve and just not helpful when taking into account the large body of literature dedicated to explaining knowledge. Early philosophers Plato and Aristotle questioned the meaning of knowledge and in the 20th century Popper and Kuhn furthered this discourse. Today, knowledge, or more specifically organisational knowledge, has become a recognised field of academic endeavour. Rather than embarking on a lengthy debate into the definition of knowledge (this in itself would be a thesis), this section examines the more commonly held views and topics of discussion in the literature of knowledge management.

There are generally two schools of thought, the first of which considers knowledge as objective, justified true belief, a phenomena that can be separated from the individual or the knower. In this perspective individual learning occurs as the

knowledge of others is communicated to the individual (Spender, 1996), it [learning] "takes places inside individual heads" (Simon, 1991, p.125).

The second school of thought considers knowledge to be socially constructed, residing in the social interactions between individuals, created when individuals transform information by way of thinking alongside their prior experiences and knowledge. Davenport and Prusak (1998) consider knowledge to be "a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers" (p.5).

What is fundamental to the social perspective is that knowledge includes in some form or other, information. It can be considered to be information in people's minds that is attached to the human cognitive process, where the combining of new information to existing knowledge allows for the creation of new knowledge. Leonard and Sensiper (1998) suggest that knowledge is "information that is relevant, actionable and based at least partially on experience" (p.113) and Alvai and Leidner (2001) contend that "information is converted to knowledge once it is processed in the minds of individuals and knowledge becomes information once it is articulated" (p.109).

A key challenge facing knowledge management researchers is the distinction between the terms information and knowledge (see Stenmark, 2002, for a review). Knowledge and information can be considered closely related, with "data and information … based on their 'organization', and information and knowledge … differentiated … on the 'interpretation'" (Bhatt, 2001, p.69). Most authors agree that data can be considered to be discrete raw facts (Bhatt, 2001; Davenport & Prusak, 1998), which without context are not in themselves meaningful (Kakabadse *et al.*, 2003). Information is then considered to be the organisation of data (Bhatt, 2001), or data that makes a difference to the recipient (Davenport & Prusak, 1998), a meaningful flow of messages that is factual (Nonaka, 1994) and might restructure or change knowledge (Machlup, 1983). As information flows knowledge can emerge,

but it requires the commitment, belief (Nonaka, 1991, 1994), experience and insight (Davenport & Prusak, 1998) of the individual, necessitating a subjective approach.

The relationship between information and knowledge has also been regarded as active and passive with "*active knowledge*, embedded in human consciousness, on the one hand, and *passive information*, written down, printed on paper or stored on electronic devices, on the other" (Muller-Merbach, 2004, p.61, emphasis in original). Others have suggested that knowledge is information combined with know-how (Kogut & Zander, 1992). Know-how is learnt and acquired by an individual, cognitively processed and influenced by contextual situations, often considered to be intuition (Bennett III, 1998).

Instigated by the seminal work of Polanyi (1958, 1966), knowledge is also often classified as explicit or tacit. According to Polanyi explicit knowledge is that which can be codified and systematically transferred, e.g. it can be found in books, journals, organisational documents etc. This type of knowledge is articulated and exists external to the individual. Some consider that since this type of knowledge can be articulated and documented it is no different to information (e.g. Stenmark, 2001). Tacit knowledge, on the other hand, is more difficult to formalise and communicate, as it reflects and is part of an individual's persona and is knowledge that is non-verbalised and unarticulated. Nonaka (1994) regards this type of knowledge as "a continuous activity of knowing" (p.16); it is specific to a context and deeply rooted in the individual. For this reason it is easy to note that "we know more than we can tell" (Polanyi, 1966, p.4). Some consider that all knowledge has a tacit element and each individual uses their tacit knowledge to put meaning to explicit knowledge (Polanyi, 1966), although others contend that tacit knowledge can never be totally converted into explicit knowledge, since some of an individual's knowledge will be retained as tacit (Cook & Brown, 1999).

Given the brief review of the literature which has examined definitions of knowledge purely from the viewpoint of organisational knowledge management, the sharing of knowledge can be considered to be socially constructed. This allows knowledge to be attached to human cognitive processes and allows for knowledge to be regarded

as both tacit and explicit. Further, without entering the knowledge-information debate, information can be considered to be a vehicle for transporting knowledge (Blumentritt & Johnston, 1999). The next section analyses organisational knowledge and the components of knowledge management.

2.2.1 Organisational Knowledge & Knowledge Management

According to Nonaka and Takeuchi (1995) the creation of organisational knowledge occurs when knowledge flows between tacit and explicit knowledge. A knowledge flow can be considered to be the streams of knowledge that flow into, or around an organisation and result in collection of knowledge (Decarolis & Deeds, 1999). The knowledge creation model proposed by Nonaka and Takeuchi (1995) distinguishes organisational knowledge from individual knowledge and contends that the creation of organisational knowledge is dependent upon the management of four continual knowledge modes. These four modes combine the interactions between tacit and explicit knowledge and involve socialisation (tacit to tacit), internalisation (explicit to tacit), combination (explicit to explicit) and externalisation (tacit to explicit).

Socialisation occurs through group interaction and because of the nature of tacit knowledge, uncodified, it can only be shared through observation, practice and apprenticeship. This mode is intrinsically linked with organisational culture (Nonaka, 1994), as without a supportive culture knowledge sharing may be severely hampered (de Long & Fahey, 2000; Janz & Prasarnphanich, 2003; McDermott & O'Dell, 2001; Sveiby & Simons, 2002). Creation of new knowledge through transformation of explicit knowledge to tacit occurs during internalisation and is associated with organisational learning and know-how. When knowledge, already in existence in explicit format is transferred by a source to a recipient, who then reconverts the knowledge with their own knowledge base to create new explicit knowledge, the model contends that combination has taken place. Explicit to explicit knowledge occurs through individual knowledge exchange in meetings, documents, phone calls etc. Nonaka and Takeuchi (1995) suggest that the most complex process is externalisation or the generation of new knowledge through codifying tacit knowledge and making it explicit.

Given the premise of the model, knowledge sharing and learning are intrinsically linked (Nonaka & Takeuchi, 1995), as individuals learn through both internalising knowledge shared by others and externalising their own knowledge. Further, an organisation can be considered to learn as it acquires and exploits the knowledge that is shared by the individuals that comprise it. Although some consider that organisations cannot learn, rather the individuals that comprise the organisation have the capacity to learn (Simon, 1991; Weick, 1978), others contend that organisations can learn through their history and routines (Nelson & Winter, 1982). Further, in today's highly competitive market, the ability of an organisation to learn quicker than its competitors is considered to be crucial to competitive advantage and the knowledge that resides in the interactions between individuals forms the basis for this (Argote & Ingram, 2000; Nonaka, 1991; Spender & Grant, 1996). For an organisation to learn and remain competitive, its members must learn (de Geus, 1988).

While knowledge creation and learning are fundamental for organisational survival, there is still the requirement to manage how the knowledge is created and how learning occurs. Knowledge management is a process that encompasses not only the management of knowledge creation but also other knowledge related activities, such as "validation, presentation, distribution, and application" (Bhatt, 2001, p.71) and the "retention, sharing, identification, acquisition, utilisation, and measurement of information and new ideas, in order to achieve strategic aims, such as improved competitiveness" (Lehaney *et al.*, 2004, p.3). Knowledge management also incorporates business processes, information technologies, knowledge repositories as well as individual behaviours (Kakabadse et al., 2003). Knowledge management activities can be considered to have a minimum of four components: knowledge creation, knowledge storage/retrieval, knowledge sharing and knowledge application (Alvai & Leidner, 2001).

Knowledge creation, as described above, involves the development of new knowledge through both social collaboration and individual reflection. Knowledge creation is closely linked with knowledge articulation or "the process through which

tacit skills and knowledge are made explicit" (Håkanson, 2007, p. 1). Tacit knowledge includes inarticulable knowledge as well as articulable knowledge or knowledge that could be, but has not yet been articulated. While knowledge articulation is often related to tacit knowledge rather than explicit knowledge which is already codified, "articulation implies *knowledge creation* – it allows tasks to be accomplished that could not previously be accomplished or not accomplished so well. By definition, articulation leads to an increase in the amount of explicit knowledge available to the community in question" (Håkanson, 2007, p.14, emphasis in original). Therefore, articulation is fundamental to knowledge creation (Zollo & Winter, 2002). Articulation is embedded in needs, goals, practice and context etc, and since we cannot presuppose that all people possess all knowledge, knowledge codified for one person may be tacit for another and not even consider by someone else. Context then becomes very important when discussing articulation and codification of knowledge, and even when knowledge is able to be articulated, some knowledge richness or context may be lost in the sharing process.

Research on the second component - knowledge storage/retrieval - is primarily influenced by information technology management and information systems, with a significant focus in the early literature on how information systems and computer technology could enable the management of organisational knowledge (Scarbrough, 1999; Storey & Barnett, 2000). Although the focus and perhaps reliance on information technology has been highly criticised for its neglect of the social aspect of knowledge (Hislop, 2002; Walsham, 2001), information technology is still regarded as a tool that can assist with organisational knowledge sharing (Meso & Smith, 2000). For example, Kock and McQueen (1988) found that email promoted a break down of physical barriers and interdepartmental conflict during sharing of knowledge for process improvement groups. Taylor (2004) found that cognitive style influenced an individual's use of computer-mediated knowledge management systems and Lam (1997) suggests that the type of knowledge – tacit or explicit - influences the usefulness of information technology. However, Newell et al. (2000) found that the intranet reinforced functional and national boundaries, reducing the amount of knowledge sharing. Explicit knowledge may be able to be documented in

information systems, but the storage of tacit knowledge due to its nature, uncodified, is not straightforward.

The third component - knowledge sharing - is the process of sharing knowledge between a source and a recipient, irrespective of whether the source and recipient are individuals, business units or organisations. Knowledge is shared between the source and the recipient through communication mechanisms, such as face-to-face discussions, meetings, documentation, emails etc. The literature suggests that organisational culture (McDermott & O'Dell, 2001; Sveiby & Simons, 2002; von Krogh, 1998) and trust (Andrews & Delahaye, 2000; Davenport & Prusak, 1998; Huemer et al., 1998) are key enablers of successful knowledge sharing. Although much of the literature on knowledge sharing encompasses the area of knowledge transfer[1], knowledge transfer also involves the application or use of the shared knowledge, which is component four of knowledge management.

A large amount of the research on the application of knowledge is centred on the transfer and use of technology, research and development and best practice in multi-national organisations. However, possibly the greatest difficulty encountered when investigating the application of knowledge is the definition and measurement of what has been applied, since "transfer of knowledge does not imply a 'full' replication of knowledge in a new location. Indeed, transfer of knowledge is often associated with modifications of the existing knowledge to the specific context" (Foss & Pedersen, 2002, p.54). Cummings and Teng (2003) describe four different approaches used by researchers to define transfer success:

1. the number of knowledge transfers in a time frame;
2. measurement of whether or not the transferred knowledge is on time and on budget;
3. how well was the transferred knowledge re-created; and
4. the degree to which the recipient obtains ownership, commitment to, and satisfaction with the knowledge.

[1] The collective body of knowledge sharing and transfer literature is discussed in the next section.

Generally, the approaches above have measured the transfer of technology and best practice related knowledge. Measurement of knowledge transfer may be more complex with other types of knowledge contexts, e.g. strategic knowledge for decision-making. The factors that inhibit or enable knowledge sharing and transfer are elaborated on in the next section.

2.3 Knowledge Sharing & Knowledge Transfer

While the terms knowledge transfer and knowledge sharing are often used interchangeably in knowledge management research, it is important to recognise that they are not synonymous. Knowledge sharing is the activity of disseminating knowledge from a source to a recipient and encompasses "a set of behaviours that involve the exchange of information or assistance to others" (Connelly & Kelloway, 2003, p.294). van de Hooff and de Leeuw van Weenen (2004) consider that knowledge sharing incorporates both the voluntary donation or communication of one's knowledge to another as well as knowledge collecting or asking colleagues to share their knowledge. In the knowledge sharing process, source individuals do not relinquish ownership of their knowledge, rather by sharing with a recipient the outcome is joint ownership of the knowledge (Ipe, 2003). The crucial distinction between knowledge sharing and transfer is that knowledge transfer also involves application of the shared knowledge by the recipient (Argote & Ingram, 2000; Darr & Kurtzberg, 2000). Knowledge transfer therefore has two components – knowledge sharing and its application, use or implementation. Knowledge transfer is predicated on knowledge sharing; sharing has to occur prior to application and successful knowledge transfer implicitly requires successful knowledge sharing. However, even when knowledge has been shared this may not lead to knowledge transfer, as the recipient may choose not to use or apply the shared knowledge.

Although there has been substantial discussion in the knowledge management literature on factors that may enhance or impede knowledge sharing, empirical

research in this area is still in its infancy[2]. Further, a considerable amount of the research on knowledge sharing is focused upon knowledge transfer and knowledge sharing is implicitly assumed. Table 2-1 summarises some of the key empirical findings on knowledge transfer, as discussed next.

[2] It is important to recognise that other academic disciplines such as anthropology, psychology, sociology and communication theory should not be discounted for their empirical research on information/knowledge sharing and or transfer.

Table 2-1 Key Empirical Contribution in Knowledge Transfer

Author(s)	Contributions
(Bjorkman et al., 2004)	Corporate socialisation methods can influence inter-unit knowledge transfer. Rewards (compensation) do not influence the extent of knowledge transfer from foreign subsidiaries to other Multi-National Corporations (MNC) units.
(Bresman *et al.*, 1999)	Transfer of know-how is affected by articulability. Patents are easier to transfer than 'knowledge know-how'; they can be documented.
(Cummings & Teng, 2003)	Knowledge context (articulability and embeddedness), relational context (knowledge distance, organisational distance) and motivation of the recipient influence successful knowledge transfer. A learning culture is not associated with knowledge transfer success.
(Foss & Pedersen, 2002)	The greater context specific the transferred knowledge and or the smaller the absorptive capacity of the receiving unit, the less likely that knowledge will be used.
(Gupta & Govindarajan, 2000)	Knowledge outflow is positively related to the value of the knowledge and the richness of communication channels. Knowledge inflow is positively related to the richness of communication channels, motivational disposition to acquire knowledge and absorptive capacity.
(Hansen, 1999)	A weak tie between sub-units speeds up knowledge sharing when knowledge is not complex, but slows down the sharing when knowledge is complex. A strong tie between sub-units is required for the transfer of complex knowledge.
(Lane & Lubatkin, 1998)	Firm level knowledge can affect the level of knowledge transfer in strategic alliances.
(McEvily & Chakravarthy, 2002)	Knowledge tacitness and complexity in transfer is a mechanism for defending technological knowledge from imitation by competitors.
(Minbaeva *et al.*, 2003; Minbaeva, 2005)	Absorptive capacity (ability and motivation) is required to facilitate successful knowledge transfer in MNC. Learning environments do not facilitate knowledge transfer success.
(Simonin, 1999, 2004)	Knowledge ambiguity mediates tacitness, prior experience, complexity and cultural/organisational distance in knowledge transfer. Learning intent enables knowledge transfer, whilst, ambiguity and tacitness impedes effective transfer.
(Szulanski, 1996)	Internal stickiness of knowledge, such as a recipient's lack of absorptive capacity and the relationship between the source and recipient can affect the transfer of best practice.
(Zander & Kogut, 1995)	The degree of knowledge codification can affect the speed of knowledge transfer and imitation of products by competitors.

In general, research on knowledge transfer has focused on a few factors including the characteristics of the knowledge (Foss & Pedersen, 2002; McEvily & Chakravarthy, 2002; Simonin, 1999; Szulanski, 1996; Zander & Kogut, 1995), the knowledge sender (Gupta & Govindarajan, 2000; Lane & Lubatkin, 1998; Szulanski, 1996) and the knowledge receiver (Gupta & Govindarajan, 2000; Szulanski, 1996). The role of strong and weak ties between the two parties, communication frequency and richness in terms of knowledge articulability has also been examined (Bresman et al., 1999; Gupta & Govindarajan, 2000; Hansen, 1999; Szulanski, 1996). Bjorkman et al. (2004) found corporate socialisation to influence knowledge transfer, but Minbaeva (2005) reported the reverse – corporate socialisation did not influence knowledge transfer.

A major focus of the transfer of knowledge literature has been in the areas of technology, research and development, marketing and best practice, with specific attention being placed on multi-national corporations transferring knowledge between their various subsidiaries or horizontal knowledge flows across business units. Schulz (2001) suggests that horizontal and vertical knowledge flows are driven by different factors, with horizontal flows involving everyday technical knowledge, continuous and incremental knowledge; the types of knowledge that have been examined in research to date. Vertical flows of knowledge or knowledge flowing up or down an organisation from operational functions to senior management have different characteristics. Vertical flows reveal knowledge on matters that are discontinuous or discrete in nature and contain factors of uncertainty (Schulz, 2001, 2003) that are generally much more political, such as threats, vulnerabilities and opportunities. In general few have examined vertical flows of knowledge within organisations.

In regards to key empirical research on knowledge sharing (Table 2-2) a significant amount of effort has been dedicated to application and testing of existing models (e.g. the Theory of Reasoned Action and the Theory of Planned Behaviour), in an attempt to explain knowledge sharing behaviours (Bock & Kim, 2002; Kolekofski & Heminger, 2003; Lin & Lee, 2004; Ryu *et al.*, 2003). Empirical research also suggests that an organisational culture/climate that promotes collaboration as a social norm

(Constant *et al.*, 1994; Sveiby & Simons, 2002) and supports learning from failures (Taylor & Wright, 2004) is positively related to successful knowledge sharing. Some suggest that a learning culture is closely associated with a knowledge sharing culture as "successful learning organisations create an organisational environment that combines organisational learning with knowledge management" (Pemberton & Stonehouse, 2000, p.186). The influence of organisational culture/climate on knowledge sharing is described in the next section.

Table 2-2 Key Empirical Contribution in Knowledge Sharing

Author(s)	Contributions
(Bock & Kim, 2002)	Expected associations and contribution are major determinants of an individual's attitude towards sharing knowledge. Expected rewards are not significantly related to an individual's attitude. Using the Theory of Reasoned Action (TRA), a positive attitude towards knowledge sharing was found to lead to a positive intention to share knowledge and consequently actual knowledge sharing behaviours.
(Chua, 2003)	An individual's decision to share knowledge is influenced in part by whether or not others will share their knowledge and varies with the number individuals who participate in knowledge sharing.
(Constant et al., 1994)	Organisational culture influences an individual's information sharing attitude and behaviours. The more an individual believes that information sharing is a social norm, the more they will be willing to share.
(Kolekofski & Heminger, 2003)	Using the TRA the intention to share information can be predicted by an individual's attitude towards stewardship, instrumentality and value for feelings. This suggests that attitude is a more complicated construct than initially proposed in the TRA.
(Lin & Lee, 2004)	Using the Theory of Planned Behaviour (TPB), results reveal that senior manager's attitudes, subjective norms and perceived behavioural control all influence their intention to encourage knowledge sharing within their respective organisations.
(Ryu et al., 2003)	Using the TRA and the TPB, subjective norms were found to have the strongest effect on behavioural intentions to share knowledge (indirect and direct through attitude). Attitude was the second strongest factor to affect intention to share knowledge.
(Sveiby & Simons, 2002)	An environment that promotes collaboration between employees will support knowledge sharing.
(Taylor & Wright, 2004)	Organisational climate (open leadership, learning from failure), infrastructure (information quality, performance orientation) and strategy implementation (vision for change and satisfaction with change), positively relate to effective knowledge sharing in the public sector.
(Tsai, 2002)	Centralisation and hierarchical structures have a negative effect on knowledge sharing, whilst informal relations through social interaction have positive effect on knowledge sharing, when business units are competing with each other for market share.
(van den Hooff & de Leeuw van Weenen, 2004)	Commitment to the organisation positively influences the source donating their knowledge. The more knowledge a person collects the more they will be willing to donate to others.

2.3.1 The Influence of Organisational Culture/Climate

Organisational culture according to Herbig and Dunphy (1998) is a system of shared values, behaviours, norms and traits which are implicitly central to all business systems (Youngblood, 2000). A knowledge sharing culture is an organisational culture that has a clearly defined focus on the sharing of knowledge, which de long and Fahey (2000) suggest influences the effectiveness of knowledge sharing by:

1. shaping the assumptions underling why knowledge is important within an organisation;
2. determining the relationship between the employee and the organisation - who owns the knowledge;
3. creating the context for social interaction - interaction that is imperative for knowledge sharing; and
4. shaping the adoption and creation of new knowledge.

A knowledge sharing culture is essential for successful knowledge sharing in an organisation because the values that underpin culture determine individual behaviours (Davenport *et al.*, 1998; Janz & Prasarnphanich, 2003). A culture that encourages interaction between individuals results in learning, knowledge exchange (Davenport & Prusak, 1998) and subsequently the creation of new knowledge. An organisational culture that is positive towards knowledge sharing results not only in collaboration between organisational members, but also an overall increase in the levels of trust and learning (Lee & Choi, 2003). Trust and collaboration amongst organisational members can also increase willingness to share knowledge (de Long & Fahey, 2000) and willingness to share has been found to increase productivity (Jarvenpaa & Staples, 2001). More recently, a study by Lucas and Ogilvie (2006) reported a culture of sharing to have a positive effect on knowledge transfer.

One of the difficulties with organisational culture as a construct is that it is an organisational phenomena and often difficult to measure. Since organisational culture implicitly guides an employee's actions, their values and their perceptions in the context of the organisation (McDermott & O'Dell, 2001), often an individual's perception of the organisational climate is used as an alternative measure. Sveiby and

Simons (2002) define a collaborative climate, or a type of organisational climate, to be "the values, beliefs and assumptions that influence the behaviours and willingness to share knowledge" (p. 421). Empirical research by Connelly and Kelloway (2003) found that an individual's perception of a positive social interaction culture was a good predictor of a knowledge sharing culture. However, what organisational climate actually is and how it should and can be measure is debatable. For example, Schneider (1975) states that climate perceptions are descriptive of situations, whilst others contend whether or not organisational climate is a product of the individual as an attitude, compared to a property of the context or situation at hand (see James & Jones, 1974, for a review).

A knowledge sharing culture in an organisation may not be homogeneous (McDermott & O'Dell, 2001) and often sub-cultures of knowledge sharing exist within functional areas or business units for example. Although knowledge sharing may be productive within these functional areas or business units, sharing outside the boundaries of a unit is often limited, as functional areas have a tendency to create silos and be inward looking, reflecting individuals with similar backgrounds and values (Quinn *et al.*, 1996). Silos can inhibit horizontal knowledge sharing and collaboration within organisations (de Long & Fahey, 2000) and often result in the erection of 'Chinese walls' for the protection of knowledge and the sustenance of power.

Power associated with owning knowledge is considered by some to be one of the reasons that individuals hoard and do not share their knowledge (Husted & Michailova, 2002). An individual that retains knowledge has the ability to control others through their need for the knowledge (Davenport & Prusak, 1998). Once the knowledge is relinquished or externalised, power associated with exclusive ownership of the knowledge ceases. The level of power associated with knowledge hoarding may, therefore, severely affect knowledge flows in an organisation. For example, if the knowledge required for decision-making on a particular issue resides with individuals in operational management and they perceive this knowledge to be key to their bargaining power in the future, then the knowledge required by senior management may not reach them in a timely manner. Practices that discourage

exchange between hierarchical levels, especially bottom-up, are considered to undermine effective knowledge sharing (de Long & Fahey, 2000).

Top management support of a knowledge sharing culture may assist in reducing hoarding and power associated with knowledge. Connelly and Kelloway (2003) found that employee perception of management support for knowledge sharing was positively related to knowledge sharing and Sveiby and Simon (2002) reported that employees who rated their supervisors low on supporting a collaborative climate generally had a more negative view on knowledge sharing than those that rated their supervisors more highly. There appears to be an imperative for organisational leaders to create and promote a learning and trusting environment (Ribière & Sitar, 2003), as a prerequisite for successful knowledge sharing.

Senior management, however, are unfortunately often the culprits, not willing to accept knowledge from others. Bower (2003) concisely summarises this by suggesting that "too many executives – even some successful ones – come to value their own opinions and judgements so highly that they ignore or underestimate facts" (p.114). The potential arrogance of valuing one's own opinions above that of those who actually possess the knowledge can be linked with the not-invented-here (NIH) syndrome (Katz & Allen, 1982). Michailova and Husted (2003) in their study on knowledge sharing in Russian firms found that the NIH syndrome intensified both strong in-group affiliation and suspicion of out-group members. Further, they found that knowledge hoarding was perpetuated by hierarchy and formal power structures; senior managers were resistant to work with, or even learn from employees who were lower in the hierarchy than themselves.

Senior managers also need to embrace and reinforce the positive aspect of learning from mistakes (Husted & Michailova, 2002; Taylor & Wright, 2004). Employees are often placed in what they perceive to be a vulnerable position and rather than sharing knowledge on their mistakes they will, out of self-interest and self-preservation, keep the knowledge to themselves. Trust between the sharer and receiver is implicit in a knowledge sharing culture; trust enables knowledge relating to mistakes to be shared without fear of recrimination. Trust is based on a combination of the subordinate's

perception of their superior's behaviours and the systems in which the superior-subordinate relationship is embedded (Shamir & Lapidot, 2003). Lack of trust can inhibit knowledge sharing in organisations (Andrews & Delahaye, 2000; Davenport & Prusak, 1998; Huemer et al., 1998).

Trust has been defined as an individual personality trait, e.g. propensity to share (Rotter, 1967) and a behavioural trait (Mayer *et al.*, 1995), although the two traits may not be mutually exclusive. Within the field of knowledge sharing an individual's tendency to trust is dependent upon situation, organisational circumstance and or, the individuals involved. It is therefore, behavioural; "the willingness of a party [trustor] to be vulnerable to the actions of another party [trustee] based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer & Davis, 1999, p.712). If an individual trusts a partner they are more likely to take risks, such as sharing knowledge, in comparison to a situation where they do not trust a partner (Mayer & Davis, 1999).

Andrews and Delahaye (2000) contend that an individual's perception of trustworthiness of another actor, together with appropriateness and credibility, form psychosocial filters that permit or inhibit an individual to share their knowledge, or to import and accept the knowledge of others. Implicitly the knowledge sharing/transfer literature suggests that if trust is high in an organisation, individuals will be predisposed towards sharing their knowledge. However, if trust is low they will be predisposed to hoarding their knowledge (Sharkie, 2004). Further, cultures with high trust have been found to be more successful in their knowledge management initiatives than those with lower levels of trust (Ribière & Tuggle, 2005). Connelly (2000) reported that the more trust present in an organisation, the greater the amount of information shared and Tsai and Ghoshal (1998) found trust to have a positive effect on resource exchange between two units. More recently, demographics or similarities in the relationship between the trustee and trustor have been found to influence perceived trustworthiness and subsequent knowledge sharing (Levin *et al.*, 2006). The frequency in communication between dyad senior managers in multi-national corporations was found to moderate the relationship

between trustee and trustor's antecedent, personal characteristics and perceived trustworthiness (Becerra & Gupta, 2003).

While trust is generally acknowledged to be crucial for successful knowledge sharing, the debate continues on whether or not trust has a main or moderating affect (Dirks & Ferrin, 2001). As a main affect trust is considered to have a direct effect on the outcome, for example, knowledge sharing, but there are conflicting findings for trust as a main effect on information sharing (see Dirks & Ferrin, 2001, for a summary of empirical research). As a moderating affect trust is considered to provide a condition, either positive or negative, under which the main variables are likely to relate (Dirks & Ferrin, 2001). For example, trust could be tested for a moderating effect on the relationship between the articulation of knowledge and the successful transfer of knowledge.

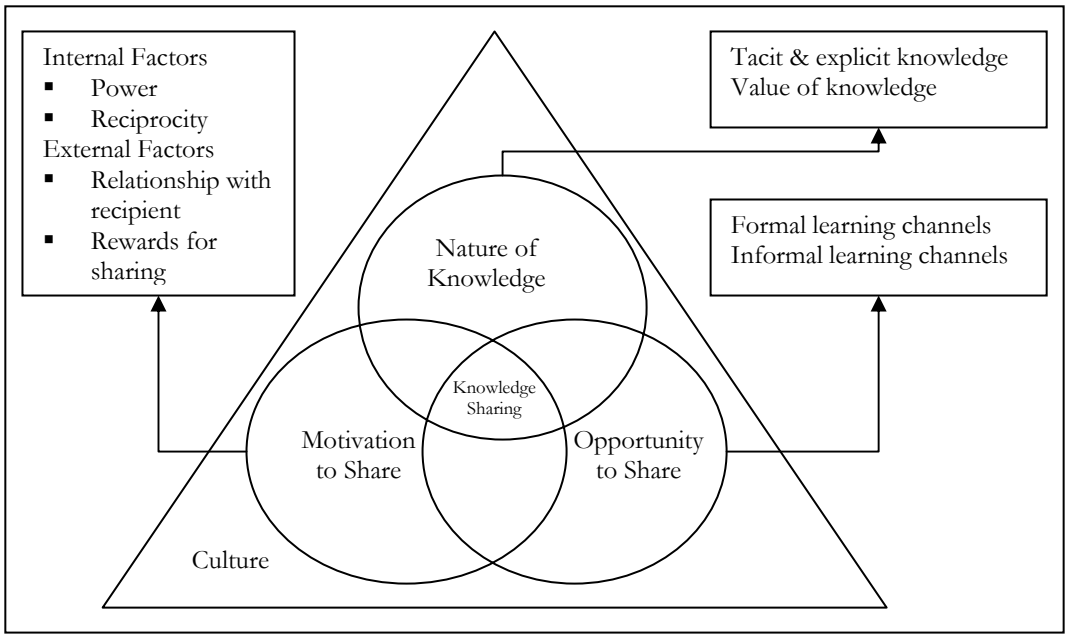
In summary, an organisation's culture or perceived climate towards knowledge sharing is fundamental to successful knowledge sharing. A culture conducive to sharing is one where functional silos are removed and senior managers do not possess all knowledge and are willing to accept the knowledge of their employees. Power then resides with organisational and not individual knowledge. Although trust resides at the individual level and is dependent upon the situation and individuals involved, a knowledge sharing culture can assist with nurturing the overall perception of trust within the organisation.

2.3.2 Knowledge Sharing & the Source

According to Ipe (2003) organisational culture is only one of many factors that influence an individual's intention to share knowledge within an organisation and that consideration of the nature of the knowledge, the opportunity to share and the motivational disposition of the source is also required. Ipe's (2003) conceptual framework[3] is depicted in Figure 2-1.

[3] Although it is not the intention to replicate Ipe's (2003) paper, key research relating to three of factors are discussed. Organisational culture has already been discussed in Section 2.3.1 of the Literature Review.

Figure 2-1 Factors Influencing Knowledge Sharing Between Individuals



Source: Ipe, M (2003), Knowledge sharing in organizations: A conceptual framework, *Human Resource Development Review*, Vol 2(4), p337-359.

The 'Nature of the Knowledge' component of Ipe's (2003) conceptual framework includes whether or not the knowledge to be shared is tacit or explicit, together with the value associated with the knowledge. As discussed earlier, tacit knowledge is considered more difficult to share as it tends to be sticky and subsequently harder for an individual to articulate (von Hippel, 1994). However, different types of organisational knowledge may also influence the level of and success of knowledge sharing. For instance, organisational knowledge can be categorised as technical or strategic (Liebeskind, 1996) and complexity associated with technological knowledge makes it more difficult to share (McEvily & Chakravarthy, 2002). Tissen et al. (1998) identify two types of knowledge that require management in an organisation - strategic and operational. Operational knowledge management is concerned with connecting people and systems, whilst strategic knowledge management is a process that is linked with business strategy and organisational design. Schulz (2001) found that routine or operational knowledge was mainly shared horizontally, compared to non-procedural or uncertain knowledge that was mainly shared vertically.

Different types of knowledge have also been found to align with hierarchical positions within an organisation – senior, middle and lower management. The

findings of Paiva (2003) supported by the works of others (see Leonard, 1994), show that strategic knowledge aligns with business strategies and strategic decision-making, and can create or strengthen future capabilities of the firm. Further detail on the relationship between strategic knowledge and organisational capabilities can be found in the works of Grant (1996) and Zack (1999). Within middle management, knowledge can be considered to be tactical and assist with the integration of strategic decisions from senior management. The final hierarchical level is lower level management and this involves operational knowledge which is "focused on problem-solving issues" (Paiva, 2003, p.48) and relates to procedural daily activities.

Notwithstanding the type of knowledge, it has been suggested that if an individual fails to recognise the value of their knowledge to others, they may not openly volunteer or share that knowledge (Gupta & Govindarajan, 2000; O'Dell & Grayson, 1998). Furthermore, if they do realise the value of their knowledge, this has been found to influence their intention to share the knowledge (Ford & Staples, 2006).

The 'Opportunity to Share' component of Ipe's (2003) conceptual framework allows for both formal and informal sharing of knowledge. Formal channels include the use of information technology systems such as data warehouses, intranets, group-based systems and email. While the use of technology is generally considered only beneficial to the sharing of explicit knowledge (Nonaka & Takeuchi, 1995), research has found that technology does assist in overall knowledge sharing (Kock & McQueen, 1988). Chua (2001) reported that when knowledge was highly explicit, communication channels such as computer technologies that are low in media richness are sufficient for knowledge sharing. However, when knowledge was low in explicitness (more tacit), rich media channels are required.

Organisational reporting is another formal channel that provides an opportunity to share knowledge. Davenport (1997) however, considers organisational reporting merely information exchange, a process that is different from knowledge sharing. This is not the view held by this author who considers that organisational reporting is an avenue for individuals to share their knowledge, particularly when reporting is a direct response to the formal asking of questions. According to Cooper (2003)

"questions are an intrinsic part of exchanges between sources and recipients" (p.1), as they can act as an initiator to share and provide the source with an opportunity to articulate their knowledge. Okhuysen and Eisenhardt (2002) found that the formal intervention of asking members of a group to question each other on their knowledge resulted in superior group knowledge generation than if members were just asked to share their knowledge. However, the assumptions that underpin the question often need to be explored before the question can be addressed[4] (Dixon, 2002). Furthermore, "an important issue behind articulating knowledge is to determine what questions are relevant to ask in order to mine the non-articulated knowledge" (Lind & Seigerroth, 2003, p.122).

Informal learning channels that offer an opportunity for individuals to share their knowledge include ad-hoc conversations, meetings and situations that generally arise as a form of social exchange. For example, communities of practice (Brown & Duguid, 1991) are considered to be an informal learning channel where individuals with similar interests gather to share their knowledge and learn from one another.

The final component of Ipe's (2003) conceptual framework is 'Motivation to Share'. Hislop (2003) suggests that the factors that motivate individuals to share their knowledge include the organisational culture, perception by the source that sharing their knowledge will not undermine their status and expertise, and the linkage between motivation to share and rewards for sharing. Ipe (2003) categorises the factors, separating them into internal and external. Internal factors include the perceived power associated with hoarding knowledge and reciprocity. As discussed previously, an individual who shares knowledge gives up the power of uniquely owning that knowledge. If an individual believes that they will retain greater power by hoarding the knowledge, it is less likely that they will be motivated to share it (Davenport & Prusak, 1998). Reciprocity implies a two way mutual benefit for sharing knowledge and Schulz (2001) found that receiving knowledge from others influenced the reciprocal flow of knowledge from the source in both horizontal and

[4] Questioning is discussed in greater detail in section 2.4 of the Literature Review.

vertical directions. However, the negative aspect of reciprocity is fear of exploitation (Ipe, 2003).

External motivational factors include the relationship between the source and the recipient and compensation for sharing. Implicit in the relationship between the individual sharing and the individual receiving the knowledge is trust as discussed earlier. Research on incentives as a motivational factor report conflicting findings. Gupta and Govindarajan (2000) found incentives to be closely related to an individual's knowledge sharing behaviour and rewards have been considered important for knowledge sharing behaviours with some technologies (e.g. intranets, see Hall, 2001). However, Bock and Kim (2002) found expected rewards such as monetary or promotion did not influence a recipient's attitude towards sharing and according to O'Dell and Grayson (1998), incentives may not sustain long-term knowledge sharing behaviours.

An individual's attitude and intention towards sharing knowledge has also been studied by researchers, with a number of studies testing the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB). The TRA developed by Fishbein and Ajzen (1975) and later modified by Ajzen (1991) to include planned behaviour, purports that an individual's attitude towards a behaviour is a precursor to their intention towards performing the behaviour and intention is an antecedent of the actual behavioural act. The TPB contends that perceived behavioural control together with attitude, are indicators of behavioural intention.

Bock and Kim (2002) tested the TRA to determine whether or not an individual's attitude towards knowledge sharing in Korean firms would predict their intention to share knowledge and subsequently result in the act of knowledge sharing. Their results support the TRA as did those of Ryu et al. (2003), who tested physicians knowledge sharing behaviours in Korean hospitals using the TRA and the TPB. However, Ryu et al. (2003) reported the TPB to better explain knowledge sharing behaviours and that subjective norms were the most influential factor on behavioural intention. Li and Lee (2004) also tested the TPB on perceptions of senior managers towards knowledge sharing behaviours and found, as in earlier studies, that attitudes,

subjective norms and perceived behavioural control all influence intention to share knowledge. However, Kolekofski and Heminger (2003) found that the attitudes affecting intentions to share information in an organisation were actually more complicated than those represented in the TRA.

Although the internal and external factors influencing the source individual's motivation to share their knowledge are generally well developed in the literature, those influencing the recipient receiving the knowledge are not. Further, some consider that the role of the receiver of knowledge has been neglected in the pursuit of understanding knowledge sharing (Dixon, 2002). The next section discusses factors that influence the recipient and knowledge receiving.

2.3.3 Knowledge Sharing & the Recipient

It has been suggested that to create a successful knowledge sharing organisation the individual who receives the knowledge, or the recipient and their requirements must first be understood (Dixon, 2002), because the recipient is the key actor in knowledge sharing (Davy, 2006). They alone determine whether or not knowledge sharing/transfer has been successful. While research into factors influencing the recipient individual continues to expand, it has for the most part been focused on knowledge seeking behaviours (the recipient *actively* seeks knowledge) rather than the situation where the recipient is presented with knowledge that has already been shared (the recipient *passively* receives knowledge). Many of the factors that influence knowledge sharing are relevant to both the active seeking and the passive receiving of knowledge and fall within the components of the conceptual framework posed by Ipe (2003) (i.e. organisational culture[5], nature of the knowledge, opportunity to receive knowledge and motivation to internalise the shared knowledge).

The 'Nature of Knowledge', that is the type of knowledge – tacit or explicit – influences how well a source can articulate and share their knowledge, i.e. stickiness of knowledge (von Hippel, 1994). Further, the extent to which the source is able to

[5] Organisational culture is not examined further in this section as it has already been a subject of discussion.

articulate their knowledge influences the recipient's ability to receive the knowledge. Explicit knowledge may be more straightforward to receive, since it is easier to articulate and may not lose as much context when shared compared to tacit knowledge. Tacitness of knowledge has been directly related to knowledge ambiguity (Reed & DeFillippi, 1990) and Simonin (1999) found tacitness of knowledge to be one component of knowledge ambiguity, which together with other components influenced the extent to which knowledge was transferred. Bresman et al. (1999) in their study into knowledge transfer in international acquisitions, found that recipients considered patents easier to receive than technical know-how, which by definition is more tacit in nature.

Mort (2001) contends that there is a requirement for knowledge to be reliably articulated and shared in an organisation for decision-making. Implicit in this process are the notions that the "sender is endowed with a piece of knowledge in which a receiver is interested" and "the receiver hopes to derive benefits, or in other words, value from utilizing the knowledge" (Lin *et al.*, 2005, p.199). The recipient senses value in the source sharing their knowledge (Gupta & Govindarajan, 2000). However, Menon and Pfeffer (2003) contend that sharing and transfer of knowledge are not the same as valuing it. The two may not be perfectly correlated as knowledge may be shared, but it may have no value to the recipient.

This is because the valuation of new knowledge is subjective to the recipient's perception of the significance they believe the knowledge could add to their current knowledge domain. Although it could be considered obvious, Augier et al. (2001) suggest that the more relevant the knowledge is to the requirements of the recipient, the more valuable the recipient will perceive it. Further, the greater the relevance of the shared knowledge to a recipient's decision-making requirements, the more likely it is that they will use the knowledge (Schulz, 2003). Perceived value has also been suggested to be influenced by the recipient's comprehension and understanding of the relevance of the knowledge to their task responsibilities (Connell *et al.*, 2003). For example, an individual may highly value new knowledge that enhances their knowledge domain and in turn assists with relevant business decisions. However, in contrast, they may place low value on knowledge that is not pertinent to their job

responsibility, individual interest, or self-interest even though this knowledge may be highly valued by colleagues. It is difficult therefore, if not impossible, to ascribe an absolute value to shared knowledge, as unlike information which does not change when it is consumed knowledge generation requires cognitive processing and is influenced by the prior knowledge of the receiver.

Richness of communication channels are said to influence a recipient's 'Opportunity to Receive' knowledge (Gupta & Govindarajan, 2000). As discussed earlier, formal channels like information technology may assist when receiving knowledge, in that recipients can seek out knowledge from systems e.g. knowledge repositories, intranet, or may equally receive new knowledge from systems e.g. emails. Sussman and Siegal (2003) found that the greater the perceived usefulness of the information contained in emails received by recipients, the higher the reported levels of information adoption. It has also been suggested that if the principal requirement of the recipient is to re-use existing knowledge, then knowledge sharing through documents is superior than face-to-face communication as it reduces the time involved (Hansen *et al.*, 1999). Gray and Meister's (2006) findings support this. They found that different knowledge sourcing methods produce different performance outcomes; published knowledge sourcing (printed publications, training manuals, knowledge repositories and the intranet) primarily promoted replication of knowledge, while dyadic knowledge sourcing (which includes reciprocity between the source and recipient) enhanced adaptation of the recipient's knowledge base. In terms of knowledge seeking, Taylor (2004) found that the cognitive style of the recipient influenced the extent of and type of information technology systems used to seek out knowledge. Less formal learning channels such as communities of practice (Brown & Duguid, 1991) also allow recipients to learn and process the shared knowledge of others that have similar interests.

'Motivation to Receive' shared knowledge is another issue that may influence the recipient. When a recipient receives knowledge, there is a requirement for them to process the knowledge (El Sawy *et al.*, 1997). This process can be regarded as internalising the knowledge (Cummings & Teng, 2003) or cognitively processing and retaining the shared knowledge. Cummings and Teng (2003) define successful

internalisation as "the degree to which a recipient obtains ownership of, commitment to, and satisfaction with the transferred knowledge" (p.42). Internalisation of knowledge is implicit to learning, as an individual learns through their internalisation of shared knowledge (Nonaka & Takeuchi, 1995) and the ability to learn is related to what an individual already knows (Bower & Hilgard, 1981). The more knowledge an individual possesses in a field the easier it is for them to assimilate new knowledge. Further, a recipient's prior knowledge is closely related to their absorptive capacity or ability to "recognise the value of new external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p.128). However, absorptive capacity alone does not necessarily equate to a recipient's preparedness to accept shared knowledge. Minbaeva et al. (2003) found that the recipients of shared knowledge required both the ability and the motivation to accept shared knowledge and Sussman and Siegal (2003) reported that prior knowledge of the recipient influenced perceived usefulness of the shared information. The not-invented-here syndrome may also affect a recipient's willingness to accept knowledge (Katz & Allen, 1982). Some have suggested that an individual's learning will be more productive when knowledge sharing and assimilation matches their cognitive style (Hayes & Allinson, 1998) and cognitive style has been found to influence information seeking behaviours of recipients (Ford et al., 2002; Taylor, 2004).

Cognitive style describes how individuals receive information and the mechanisms they use to process information. In general cognitive style can be defined as:

> "a person's preferred way of gathering, processing, and evaluating information. It influences how people scan their environment for information, how they organize and interpret this information, and how they integrate their interpretations into the mental model and subjective theories that guide their actions" (Hayes & Allinson, 1998, p.850).

An individual's cognitive style is often metaphorically classified as left-brain/right-brain (Leonard & Strauss, 1997) or analytical/intuitive (Schweiger, 1983). Left-brain or analytical individuals are generally characterised by their logical reasoning and focus on detail, whilst right-brain or intuitive individuals are more likely to base

decisions on feelings, not necessarily requiring the same amount of hard information as their analytical counterparts (Allinson & Hayes, 1996).

While the terms cognitive style and learning style are often used interchangeably, cognitive style describes an individual's mode of thinking and problem solving, whilst learning style can be considered the application of an individual's cognitive style within a situation (Ridings & Cheema, 1991). A number of cognitive style and learning models, together with their respective measurement instruments, have been proposed (see Cassidy, 2004; Coffield *et al.*, 2004a, 2004b; Ridings & Cheema, 1991). Generally they can be distinguished by their approach and are categorised as the cognition-centred approach, the personality-centred approach and the activity-centred approach (van den Broeck *et al.*, 2003). The cognition-centred approach focuses on the relationship between cognition and style and includes models such as the Cognitive Style Index (Allinson & Hayes, 1996) and Riding's Cognitive Style Analysis (Ridings & Rayner, 1998). The personality-centred approach focuses on an individual's personality style(s) in relation to cognition and includes the well documented Myers-Briggs Type Indicator (Myers & McCaulley, 1985). The final approach, activity-centred, focuses on learning and teaching styles, is grounded in educational theory and includes the Learning Style Inventory (Kolb, 1999).

Understanding the influence of an individual's cognitive style is important in knowledge management, as it may assist with explaining why or why not some individuals are more adept at using certain knowledge management systems. For example, Taylor (2004) reported that individuals with a more analytical disposition tended to search and seek out work related knowledge using knowledge management systems more than intuitive individuals. He also found that gender influenced knowledge management system usage and that males utilised such systems more than their female counterparts. Further, Barkhi (2002) found that an individual's cognitive style interacted with the communication modes (face-to-face versus screen-to-face) they used when engaged in negotiation with other parties.

External factors may also motivate the recipient to accept shared knowledge. The relationship the recipient has with the source is fundamental since factors such as

trust (Huemer et al., 1998) and reputation (Szulanski, 2000) may influence a recipient's motivation to internalise shared knowledge. A recipient's intention to seek out knowledge is positively related to the extent to which they favourably evaluate the knowledge and skills of the source individual, in respect of the knowledge relevant to their own work (Borgatti & Cross, 2003). Menon and Pfeffer (2003) suggest that senior managers may accord external sources a higher status than internal sources and therefore seek knowledge from outside their organisation. A recipient's knowledge seeking behaviour however, essentially involves some form of questioning, either of oneself when ascertaining what knowledge is required or of others when asking them to share their knowledge. The next section examines how questions and their structure may assist in the process of knowledge sharing.

2.4 Questioning

Academic interest into questioning and the influence of question structure can be traced back to the 1930's and the establishment of organisations like Gallup Poll in 1935, National Opinion Research Centre in 1941, Institute for Social Research in 1946 and Harris Survey in the mid-nineteen fifties. The mission of these institutions was to use survey or polling methods to elicit the opinions of the American public on a national scale[6]. While research on questioning was at this time for the most part theoretical, a number of small experimental studies into questioning began to evolve (Cantrill, 1944; Payne, 1951) and two schools of practice or thought emerged - closed and open questioning. The debate over the best question structure began (Converse, 1984; Lazarsfeld, 1944).

2.4.1 Open-ended versus Closed Questions

Researchers agree that "differing ways of asking question(s) may produce quite different answers" (Sudman & Bradburn, 1982, p.18). Schuman and Presser (1979) found that open-ended and closed structures of the same question elicited two quite different responses, with answers to closed questions being influenced by the choices

[6] See Converse and Schuman (1984) for a history of the questioning methods used by these organisations.

presented, whilst responses to open versions of the same question differed between respondents. The claims and assumptions that underpin open-ended and closed structured questions are described in detail by Foddy (1993) and are outlined in Table 2-3.

Table 2-3 Assumptions Regarding Open and Closed Questions

Open Questions	Closed Questions
Allow respondents to express themselves in their own words.	Allow respondents to answer the same question so that answers can be meaningfully compared.
Do not suggest answers.	Presents a recognition, as opposed to a recall task to respondents and for this reason respondents find them much easier to answer.
Avoid format effects.	Produce less variable answers.
Allow complex motivational influences and frames of reference to be identified.	Produce answers that are much easier to computerise and analyse.
Are a necessary prerequisite for the proper development of sets of response options for closed questions.	
Aid in the interpretations of deviant responses to closed questions.	

Source: Foddy, W. (1993). *Constructing questions for interviews and questionnaires: Theory and practice in social research*, Cambridge University Press, p128.

The proponents of open-ended questions claim that questions structured in this way do not provide the respondent with suggestive answers and therefore allow for the discovery of spontaneous responses (Schuman & Presser, 1979). According to Lenhert and Stucky (1988) it is important for the questioner to understand that "when we ask questions, we are seeking certain types of information … in the case of [open] questions, we are looking for new information that we do not know" (p.222). The open-ended question allows for an uninfluenced response and therefore can be used to solicit suggestions, explore knowledge and memory, and evaluate and classify arguments (Payne, 1951). This structure of question also removes the bias that may result from the predetermined category responses of closed questions (Schuman & Presser, 1979), since "closed questions are hypothesized to be more susceptible to

social desirability – respondents may be reluctant to choose one of the extreme response categories" (Ivis *et al.*, 1997, p.622).

The assumption implicit in open-ended questions is that the respondent has a level of knowledge of the question topic and can therefore accurately respond. Foddy (1993) suggested that the response provided to open-ended questions indicates the respondent's level of knowledge, because implicit in the response is the assumption that:

- if the respondent knows the answer to an open-ended question they will answer;
- if the respondent does not know the answer to an open-ended question they will not try to answer the question;
- if the respondent does not know the answer to a closed question they will respond anyway.

However, Campbell (1945) notes that the answer to a question may not be what the researcher intends, as it is "possible to view a question through more than one frame of reference" (p.342). Different respondents may answer with different degrees of inclusiveness because different individuals may have varying salience and strength of feelings towards the question topic (Foddy, 1993). Moreover, Geer (1988) found that rather than being unable to answer an open-ended question, those that did not respond appeared to be uninterested in the question and topic.

The proponents of open-ended questions also claim that they avoid formal affects that are implicit in closed questions (Foddy, 1993). For instance, Bishop et al. (2001), using self-administered questionnaires and telephone surveys, found that respondents were more likely to select a middle response alternative or a 'No Opinion' alternative, if offered to them. In contrast, Schuman and Presser (1981) found that introducing a middle category had limited effect on the substantive conclusions made, although they did contend that when a 'No Opinion' is offered in a survey it is more likely to be used. Bishop et al. (2001) also found that most responses to closed question were reported within the first five categories, suggesting that when a large number of categories is used, this may result in response bias.

Foddy (1993) maintains that open-ended questions allow for more complex factors to influence and guide the response. Each respondent can have their own frame of reference and this influences how they respond (Campbell, 1945). However, Foddy (1993) also notes that the freedom associated with an open response can lead to ambiguity rather than clarity and therefore question wording requires thoughtful formulation.

Generally, researchers agree with Foddy's (1993) view that open-ended questions are a good prerequisite for ensuring solid closed question development. Some suggest that when the question designer does not know enough to write appropriate response categories for a closed question, open questions should be used (Converse & Presser, 1986). Lazarsfeld (1944) in his early work suggests that open-ended questions should be used initially so as to develop the appropriate closed question response categories. Payne (1965) contends that by using open-ended questions to gather data on the appropriate response categories, the questioner can eliminate the need to ask 'why' questions in the future. This does not mean that open-ended questions should only be used for the development of appropriate closed question categories, or when closed categories cannot be developed, as open-ended questions and 'why' questions can aid with the interpretation of responses to deviant closed questions (Foddy, 1993).

The proponents of closed questions claim that the responses from questions structured in this way can be meaningfully compared because the answer categories are pre-determined. All respondents are communicated the same reference (Converse & Presser, 1986). However, closed questions inherently assume that the question developer knows the dimensions of thought they want the respondent to use in answering the question (Dillman, 1978). In addition, often the range of response alternatives assists the respondent to understand the positioning of the questions and the assumptions of the questioner/researcher (Schwarz *et al.*, 1988). However, care is required when developing the response categories to ensure that the options are suitable (see Cantrill & Fried, 1944, for a discussion), complete and ordered appropriately (Dillman, 1978). As was mentioned earlier, the use of open-

ended questions in pilot studies can assist with the development of meaningful response categories for closed questions (Lazarsfeld, 1944).

The assumption implicit in closed questions is that respondents find them easier to answer (Dohrenwend, 1965; Foddy, 1993; Ivis et al., 1997). Dohrenwend (1965) found that the number of usable open-ended responses to questions declined during interviews compared to closed question responses which remained constant. It has been suggested that closed questions are easier to answer in surveys that inquire about sensitive issues (e.g. heavy drinking), since the respondent has some degree of anonymity and is also not pressured into producing an exact detailed response that may be perceived as unfavourable (Ivis et al., 1997). Others suggest closed questions are easier to answer as they only ask the respondent to recognise and select an appropriate response category, rather than having to fully recall from their own knowledge base (Foddy, 1993).

One specific type of closed question is the binary, two-way or dichotomous question that has only two possible response alternatives, e.g. 'Yes' or 'No'. An advantage of this type of closed question is that the response options are reduced to their simplest terms and are close to decisions that individuals are accustomed to making (Payne, 1951). Shafir (1993) suggests that the tone or wording of the question will influence the selected binary response that an individual will make, since "people base their decisions on reasons for and against the options under consideration, [and] they are likely to focus on reasons for choosing an option when asked to choose and they are likely to focus on reasons for rejecting an option when asked to reject" (p.548). Interestingly, Converse and Schuman (1984) report that closed questions were the dominant question structure used by the main polling firms in the 1970's and the two-way question (binary) was often used. This was to a certain extent due to the types of surveys being administered at the time, which were focused on why respondents held the attitudes they did towards certain issues. Closed structured questions made it easier to analyse and explore these attitudes with the large sample sizes used.

The proponents for closed questions also claim that there will be less variability in the responses, because respondents are constrained by the categories provided. Closed question responses are, therefore, easier to code and analyse. However, researchers should recognise that when interpreting findings from closed questions the results could well have been different if open-ended questions had been used and that they should exercise care when generalising the findings (Foddy, 1993).

Finally, some consider that the length of the question influences the response and that longer questions provide the respondent with more time to process the question and recall past events more accurately (Sudman & Bradburn, 1982). Research also suggests that the tone and length of space left for an answer also may have an effect. Gendall et al. (1996) found that providing more space for an answer resulted in longer responses, but did not produce a greater number of ideas. Research on question tone (neutral, negative or positive) suggests that the tone of the question has an influence on the length of the responses and the number of ideas generated (Brennan, 1997). Longer responses and subsequently a greater number of ideas can be generated if different question tones are used in separate questions rather than one long question (Brennan & Holdershaw, 1999).

In general the empirical evidence suggests that open-ended questions do not possess the advantage of response depth over closed questions (Dohrenwend, 1965) and are therefore, neither inferior nor superior to closed questions (Schuman & Presser, 1981). Both question structures have a place and their use depends on the purpose of the question and also the objective of the survey or questionnaire. Interestingly though, there is limited examination in the literature of the open versus closed question debate and subsequently the best question structure when the recipient of the question responses is not the question designer. Because the above mentioned studies into questioning are fundamentally grounded in the survey and polling field where the recipient of the responses is also the designer of the questions e.g. a researcher, they may not be relevant to all questioning situations used to initiate knowledge sharing. For instance, although in face-to-face knowledge sharing the individual asking the question may also be the recipient, with documented knowledge

sharing the individual who designed the question may not be the same individual who is the recipient of the response.

2.4.2 Questioning and Knowledge Sharing

Questioning is considered to be fundamental to knowledge sharing because "asking questions is the key to revealing and sharing new knowledge" (Lloyd, 2002, p.11). Although questioning is by far not the only mechanism for knowledge to be shared (often knowledge is shared without the recipient having any questions in mind, for instance, knowledge may be embedded in organisational processes and structure), some consider that questions are an intrinsic part of knowledge sharing between a source and recipient, and can serve as a representation of knowledge transfer (Cooper, 2003). Others suggest that the challenge facing those individuals that are making decisions in an organisation is that they are not asking the right questions of the right individuals (Dixon, 2004), or moreover, they may not know the right questions to ask (Meso *et al.*, 2002). Of considerable interest however, is the finding that proactive questioning is more productive in the generation of new knowledge than just passively requesting knowledge to be shared (Okhuysen & Eisenhardt, 2002).

When a recipient (the receiver of the shared knowledge) is seeking out knowledge and poses a question, this question may act as an initiator for the source individual to begin sharing their knowledge. Questions can be posed during face-to-face conversations, both formal and informal, as well as through information systems such as intranets, question and answer systems and emails etc (Barak & Rafaeli, 2004; Cooper, 2003). Although face-to-face conversations allow for the greatest level of clarity in the questioning process, as they permit reciprocity between the source and recipient (Knippen & Green, 1999), some information systems also allow for reciprocity e.g. email and question and answer systems. However, in spite of the manner in which a question is posed, as discussed earlier, there are a number of assumptions that underpin question structure (open-ended and closed questions) and they need to be considered from the perspective of the two knowledge sharing actors – the source and the recipient.

When a questioner poses an open-ended question they assume that the source has an extent and depth of knowledge about the question topic and can respond appropriately (Foddy, 1993). However, often when presented with the response from an open-ended question the recipient may not be satisfied that the response has sufficiently answered their question and provided them with the knowledge required. Knippen and Green (1999) suggest that this may occur when the question did not include a context or request for specific information. An open-ended question may provide the source with more control over their response than with a closed question. They are able to choose how they will respond by articulating and sharing (or not sharing) variable amounts of knowledge. While open-ended questions appear to allow for more scope and potential value to be extracted from the response – they do not limit the amount of knowledge that an individual may wish to share - open-ended questions have been found to not always possess an advantage of depth in response compared to questions of a closed structure (Dohrenwend, 1965).

Closed questions on the other hand, allow the questioner to control the context of the response (Knippen & Green, 1999), potentially focusing the source individual's response towards the questioner's knowledge and decision-making requirements. However, although closed question structures are considered easier to respond to (see earlier discussion), such questions implicitly assume that the questioner is already in possession of substantial information about the responding individual's knowledge (Vinten, 1995). In the context of sharing knowledge in an organisation, this implies that the recipient of the response (who may not be the question developer) is already knowledgeable on the question subject matter. For example, the response to a binary closed question with an answer format of 'Yes' or 'No' may only be intended to result in knowledge which confirms that which the recipient already knows. Further, with closed questions, there remains the issue of whether or not closed structured questions provide the respondent (source) with sufficient scope to articulate their knowledge to the extent to which they choose to share.

Dixon (2002) suggests that when knowledge sharing in an organisation is initiated in the form of a question, the knowledge sharer (source) may be inclined to offer conclusions to questions rather than the reasons and support behind the conclusions.

It is often the knowledge inherent in the reasons and support behind the conclusions that the recipient requires and questions need to be structured, therefore, in a manner that assists recipients in ascertaining the reasons, rationale, or tacitness behind the conclusions. Knippen and Green (1999) suggest that directed questions may assist the questioner to control the context of the response, as unlike open-ended questions they request "specific information for clarity about a particular part of the communication" (Knippen & Green, 1999, p.161). Directed questions may guide the source individual to respond with knowledge that is more applicable to the requirements of the recipient and therefore, the source or knowledge sharer needs to "know why the question is being asked as well as the context in which the question is embedded, in other words, the web of relationships in the mind of the person asking the question" (Dixon, 2002, p.37).

2.5 Chapter Summary

This chapter described some of the theoretical and empirical research that has been conducted in the field of knowledge management and questioning. It began by examining and defining what knowledge is, placing it in the context of organisational knowledge and the management of knowledge in organisations. The review was then narrowed to an examination of one aspect of knowledge management, knowledge sharing. The differences between knowledge sharing and knowledge transfer were analysed and described and the key empirical studies that have been undertaken in each area outlined.

The influence of organisational culture/climate on the creation of an environment conducive for sharing was described, inclusive of the key factor trust, before narrowing the review to the level of individual sources-recipients of knowledge. Factors that may inhibit or enhance the source to share their knowledge were discussed, including the nature of the knowledge, the opportunity to share and the motivation to share, followed by an analysis of the factors that may influence the recipient when receiving and internalising the shared knowledge. The latter included

the nature of the knowledge, the opportunity to receive knowledge and the motivation to receive and internalise knowledge.

On the basis that questions can be an intrinsic part of knowledge sharing (posing a question may result in an opportunity for a source individual to share their knowledge), questioning was examined and in particular the assumptions that underpin the use of open-ended and closed questions. The review of the literature was concluded with an examination of the assumptions underpinning open-ended and closed structured questions in the context of knowledge sharing and the source and recipient. The next chapter examines this in greater detail and describes the research gap that was revealed during this review of the literature before the research question and theoretical research model that form the basis of this thesis are posed.

— CHAPTER THREE —

GAP ANALYSIS & RESEARCH MODEL

3.1 Introduction

This chapter describes the research gap that emerged from the review of the literature presented in the preceding chapter. In this chapter, the emphasis is on the development of the theoretical research model, which is the foundation of this thesis[7]. It begins by summarising the key limitations that arose from the review of the literature, with specific focus on the recipients of shared knowledge and how questioning may influence them, before posing the research question, outlining the theoretical research model and describing the main variables. The variable recipient attitude is discussed with specific reference to the Theory of Reasoned Action (TRA) and its operationalisation of the attitude construct, together with other factors that may influence a recipient's attitude towards knowledge received or moderate the relationship between the main independent and dependent variables. Question response structure is discussed and the main hypotheses posed before describing the assumptions and limitations with the research model that will be tested.

3.2 Research Gap

Knowledge is considered to be the most valuable resource that an organisation owns (Grant, 1996) and must be exploited for competitive advantage. However, to be valuable knowledge must be shared, since the creation of new knowledge occurs when knowledge flows between individuals within an organisation (Nonaka & Takeuchi, 1995). While research on knowledge sharing and transfer is rapidly

[7] The author would like to acknowledge that the original research model proposed for this thesis was published by the author under the title "The impact of question structure when sharing knowledge" in the *Electronic Journal of Knowledge Management*, 2003, Volume 1, Issue 2, p.17-24. The model has been adapted since publication and only part of the model is discussed and tested within this thesis.

gaining the attention of researchers, the review of the literature revealed that the majority of the empirical research has been performed using the business unit or the organisation as the unit of analysis, with particular emphasis upon the measurement of knowledge transfer. Only recently have the complexities of micro level, individual-to-individual knowledge sharing begun to be unravelled, with theoretical and empirical research both suggesting that the issues facing the source and recipient individual are not too dissimilar and often interdependent in the knowledge sharing context (Ipe, 2003).

In summary, the literature suggests that an organisational culture supportive of sharing may reduce knowledge hoarding (Husted & Michailova, 2002) and issues related to the not-invented-here syndrome (Katz & Allen, 1982), as well as promote an environment of trust between the two sharing parties (Connelly, 2000; Levin et al., 2006; Ribière & Tuggle, 2005; Tsai & Ghoshal, 1998). The type of knowledge being shared may influence how well it can be articulated (von Hippel, 1994) and the value placed upon shared knowledge may be difficult to quantify because it is subjective to the source and recipient individuals. Power associated with uniquely owning knowledge may inhibit it from being shared (Davenport & Prusak, 1998; Husted & Michailova, 2002), especially if the source does not perceive reciprocity from the act of sharing and even if shared, the recipient may not have the absorptive capacity or cognitive style to internalise the knowledge (Cohen & Levinthal, 1990; Cummings & Teng, 2003; Hayes & Allinson, 1998; Nonaka & Takeuchi, 1995). Further, the relationship between the source and recipient also may influence knowledge sharing, as may organisational incentives (Gupta & Govindarajan, 2000). Over and above everything else, there has to be the opportunity to share and receive knowledge – both informally and formally (Ipe, 2003). Although technology may assist with knowledge sharing (for both the source and recipient) and communities of practice may provide a context for individuals with similar interests to share (Brown & Duguid, 1991), there still remains the requirement to initiate or trigger the knowledge sharing process and this is often manifested in the form of a question (Cooper, 2003).

Research suggests that questioning is possibly a better mechanism for initiating knowledge sharing, rather than just expecting people to share their knowledge (Okhuysen & Eisenhardt, 2002). Some also suggest that questioning can serve as a representation for knowledge transfer (Cooper, 2003) and in spite of the perceived importance of questioning there is still limited research on how to ask the right types of questions to elicit knowledge (Meso et al., 2002). Further, there are assumptions that underpin the structure of a question (see Foddy, 1993, for a review) and in the context of knowledge sharing these assumptions must be viewed from the perspective of the source and the recipient. Open-ended questions implicitly have a different assumption of presupposed knowledge to those that are closed or binary. For instance, open-ended questions assume that the respondent has a depth of knowledge about the question topic and can respond appropriately (Foddy, 1993), whilst closed questions assume that the recipient of the response has possession of substantial information about the responding individual's knowledge (Vinten, 1995). The next section describes the research question and outlines the research model designed to examine question response structure from the perspective of the recipient of shared knowledge.

3.3 Research Question & Research Model

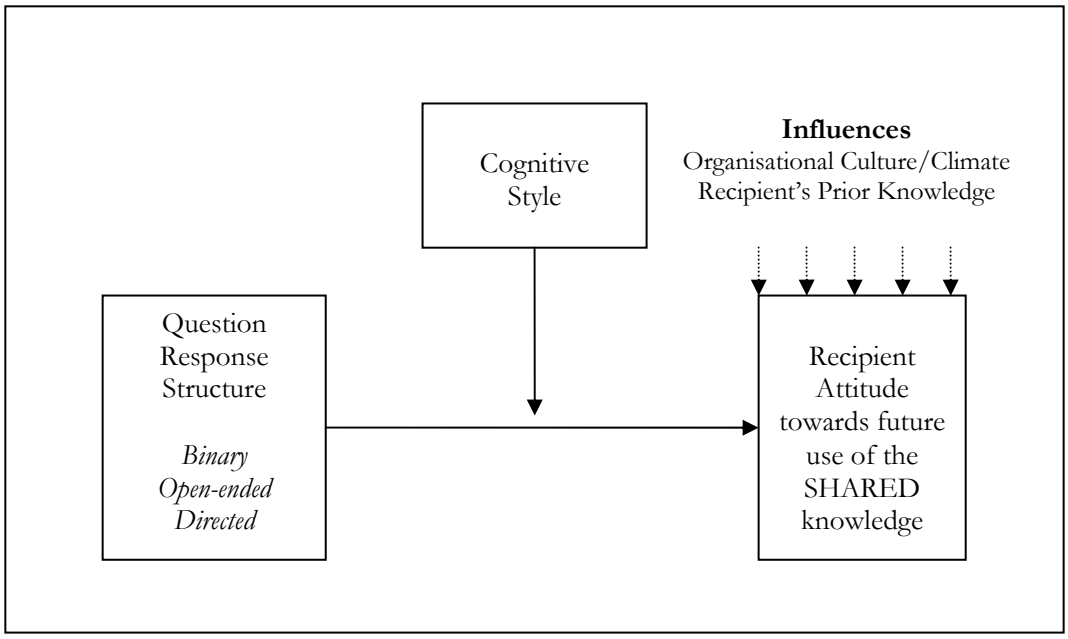
While a number of studies on knowledge sharing have investigated factors that affect the source individual sharing their knowledge, the literature suggests that few have attempted to examine the factors that influence the recipient (Dixon, 2002). Those that have are focused mainly on recipient knowledge seeking behaviours rather than the passive receiving of knowledge (Barkhi, 2002; Ford et al., 2002; Taylor, 2004). The suggestion in the literature is that questioning provides an opportunity for a source individual to share their knowledge and is therefore intrinsic to knowledge sharing (Cooper, 2003). Active questioning of individuals has been found to generate more new knowledge than just passive volunteering of knowledge (Okhuysen & Eisenhardt, 2002). However, questions have implicit assumptions that underlie their structure, i.e. open-ended or closed (Foddy, 1993) and this may influence the type of response a source individual can provide and subsequently the

attitude of a recipient towards the knowledge they receive. To examine these ideas further, the following research question is posed:

> Does the structure of a question to which the source of the knowledge responds influence the recipient's attitude towards the knowledge they receive?

The relationship between question structure or more specifically question response structure and recipient attitude is depicted in Figure 3-1. This model is predicated upon the existence of a relationship between the articulation of a source individual's knowledge in response to a question and the attitude a recipient has towards the knowledge they receive from the response. The main independent variable is question response structure. This is the response provided by a source individual when presented with a question and asked to share their knowledge. Three question response structures are posed - binary, open-ended and directed, described in greater detail in the forthcoming Section 3.3.2. The dependent variable in the model is the recipient's attitude towards future use of the shared knowledge. The research model also maintains that a recipient's cognitive style will moderate the relationship between question response structure and attitude. Finally, the model suggests that organisational culture/climate and a recipient's prior knowledge will influence their attitude. The dependent variable recipient attitude towards future use of the knowledge, together with its potential influencing factors and the moderator cognitive style is described in the next section, followed by a discussion of the independent variable question response structure, the purported hypotheses and the assumptions and limitations of the research model.

Figure 3-1 Research Model



3.3.1 Recipient Attitude

The dependent variable in the proposed theoretical research model is the recipient's attitude towards future use of the shared knowledge. An individual's attitude can be defined as an "enduring disposition to consistently respond in a given manner to various aspects of the world; composed of affective, cognitive and behavioural components" (Zikmund, 1994, p.298). The affective component reflects an individual's feelings or emotions towards an object, the cognitive component their awareness about an object and the behavioural component their intention and predisposition to action or act on their attitude[8] (Zikmund, 2003).

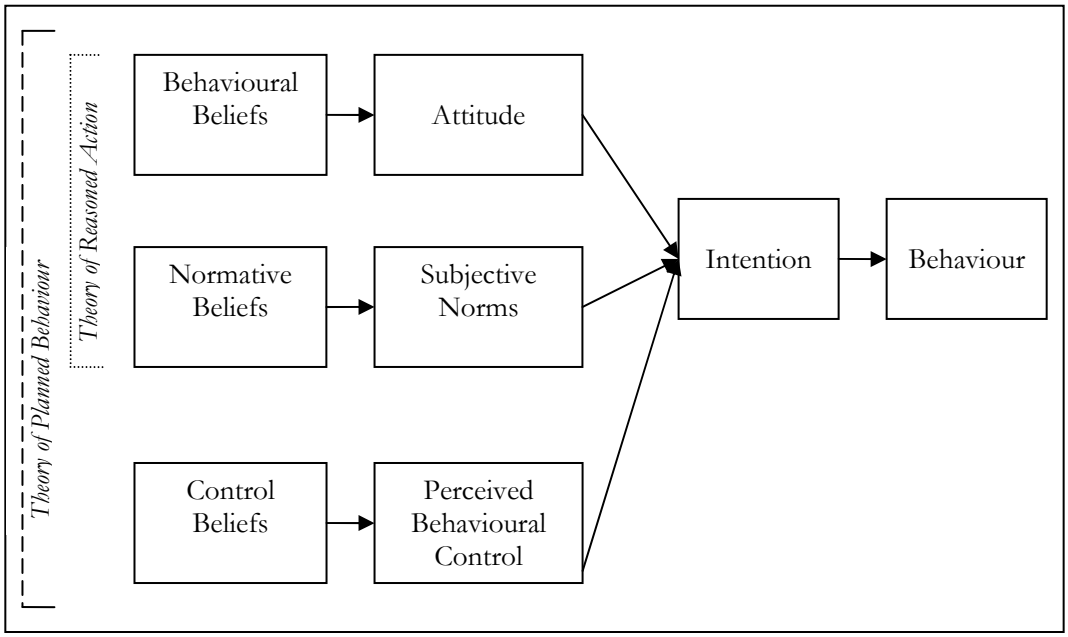
Although research into a source individual's attitude towards sharing knowledge has been examined in the literature (see Bock & Kim, 2002; Lin & Lee, 2004; Ryu et al., 2003) in conjunction with the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (Ajzen, 1991), the attitude of a recipient toward receiving knowledge has not been investigated. The two theories, however,

[8] An individual's attitude towards an object can be difficult to measure as attitude is a hypothetical construct and cannot be directly observed, it requires indirect measurement through appraising behaviour or expression (Zikmund, 2003).

can equally be applied to the recipient and may assist when measuring a recipient's attitude towards receiving knowledge or their intention to use and apply the shared knowledge.

The Theory of Reasoned Action (TRA) states that an individual's actual performance of a behavioural act can be predicted by their intention to perform that behaviour and their attitude towards performing the behaviour is a predecessor of intention. Therefore, the more favourable their attitude towards performing the behaviour, the more likely it is that they intend to perform the behaviour and subsequently actually perform the behaviour. The intention-behaviour link is strongly supported in the literature by a meta-analysis review (see Sheppard *et al.*, 1988). The TRA posits that intentions mediate the effect of two independent variables on behaviour - attitude and subjective norms. Attitude reflects an individual's disposition towards performing a behavioural act and manifests in their beliefs about the behaviour. Subjective norms on the other hand are normative based and represent an individual's perception of what others consider they should do and subsequently their motivation to comply with these. Although the TRA has been rigorously tested, it has also been criticized for not having predictive power when the behavioural act is not under the individual's volitional control (Sheppard et al., 1988), e.g. the individual is forced to perform the behaviour. In recognition of this limitation Ajzen (1991) modified the theory to include perceived behavioural control and the beliefs behind them (called the Theory of Planned Behaviour (TPB)). According to the TPB, perceived behavioural control influences an individual's intention to perform the behaviour. The TRA and TPB are depicted in Figure 3-2.

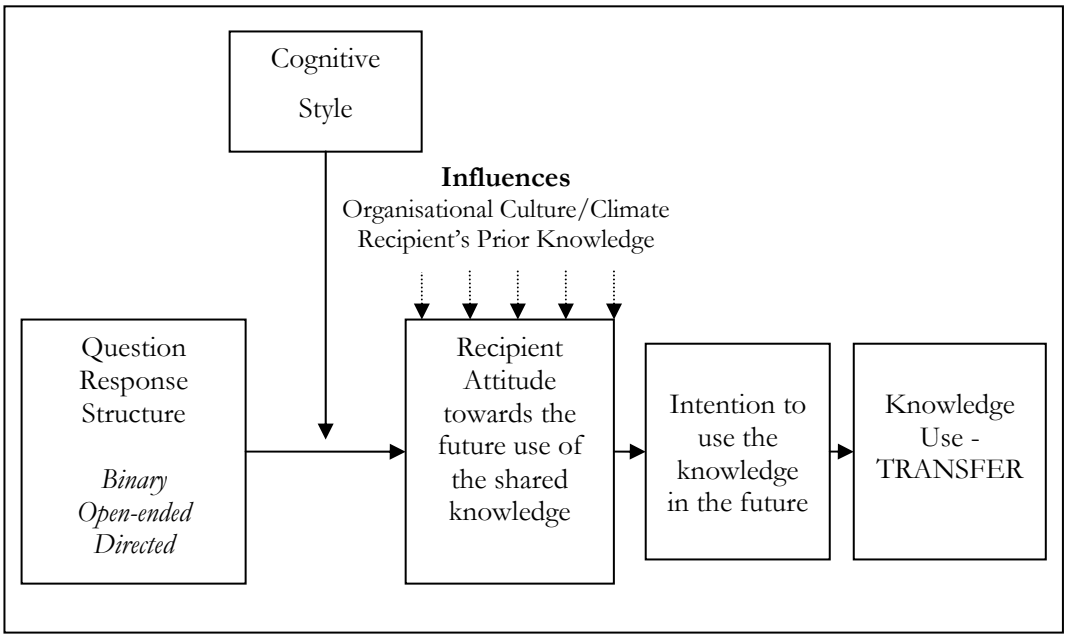
Figure 3-2 TRA and TPB



As mentioned earlier the TRA and TPB have been tested and explored within the knowledge sharing literature (see Bock & Kim, 2002; Lin & Lee, 2004; Ryu et al., 2003), although the focus in these studies was on the source sharing their knowledge, rather than the recipient receiving and applying knowledge. However, when the theories are applied to the recipient individual, they allow for the distinction to be made between the sharing of knowledge and the transfer of knowledge. For instance, an individual who has received shared knowledge (the recipient) can have an attitude towards this knowledge and their attitude may influence their intention to use the knowledge in the future. Once they use the shared knowledge through the behavioural act of applying the knowledge, by definition the knowledge has been transferred (Argote & Ingram, 2000; Darr & Kurtzberg, 2000). Figure 3-3 illustrates the difference between shared knowledge and transferred knowledge by relating the TRA[9] with the posed theoretical relationship between question response structure and recipient attitude.

[9] The TRA rather than the TPB was applied in this study for the following reasons. First, there was no requirement to measure perceived behavioural control given the design of the study. Second, the full theory was not tested as the research model (Figure 3-1 and Figure 3-3) was only examining shared knowledge not transferred knowledge. Third, the operationalised measures that would be used in this study - attitude and intention - were identical in the two theories (TRA and TPB).

Figure 3-3 Research Model Including TRA



It is not the intention of this thesis to fully test the research model depicted in Figure 3-3. The behavioural act of using the knowledge (e.g. transfer – the far right hand variable) will not be examined. However, the research model does illustrate the difference between sharing and transfer and provides a method for measuring the two; sharing can be measured by attitude and transfer can be measured by the behavioural act of applying the shared knowledge. In respect of the variable recipient's intention to use the knowledge in the future, this construct fully mediates the relationship between attitude toward future use of the knowledge and the act of apply or using the knowledge. Intention occurs after knowledge has been shared but occurs before knowledge is transferred. While a recipient's intention to use the knowledge is not a fundamental variable in this study and does not form part of the research question, it is partially examined in an endeavour to ascertain whether or not attitude is a good predictor of intention (see Chapter 7, Study Three).

According to the TRA an individual's perception of the organisational culture/climate is a subjective norm as it shapes the assumptions underlying knowledge sharing, inclusive of the expectations of individuals to share their knowledge and or to accept the shared knowledge of others; it should influence an

individual's intention. However, the research model depicted in Figure 3-3 suggests that organisational culture/climate influences attitude. It was not the purpose of this study to test the TRA and since organisational culture/climate is considered to be a key influential variable in the literature[10] it was included as a factor that may influence the main dependent variable under investigation - recipient attitude.

Another factor suggested by the literature to influence recipient attitude and included in the research model is a recipient's prior knowledge[11]. As with organisational culture/climate this factor is not fundamental to the purported relationship between question response structure and recipient attitude towards shared knowledge. However, it may distort a true representation between the main constructs in certain circumstances and therefore, requires consideration. For example, depending on the context of the shared knowledge, a recipient's prior knowledge may influence their attitude towards future use of the shared knowledge, in that the shared knowledge may or may not add to their current knowledge base. Details on prior knowledge and organisational culture/climate can be found in Chapter 7, Study Three.

The final relationship purported in the research model is that of the moderating influence of a recipient's cognitive style on the relationship between question response structure and recipient attitude. Cognitive style has been found to influence the manner in which recipients actively seek out knowledge (Taylor, 2004) and may also influence their attitude towards passively receiving knowledge. Research contends that analytical individuals prefer more 'hard' information than their intuitive counterparts (Allinson & Hayes, 1996). Binary question responses by definition do not contain as much 'hard' information as open-ended or directed question responses and therefore it is plausible that a recipient's attitude will differ to responses of this structure dependent on their cognitive style. Details on cognitive style can be found in Chapter 6, Study Two.

The next section describes the independent variable question response structure and outlines the main hypotheses.

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[10] The literature did not suggest any moderating influence of organisational culture/climate.
[11] The literature did not suggest any moderating influence of a recipient's prior knowledge.

3.3.2 Question Response Structure & Hypotheses

The construct question response structure is the response that a source individual provides to a question of a given structure. For example, if the source individual is presented with a closed question, they can only respond by selecting one of the categories provided and therefore their response is of a closed structure. In contrast, if they are provided with an open-ended question their response has an open-ended structure. Three question response structures are posed in the research model – binary[12], open-ended and directed. The rationale underpinning each are explained next and the hypotheses posed.

The review of the literature revealed there to be two main question structure types, open-ended and closed (which includes binary questions), and that there are implicit assumptions associated with each (Foddy, 1993). Further, as discussed in the preceding chapter the implicit assumptions underling the structure of a question influences both the source and the recipient individuals. For example, when presented with questions of a closed structure, the respondent (source) can only select their answer from the options provided. If their desired response does not correspond to one of the options provided, unless a category such as 'other' is supplied and they select a response that approximates to their desired response, then issues of accuracy and validity are raised. However, if the same question allowed for an open-ended response, the respondent is not restrained by the options of a closed structured question and can articulate their desired response. This rationale is supported by Schuman and Presser (1981) who found that there was a wider spread in response (past those categories provided in closed questions) when open-ended questions were used.

Closed questions inherently assume that the recipient of the response knows the dimensions of thought they want the source to use in answering the question (Dillman, 1978); because they (the recipient) already have the prior knowledge and or the absorptive capacity (Cohen & Levinthal, 1990) to comfortably process the

[12] Binary structured questions were selected over closed since responses could be limited to 'Yes' or 'No' and unlike closed questions there was no requirement to design and test response categories.

implications of a 'Yes' or 'No' response for a binary question, or the selected category option for a multi-item closed question. This may be true in survey research where the researcher is also the individual who creates the survey and their objective is only to collect data on certain pre-defined criteria and categories, often based on extant theory and research. However, this assumption may be invalid if the questions posed are there to elicit knowledge from a source individual, knowledge which may be contextually new to the recipient. In this circumstance, it is not unreasonable to expect that the recipient has limited prior knowledge. Binary or closed question responses may not provide them with sufficient detail and or depth for them to be content with, or even able to, process the implications of the subsequent response. In this situation it is also not unreasonable to expect that a recipient may have a less favourable attitude towards binary structured responses compared to open-ended structured responses. The following hypothesis can be posed:

H_{1a}: The responses elicited from open-ended structured questions will result in the recipient having a more favourable attitude towards the knowledge received than for binary questions.

The research model also poses a third type of question response structure, that being directed. While to date, directed questions have only cursorily been discussed in the literature, they have the potential to overcome some of the limitations associated with open-ended questions. For instance, Knippen and Green (1999) contend that because open-ended questions do not involve any request for specific information (i.e. there is no direction) the respondent's reply can be unlimited and may in fact not answer the question at all. Further, it has been suggested that open-ended questions may lack a frame of reference from which the respondent views the question (Campbell, 1945), i.e. "open questions afford fewer clues as to what kind of answer the researcher expects. In other words, there are good reasons for rejecting the hypothesis that answers to an open question indicate the way in which respondents have interpreted it" (Foddy, 1993, p.133). To assist with respondent interpretation

of a question and counter possible lack of direction in their response, Knippen and Green (1999) suggest the use of directed questions which allow the questioner to have more control of the context of the response. They contend that such questions provide more clarity in communication. Consequently the following hypothesis relates open-ended and directed questions.

H_{1b}: The responses elicited from directed structured questions will result in the recipient having a more favourable attitude towards the knowledge received than for open-ended questions.

Hypothesis H_{1a} posed that open-ended question responses will result in a recipient having a more favourable attitude towards the knowledge received than binary question responses and hypothesis H_{1b} posed that directed question responses will result in the recipient having a more favourable attitude towards the knowledge received than open-ended question responses. The last hypothesis relates directed and binary question responses.

H_{1c}: The responses elicited from directed structured questions will result in the recipient having a more favourable attitude towards the knowledge received than for binary questions.

The hypotheses posed above (H_{1a}, H_{1b} and H_{1c}) accommodate all three variations of question response structure - binary, open-ended and directed. Each hypothesis purports recipients to have a more favourable attitude towards one question response structure over another. Explicitly these hypotheses contend that as question response structure increases in complexity from binary, to open-ended and then directed, a recipient's attitude towards the knowledge received from the responses will become more favourable – a positive single direction (one-tailed). Additional assumptions and limitations with the theoretical model are described next.

3.3.3 Assumptions and Limitations

The proposed research model is not without limitations. First, it does not allow for the circumstance where the source and recipient have reciprocity and can question each other to obtain clarification on the knowledge shared. The research model assumes that knowledge is shared by the source and manifests itself in the question response structure. The recipient is then provided with the question response and their attitude towards future use of the knowledge they gain from the response measured. This uni-directional knowledge sharing will be tested using documented shared knowledge only. Although face-to-face interviewing or discussions allow the recipient to question the source for further knowledge clarification, not all knowledge sharing within organisations has such reciprocity opportunity. For example, responses to formal requests for a report or compliance, self-assessment or audit questionnaires often only allow for knowledge to move in one direction, from the source to the recipient.

The research model assumes that question response structure is established by question structure; a binary structured question permits only a binary structured response, an open-ended structured question permits only an open-ended structured response and a directed structured question permits a directed structured response. Further, the research model also assumes that the recipient is not the question developer. While often it is the recipient who poses the question to the source in search for knowledge (thereby they are both the question developer and the recipient), it should be recognised that within organisations often the question developer and individual who poses the question is not the recipient. For instance, an auditor may develop and pose a question to the source individual who shares their knowledge. However, the shared knowledge contained in the response is required by an individual who is not the auditor, i.e. senior manager (recipient).

The theoretical framework also does not distinguish between tacit or explicit knowledge and recognises either, as well as a combination of both. The definition of knowledge embraced in this thesis for the purpose of studying knowledge sharing is that of Alvai and Leidner (2001), who contend that "information is converted to knowledge once it is processed in the minds of individuals and knowledge becomes

information once it is articulated" (p.109). This definition permits information to be the vehicle for transporting knowledge between a source and recipient individual within the organisation (Blumentritt & Johnston, 1999). Knowledge shared by a source individual, although transported as information, has an effect on the recipient's current knowledge state as soon as it is cognitively processed by the recipient. The coalescence of the new shared knowledge with the recipient's current knowledge can result in a transformation of their current knowledge state and a capacity to act (Choo, 1998). When the recipient processes question responses, they recreate this information with their own knowledge, values and beliefs, creating new knowledge (Davy, 2006; Wilson, 2002). The research model assumes that the recipient has an attitude towards future use of this newly created knowledge and furthermore, this attitude can be measured.

As mentioned earlier the research model is not designed to test the TRA, rather the operationalisation of the attitude construct by the TRA is the principal reason that it was used. It is also recognised that the TRA assists in representing the difference between knowledge sharing and knowledge transfer. Further, if the TRA was to be tested (it is not), organisational culture/climate is a subjective norm that influences intention rather than attitude as depicted in the research model. Finally, although the research model has support from the literature, it lays no claim to have included all possible factors that may affect the recipient's attitude towards future use of the shared knowledge. Nonetheless, the research model provides a basis for both empirical research and further theoretical analysis.

3.4 Chapter Summary

This chapter described the research question on which this thesis is based. The chapter began by summarising the main issues that arose from the literature review conducted in the preceding chapter. Next, the research question which was deduced from the literature was posed and the theoretical research model developed. The dependent variable recipient attitude was then described in detail with specific reference to the operationalised attitude construct from the Theory of Reasoned Action (TRA). The TRA was also used to explain the distinction between measuring

knowledge sharing and measuring knowledge transfer. Next, other variables that may influence a recipient's attitude towards future use of the shared knowledge were described (organisational culture/climate and prior knowledge), followed with rationale for the purported moderating influence of a recipient's cognitive style.

The chapter then described the independent variable question response structure and explained how this construct represented the shared knowledge of a source individual; their response to a question of a certain structure. The rationale for the three question response structures was described and the subsequent hypotheses posed, followed by a description of the assumptions and limitations surrounding the research model. The next chapter continues from this point and describes the research methodology that shapes how the research question and model are investigated in this thesis.

— CHAPTER FOUR —

RESEARCH METHODOLOGY

People view the world differently

4.1 Introduction

The conventional reality that 'people view the world differently' reinforces the necessity for multiple approaches to research. It underlies the importance of the researcher informing their audience of their theoretical perspectives; to provide detailed justification on why they are conducting research in the manner that they do and to mitigate misunderstanding surrounding the objectives, methodology and findings of their research. Greater knowledge and understanding of the various theoretical perspectives may also assist researchers to clarify and refine their research.

Easterby-Smith et al. (1991) contend that there are three reasons as to why it is important for the researcher to understand philosophical issues:

1. understanding the various theoretical perspectives assists the researcher in clarifying their research design;
2. it will also assist the researcher to understand designs that will and will not work; and
3. comprehension of philosophical issues will assist the researcher to create new designs that they may not have attempted before.

The objective of this chapter is to discuss the reasons for the philosophical stance taken by this author in this thesis. In the first section a description of the theoretical perspectives that underpin social science research is outlined and the theoretical position of this author established. The second section of the chapter describes the methods used to investigate the research question outlined in Chapter 3. The final section of the chapter presents rationale for a three study progressive approach that

this thesis takes to data collection. This includes the commonality and differences between the three studies and the attempt to counter the trade-off between internal and external validity issues.

4.2 Theoretical Perspectives

The objective of this section is to summate the narrative on the central debate surrounding the theoretical perspectives that should be considered when undertaking social science research, with the aim of providing insight and understanding into how the research question for this thesis has been investigated by the author. The two main philosophies guiding social science research, that being positivism and phenomenology, will be reviewed followed by the seminal work of Burrell and Morgan (1979) and their 4-paradigm approach. Next, an alternative viewpoint, the quantitative-qualitative perspective to research is discussed, concluding with a description of the theoretical stance taken by the author in this thesis.

4.2.1 Positivism - Phenomenology

In positivist research, social reality is considered to exist external to the researcher and knowledge is formed from observations of this external reality. Acknowledging that reality is external "the researcher is independent of and neither affects nor is affected by the subject of the research" (Remenyi *et al.*, 1998, p.33); the researcher does not get involved with their subjects and furthermore, their investigation of reality has no effect on reality (Hussey & Hussey, 1997).

This approach to social science research can be traced back to the influential work of Comte (1798-1857), who speculated that in sociology all phenomena was subject to natural laws and the aim was to discover these laws. But Popper (1959) contends that it was not possible to collect all evidence to prove a proposition or discover a law; however, it is possible to disprove a proposition, therefore falsifying it. Positivism is therefore, considered an approach to research where external reality is observed by a researcher, with the goal of falsifying preset propositions, generating new scientific knowledge as proposition(s) are falsified.

The central criticism to the positivist approach is that social reality cannot be studied without the intrinsic involvement of the researcher, as the researcher is part of the meaning associated with reality. Further, positivism does not accommodate the notion that the study of a person cannot be mutually exclusive of their social context.

Arising from this the phenomenological viewpoint contends that social science research is about "understanding human behaviour from the participant's own frame of reference" (Hussey & Hussey, 1997, p.52). This approach cannot consider the world external to the researcher, as without the researcher there can be no meaning; the researcher is trying to understand what is happening, but acknowledges that every event is a unique occurrence in its own right. There is, therefore, no single objective reality, rather multiple realities exist. Unlike positivism there is no concern with developing laws and rather knowledge is inherently subject to the situation being researched and the participants involved.

Easterby-Smith et al. (1991) provide a simple comparative classification of positivism and phenomenology based on the researcher's basic beliefs, what they should be looking for and the preferred research methods. This is outlined in Table 4-1. Consistent with the classifications provided in Table 4-1, the positivism approach can be considered reductionist in nature. Phenomena are reduced to simple elements that can be tested and often other interesting factors are excluded from investigation. The phenomenological approach on the other hand is considered holistic, allowing and encouraging more complex examination of phenomena (Remenyi et al., 1998). While it could be quite easy to consider positivism and phenomenology as opposing extremes, the two approaches can also be regarded as closely related. They can be viewed as "a dialectical relationship … providing a set of tools or directions which the researcher may draw on as and when appropriate" (Remenyi et al., 1998, p.37). This aside, the two approaches are often labelled paradigms.

Table 4-1 Positivist-Phenomenological Classification

	Positivist	Phenomenological
Basic beliefs	The world is external and objective	The world is socially constructed and subjective
	Observer is independent	Observer is part of what is observed
	Science is value-free	Science is driven by human interests
Researcher should	Focus on facts	Focus on meanings
	Look for causality and fundamental laws	Try to understand what is happening
	Reduce phenomena to simplest elements	Look at the totality of each situation
	Formulate hypotheses and then test them	Develop ideas through induction from data
Preferred methods include	Operationalising concepts so that they can be measured	Using multiple methods to establish different views of phenomena
	Taking large samples	Small samples investigated in depth or over time

Source: Easterby-smith, M., Thorpe, R., & Lowe, W (1991), *Management Research: An Introduction*, London, Sage, page 27.

Paradigms within the context of scientific research can be considered lenses through which researchers view the world. Although the dominant paradigms are that of the positivistic and phenomenological approaches discussed above, Burrell and Morgan (1979) suggest a more complex 4-paradigms approach to social science research.

4.2.2 The 4-Paradigms Approach

The seminal work undertaken by Burrell and Morgan (1979) describes 4-paradigms which social science researchers could use to underpin their research assumptions. Their work expands on the positivism-phenomenological debate and invites discourse into other issues that concern the nature of social research. They label two polar extremes objective-subjective and then allow the researcher to take a position along the continuum from extreme weak to extreme strong, in recognition of the "intermediate points of view [that] have emerged, each with its own distinctive configuration of assumptions about the nature of science" (Burrell & Morgan, 1979, p.8). They define four conditions – ontology, epistemology, human nature and methodology – to explain the objective and subjective dimensions of social science research.

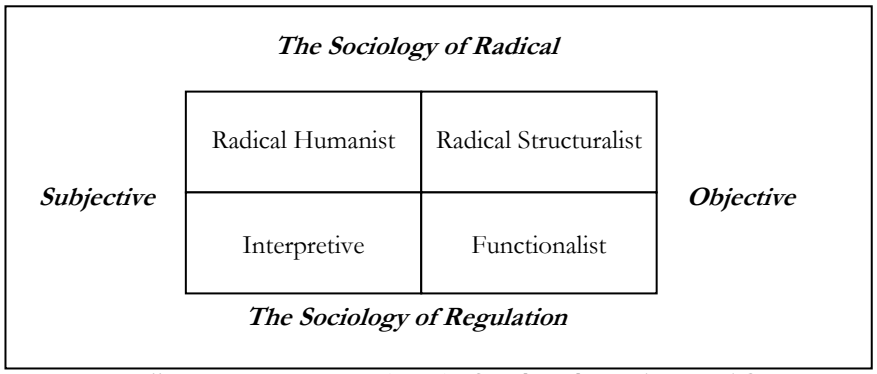
Burrell and Morgan (1979) define an objective ontological approach realism, where the world is external to individuals and the researcher must distance themselves from their subject. In contrast nominalism is where reality is subjective, dependent upon the individual and consequently can only be studied by examining phenomena through the perspectives of the individual. The epistemological approach is either objective (positivist) where knowledge is considered to be gained through a search for causal relationships between constructs, independent of the researcher, or subjective (anti-positivism) where knowledge can only be gained from the social world by understanding it from the viewpoint of the individual.

Human nature, the third condition, relates to whether or not events determine behaviour. If viewed objectively human nature is deterministic, that is the subject and the activities performed by the subject can be determined by the situation surrounding the individual. In contrast, if viewed subjectively there is autonomy, a disengagement of the subject from the environment in which they conduct their activities. The methodology or the process researchers adopt to investigate and conduct their research is either an objective nomothetic approach, where methods are grounded in documented protocols and the testing of hypotheses using analytical scrutiny, or a subjective ideographic approach, involving the researcher with the subjects, documenting findings in the natural environment.

While the subjective-objective dimension provides a structure for positioning beliefs on whether or not human beings can be studied externally from the researcher, Burrell and Morgan (1979) contend that there is an additional dimension - the environment in which a subject exists. They suggest an environment where at one end of the continuum there is complete order (regulation) and at the other extreme conflict (radical change). A regulatory environment is stable, integrated, provides functional co-ordination and consensus between the individual subjects. Alternatively, a radical change environment is characterised by continuous change, conflict, disintegration and coercion between individual subjects. Burrell and Morgan (1979) combine the two continuums, subjective-objective and regulatory-

radical change, to posit a 4-paradigms model, in which a researcher can ground their assumptions and beliefs (Figure 4-1).

Figure 4-1 Research Paradigms



Source: Burrell, G. & Morgan. G. (1979). *Sociological Paradigms and Organisational Analysis*. London, UK: Heinemann.

The radical humanist paradigm, also referred to as post-modernist, is underpinned by the fundamental assumption that each human being has an individual voice, but these voices are being oppressed by domination and power. In social science research this dominating power is often observed to be the organisation in which the individual works, or the society in which the individual lives. The role of the researcher is to diffuse the power, understand and free the voice of each individual.

The radical structuralist or critical thinker paradigm is similar to the radical humanist paradigm in that it considers individuals to be oppressed by power. However, in contrast to radical humanist researchers who believe that the world is subjective in nature and can only be understood by examining it through the eyes of the subjects, the radical structuralist researcher takes an objective viewpoint. They are committed to understanding the power struggle of the individual either in an organisation or society and search for enlightenment as to the relationships between constructs, especially the construct of power. In addition, the radical structuralist researcher has a desire to re-structure society and organisations to change current power structures.

The interpretive paradigm or phenomenological approach has subjective beliefs similar to that of the radical humanist, but the interpretive researcher is concerned with understanding the world as it is, rather than trying to deconstruct the power and

suppression of individuals. The interpretive researcher is resolute in searching out patterns and interactions between phenomena, the reasons for these patterns and then subjectively describes them.

The final quadrant is the functionalist or positivistic paradigm. This paradigm considers the researcher to be independent of the phenomena being observed and grounded in an environment that is characterised by social order and regulation. As such, the role of the researcher is to deduce from theory causal relationships between phenomena with the objective of testing whether or not such relationships are plausible. A functionalist researcher believes that the causal relationship between phenomena exists independent of the researcher and it is the role of the researcher to gather evidence, especially mathematical, of the relationship, without directly affecting the phenomena. Although often critiqued for the way it removes the social environment from the subjects being studied, functionalist research maintains highly structured protocols, measurable factors and statistical analysis when analysing causal relationships between phenomena.

In regards to the 4-paradigms, Burrell and Morgan (1979) contend that a researcher cannot work at a given point of time within more that one paradigm. They state that:

> "a synthesis is not possible, since in their pure forms they are contradictory, being based on at least one set of opposing meta-theoretical assumptions. They are alternatives, in the sense that one can operate in different paradigms sequentially over time, but mutually exclusive, in the sense that one cannot operate in more than one paradigm at any given point in time, since in accepting the assumption of one, we defy the assumption of all others" (p.25).

The 4-paradigms approach of Burrell and Morgan (1979) is not without its critics. Some consider the mutual exclusivity of the paradigms too extreme (Reed, 1997; Willmott, 1993). Others contend that the model provides protection and justification for functionalist researchers, who at the time were subject to criticism by their less mainstream interpretive counterparts (Deetz, 1996). Notwithstanding this, if the 4-paradigms approach is viewed as a descriptive rather than prescriptive model,

it does provide a framework that enables the researcher to understand their fundamental assumptions.

While understanding philosophical assumptions to knowledge and research should not be underestimated, it is equally important that the researcher identify with the approaches to research that can assist with the design process and properly address posited research questions. The next section examines the quantitative-qualitative perspective to research.

4.2.3 Quantitative-Qualitative Methods Approach

Until recently, quantitative and qualitative methods of research have often been associated with their respective positivist and phenomenological approaches. Quantitative methods inherently involve experiments and surveys aimed at testing hypotheses, using large samples of data in attempt to find 'cause and effect' relationships – the positivist approach. Alternatively, qualitative methods often use strategies of inquiry that implicitly require direct involvement of the researcher with the phenomenon, such as case studies, ethnographic studies, grounded theory and narratives. Creswell (2003) argues that the two approaches should not be considered mutually exclusive and that there are legitimate mixed method approaches. Hussey and Hussey (1997) contend the use of both methodologies in a single study may assist with triangulation and add richness to findings. Creswell (2003) defines three strategies of inquiry that researchers can use to assist with their research design (Table 4-2).

Table 4-2 Strategies of Inquiry

Quantitative	Qualitative	Mixed Methods
Experimental designs	Narratives	Sequential
Non-experiment designs,	Phenomenologies	Concurrent
such as surveys	Ethnographies	Transformative
	Grounded theory	
	Case studies	

Source: Creswell, J. W. (2003). *Research design: Qualitative, Quantitative, and Mixed Method approaches*, 2nd ed. Sage Publications.

Creswell's (2003) quantitative approach confronts the traditional positivist paradigm and takes a more post-positivist stance, challenging that there can be no absolute truth about knowledge when studying human behaviour. His approach is reductionist, in that phenomena should be reduced to small groups where causes that influence outcomes can be tested. In this approach "an individual begins with theory, collects data that either supports or refutes the theory, and then makes necessary revisions before additional tests are conducted" (Creswell, 2003, p.7). Such research should use experiments or surveys as the strategy of inquiry, have unbiased approaches and employ statistical procedures.

In contrast Creswell (2003) suggests that the qualitative approach should employ strategies of inquiry that use grounded theory, ethnography, case studies, narrative and phenomenology. Such approaches assume that knowledge is generated by the researcher as they understand the social reality in which they live and develop meaning towards the objects with which they interact. He suggests that two types of knowledge claims fall under the qualitative approach: that of constructivism, similar to the general phenomenological paradigm; and that of advocacy/participatory, which is similar to Burrell and Morgan's (1979) radical humanist paradigm. He suggests that the advocacy/participatory approach is a revolt against the post-positivist assumptions of structure, where power, politics and people are intertwined and research should have an agenda of change. That agenda should include change in the lives of participants and the freeing of marginalised groups from constraints. In the qualitative strategy of inquiry the researcher collaborates with participants,

creating an agenda for reform and change, collecting meanings and bringing personal values to the study.

The final strategy of inquiry suggested by Creswell (2003) is that of mixed methods. This approach uses sequential, transformative and concurrent methods of inquiry to collect both qualitative and quantitative data with a pragmatic viewpoint. Pragmatism considers that knowledge does not fall into one philosophical reality. It is for the researcher to decide how knowledge is 'best' derived. The mixed methods approach allows the researcher to converge qualitative and quantitative data with concurrent procedures, use transformative procedures or theoretical lens' to frame research areas and sequentially expand from one method to another. For example, the researcher can test theory using quantitative methods and then taking a few cases and exploring these in more detail using qualitative methods.

4.2.4 Deductive versus Inductive Research

Finally, a discussion of research methodology would not be complete without mentioning deductive and inductive research methods. Deductive research can be defined as "a study in which conceptual and theoretical structure is developed which is then tested by empirical observation; thus particular instances are deducted from general inferences" (Hussey & Hussey, 1997, p.19). This type of inquiry is used in quantitative studies where a theory is tested such as experimental designs and surveys as mentioned above. Inductive research involves the development of theory from observation of reality, "thus general inferences are induced from particular instances" (Hussey & Hussey, 1997, p.19). This inquiry is qualitative often emanating from a grounded theory approach to research.

Although not in any way exhaustive, the aim of this brief review of the philosophical and methodological issues involved in the research process provides an appreciation of the assumptions that underpin the approach to the research question described in Chapter 3. The theoretical and methodological stance taken by the author for this thesis is described in the next section.

4.2.5 Selected Theoretical Stance and Research Method

The objective of this thesis is to investigate and ascertain whether or not there is a relationship between the structure of questions asked of individuals from whom knowledge is sought and the recipient's attitude towards the knowledge contained in the shared responses. The requirement to obtain substantive evidence that such a causal relationship exists between the two phenomena calls for an objective structured approach to be adopted. This approach postulates independence of the researcher from the causal relationship being studied; a functionalist or positivistic approach.

Accurate selection of an appropriate method by which the phenomena could be investigated was considered essential, as this would ensure that the research was performed in a manner that would address the research question. A number of research methods were considered: surveys; cross-sectional studies; experiments; and longitudinal studies. An experiment methodology was considered to be the most suitable because it allowed for different groups of participants to be exposed to the different types of question response structures proposed – binary, open-ended and directed – addressing the posed hypotheses in a direct manner[13]. Further, the experiment methodology allows for incremental development of detail associated with the design[14]. The next section outlines the experiment research method, inclusive of issues relating to validity and design.

4.3 Experiment Research Method

An experiment is an investigation in which one or many independent constructs are manipulated and the effect of this on a dependent construct observed (Hussey & Hussey, 1997). An objective of experimental research "is to allow the researcher to control the research situation so that causal relationships among variables may be evaluated" (Zikmund, 1994, p.241). This requires the researcher to understand and to control for any extraneous variables that may have an effect on the relationship

[13] The posed hypotheses and rational was described in Chapter 3, Section 3.3.2.
[14] The three study progressive approach is described later in this Chapter, Section 4.5.

between the independent and dependent constructs being studied. The researcher must also attempt to control for any variables that may confound the main constructs and distort any true relationship.

There are two principal environments in which experiments can be performed: a natural setting, referred to as a *field experiment* or; a manufactured environment characterised as a *laboratory experiment*. A laboratory setting offers a number of advantages to the researcher. First, confounding variables or variables that may obscure the effect of others are usually more easily controlled for in a laboratory setting (Hussey & Hussey, 1997), increasing internal validity. In addition, often a laboratory environment is the only feasible method. Second, when attempting to examine a research question that involves an organisational circumstance, using a construed scenario in a laboratory experiment that emulates this circumstance can reduce the complexity - the number of variables that would require controlling if undertaken in the field. A laboratory experiment in some circumstances may provide a more accurate representation of the relationship being investigated than a field experiment.

It has been suggested that results from laboratory experiments have limited generalisation often because students are involved and the findings may not be replicated in the real world (Gordon *et al.*, 1986). However, debate over the use of laboratory experiments and the feasibility of results has been fruitful, with some suggesting that with properly qualified generalisability, the results from laboratory experiments using students may not be invalid (Dobbins *et al.*, 1988).

Regardless of whether data is collected in the field or the laboratory, there are a number of elements that require consideration in any experiment. These include: how the independent variables are manipulated; the measurement of the independent and dependent variables; selection criteria for the test units or participants; and how the researcher will control extraneous variables (Zikmund, 1994).

In an experiment the researcher manipulates the independent variable to observe how this influences the dependent variable. Treatments are used to describe the

alternative manipulations of the independent variable. Dependent on the type of experiment design (see the forthcoming Section 4.3.2 Types of Experiment Design) the researcher applies treatments to test units that are split into experimental groups, with different experimental groups receiving different treatments. Quite often experiments have multiple treatments and often comprise a control group to which no treatments are applied.

Another aspect that the researcher must consider in constructing an experiment is how the dependent or observed variable will be measured. Since the purpose of an experiment is to examine the causal relationship between the independent variable and the dependent variable, the researcher must be careful to ensure that the dependent variable is measured correctly. Issues influencing measurement are examined in the next Section 4.3.1 Experimental Validity.

A further consideration when designing an experiment is the selection criteria for test units. Test units are the units of analysis, subjects or participants to which treatments are applied. It is important that the researcher consider the sampling techniques that will be used to assign their test units to treatments. Types of procedures include: random sampling where all subjects have a random chance of receiving a treatment; matching, where participants are matched to a treatment group dependent on their background information or; repeated measures, where subjects are exposed to all the treatments groups. A further consideration when selecting test units is how many participants are required for each treatment: too few and the results may be inconclusive; too many and time and effort is wasted. Since the effect of the treatment is what is being measured, the sample size must be sufficient to ensure adequate replication of the effect.

A final issue the researcher must be aware of is how they will control for extraneous variables or variables other than the independent variable that could distort or mask measurement of the real effects that a treatment has on the dependent variable (experimental noise). The effect of extraneous variables may result in error or uncertainty in the data collected and therefore influence the conclusions reached.

Errors are categorised as systematic or random. Systematic errors are those that affect the dependent variable every time a treatment is applied. They are constant, repeatable and occur in the same direction. This type of error is often difficult for the researcher to identify, as it can be difficult to statistically account for bias. Randomisation may assist in reducing this type of error (Cox, 1958). The second type of error is random error. These errors account for statistical fluctuations which can occur in either direction and can occur in the quantity of the measurement or the measurement process itself. This type of error can be statistically evaluated and often reduced by increasing sample size. Finally, when reporting experimental results it is important that the researcher clarifies the estimated accuracy of the results or how close the results are to being true; this increases as the estimated error gets smaller.

The next section provides further detail on the potential influence of confounding and extraneous variables and their effect on experimental validity. Following this an assortment of experiment design structures are described and the types of data collection methods available considered.

4.3.1 Experimental Validity

This section describes the factors that may jeopardise an experiment and render an experiment ineffective and or inconclusive. Building on the early work by Campbell and Stanley (1963) the four types of validity (statistical conclusion, internal, construct, external) proposed by Cook and Campbell (1976, 1977) are examined.

Statistical Conclusion Validity

Statistical conclusion validity broaches the question of whether or not there is a relationship between the constructs being studied. A researcher may find that a relationship is supported at $p<0.05$ but not at $p<0.01$ and query reporting the relationship as it may be false. Therefore, careful usage and analysis of statistical procedures is very important to ensure validity of reported results. Variables that may threaten statistical conclusion validity are outlined in Table 4-3.

Table 4-3 Statistical Validity

Variable	Description
Statistical Power	When a sample size is small and alpha is set low then there is an increased probability that the researcher will make a Type II error, or a no-difference between the treatments conclusion and therefore accept an incorrect hypotheses. The second type of statistical power error, or a Type I error, the probability of rejecting the correct hypotheses can occur if alpha is set high.
Fishing & the Error Rate Problem	The likelihood of making a Type I error on a particular comparison increases with the number of comparisons that are made.
Reliability of the Measures	Error terms can increase when the reliability of the measure is low. This can be reduced by either, conducting longer tests where selected items have high inter-correlation or using a larger test unit, for example, groups over individuals, as a group mean is potentially more stable than an individual mean.
Reliability of the Treatment Implementation	This type of validity issue may occur when treatments are implemented to test units in a varying way or during different occasions and has the potential to increase error variance. To reduce the potential impact of this type of validity issue, treatments should be implemented in the most standardised way possible.
Random Irrelevancies in the Experimental Setting	Often the experimental setting, especially in field experiments, can have extraneous variables that may influence test unit's response to a treatment and increase error variance. The researcher should attempt to select settings that are free of sources of variation, or they should measure the extraneous variables that are common and control for them in statistical analysis.
Random Heterogeneity of Respondents	This type of validity is related to the extent to which a treatment affects the dependent construct. In particular instances, certain individuals may be more affected by a treatment than others, again influencing the error variance. To counteract this, the researcher can either block the characteristics that are confounding the reaction to the treatment or select a homogenous test unit population. The latter option does influence external validity and generalisation of findings.

Source: Cook, T.D & Campbell, D.T (1977). *Quasi-experimentation: Design &Analysis Issues for Field Settings*, Chicago: Rand McNally College Publishing Company.

Internal Validity

Internal validity is about ensuring that if there is a relationship between A and B, that it is a plausible causal relationship from A to B, with no alternative explanation. Cook and Campbell (1976, 1977) suggest for internal validity to be maintained there should be no plausible alternative that can explain the variation in the test unit, other than the applied treatment. For example, if application of treatment A causes an

effect on B, then it can be inferred that A→B. However, if a third variable C has an impact on B and the causal relationship between A and B is related only though C then A→C→B. With the second example it is incorrect to conclude that A causes B when C provides an alternative explanation. Cook and Campbell (1976, 1977) purport thirteen potential threats to internal validity which are outlined in Table 4-4.

Table 4-4 Internal Validity

Variable	Description
History	Any event which is not part of the treatment(s) and may occur between the pre-test and post-test. Such an event may influence and affect the performance of the test unit, distorting true measurement of a causal relationship.
Maturation	A change in the test units which is not part of the treatment(s) and occurs between the pre-test and post-test phases. For example, the test unit(s) growing older or wiser.
Testing	Improved scores from pre-test to a post-test due to test unit(s) familiarity with the process or test.
Instrumentation	A change in the measurement instrument between the pre and post-test, which is not directly related to the treatment(s) applied.
Statistical Regression	Threatens validity when test units are assigned to treatment groups based on pre-test scores.
Selection	Threatens validity if the disparity between test unit(s) in different groups is their selection into that group based on characteristics, rather than the treatment(s) applied.
Mortality	Threatens validity when test units drop out between pre-test and post-test.
Interaction Selection	The interaction of selection variables, such as selection-maturation, where individuals in different treatment groups are maturing at different rates.
Ambiguity about Direction of Causal Inference	This type of threat to internal validity is considered to occur when all other explanations for variation are removed and the researcher is still not sure if A causes B or B causes A.
Diffusion or Imitation of Treatments	If knowledge is shared between test unit(s) receiving different treatments, then subsequent measurement of treatments may result in no difference between groups.
Compensatory Equalisation of Treatments	Providing of goods or benefits to test unit(s) that are perceived as desirable may threaten validity if the practice is common knowledge, since other test unit(s) may not tolerate such inequality.
Compensatory Rivalry by Respondents	Rivalry may occur between treatment groups if the experimental and control condition are made public. The result may entail the test unit(s) of a treatment group reacting in a different manner to that if they had not been publicly aware of the experimental conditions.
Resentful Demoralisation of Respondents Receiving less Desirable Treatments	If test units in one treatment group believe that they are receiving a less desirable treatment than members of another group they may react in a manner towards the treatment(s) which distorts measurement.

Source: Cook, T.D & Campbell, D.T (1977). *Quasi-experimentation: Design & Analysis Issues for Field Settings*, Chicago: Rand McNally College Publishing Company.

Construct Validity

Assuming that there is a plausibly causal relationship between constructs, construct validity asks the question: what specific cause and effect constructs are in the relationship? To warrant this type of validity a researcher must ensure that if they interpret a theoretical causal relationship between A and B, that another researcher cannot interpret this relationship as between X and B or A and Y (Cook & Campbell, 1976). Concerns surrounding construct validity can be minimised by ensuring that throughout the design phase definitions of words are clear and will be comprehensible to all participants involved. In addition, Cook and Campbell (1976) purport that construct validity is conditional on testing for convergence, where different measures manipulate the same thing and divergence, where a single measure can manipulate two or more distinct things. They suggest the following tests.

1. Assessing the 'take' of the independent variable – a researcher should ensure that the independent variable alters or varies that which it is intended to.
2. Covariation – a researcher should ensure that the independent variable does not covary with measures of related but different constructs. For example, if the causal hypothesis is A→B, then manipulating A should correlate with changes reported in B. However, changes reported in B should not be related to other constructs since such a correlation with another construct would make it difficult to ensure that the effect is due only to A.
3. Correct measurement of construct – the dependent construct should comprise of items that it is intended to measure. This can be achieved through ensuring significant inter-item correlation.
4. Irrelevant items – the dependent construct should not comprise of irrelevant items that sort of measure what is intended.

External Validity

The question that external validity is attempting to respond to is: given that there is a plausible relationship, to what population does it generalise, if any, given setting, time, people etc? Cook and Campbell (1976, 1977) suggest three elements that require consideration.

1. Interaction of multiple treatments – threatens validity when a test unit is provided with more than one treatment. In such a case the question can be raised as to which treatment can the results be generalised and to what.
2. Interaction of setting and treatments – concerns the setting in which the treatment(s) took place and the ability to generalise. For example, can the findings from a public organisation also be generalised to a private organisation?
3. Interaction of selection and treatments – this type of external validity is concerned with the type of population that the cause-effect relationship can be generalised to (race, social status, organisation etc). This issue may be reduced by making the test unit(s) selection voluntary.

4.3.2 Types of Experimental Design

This section examines the different types of experimental design and describes the fundamental principles of the various designs and their connection with experimental validity. Experimental designs are divided into two taxonomies: basic experimental design where the researcher is only manipulating one independent variable to observe the effect on one dependent variable or; complex experimental design where two or more independent variables are required and their interaction on the dependent variable(s) is investigated.

Campbell and Stanley (1963) suggest six types of basic experimental design and consider the issues that effect experimental validity. Each design is described in Table 4-5 below and makes use of the following symbols.

X	experimental treatment
O	the observed measurement of the test unit (if there are more than one observations O_1, $O_2 \ldots O_n$ indicates temporal order)
R	test units are randomly assigned to the experimental treatment X
E	experiment group
C	control group

Table 4-5 Experiment Designs

Name	Design Structure	Description
One-Shot Design	X O_1	Allows only for measurement of the dependent variable once the treatment has been received. A problem is that there has been no pre-test measurement performed prior to the treatment and therefore it is difficult to infer that the measurement is related to the influence of the treatment. Also there is no control group to ascertain a comparison between the treatment and no treatment.
One-Group Pre-test-Post-test Design	O_1 X O_2	Overcomes the deficiency of the one-shot design in that the test units are tested prior to the treatment as well as after the treatment. The difference between O_2 and O_1 is regarded to be the influence of the treatment. No control group used in this type of experiment and therefore no comparison against those that did not receive the treatment. A weakness of this design is the time lapse between pre and post test may result in the maturation effect and validity associated with history.
Static Group Design	*E* X O_1 *C* O_2	This design acknowledges the control group and allows for comparisons to be made between the group that receives the treatment and the control group. The influence of the treatment in this design is O_2 minus O_1. A major inadequacy of this design is not having assurance that the two groups (experimental and control) are sufficiently similar to say that the only difference between the two is the treatment. There is still no randomised selection of which test units are allocated to either the experimental group or the control group. This design does control for history, testing, instrumentation and statistical regression internal validity issues by eliminating any pre-test of the test units.
Pre-test – Post-test Control-Group Design	*E* R O_1 X O_2 *C* R O_3 O_4	This design uses random selection to assign test units to either the experimental group or the control group. Both the experimental group and control groups are measured pre-test and post-test, with only the experimental group being exposed to the treatment between measurements. The effect of the treatment is the difference in the measurement of the experimental group minus the difference of the measurement of the control group or $(O_2 – O_1) – (O_4 – O_3)$. This type of design attempts to control for the effect of extraneous variables as it considers that variables effecting internal validity issues will be same for both groups given that both groups have before and after measurement. Controls for history, maturation, testing and instrumentation.
Solomon 4 Group Design	*E* R O_1 X O_2 *C* R O_3 O_4 *E* R X O_5 *C* R O_6	The Solomon four group design originates with the work of Solomon (1949). This design is regarded as time and effort intense. This design allows the researcher to control for the interaction testing effect, by having one experimental and control group that does not receive pre-test measurement (O_5 and O_6). Complex comparisons can be made, for example, the combined effect of maturation and history can be examined by contrasting the measurement of O_6 with O_1 and O_3.
Post test only control group design	*E* R X O_1 *C* R O_2	When it is not appropriate to conduct a pre-test and there is no expected error with selection of test units then an experiment can be designed to only have post-test measurement. In the post-test-only control group design the effect of the treatment equal $O_2 – O_1$. As a result of no pre-test within this design the issues of testing and instrumentation are eliminated and the use of a control group ensures the same assumptions about extraneous variables (history, maturation, mortality).

Source: Campbell, D.T & Stanley, J. C. (1963). *Experimental and Quasi-experimental Designs for Research*. Chicago: Rand McNally College Publishing Company.

The first three types of basic experiments are considered to be quasi-experiments or not true experiments, as they fail to randomise the assignment of the experimental treatment to the test units. This type of experiment is often necessary in social science research as the researcher may have no control over assignment to a treatment group, which may be dictated by position in an organisation or business unit that the individual works within, etc. Each of the six experimental designs mentioned are considered appropriate for a single-factor experiment. However, when there are more than two independent variables required in the experiment, factorial experiments may be a better option.

Factorial designs consist of two or more factor combinations and allow for the testing of two or more treatments. A factorial design can have a main effect which is the influence that each independent variable has on the dependent variable. When there is a combined effect of two or more independent variables on the dependent variable, this is considered as an interaction effect. Factorial design is structured by the number of treatments (factors) and the number of levels of each treatment. A 2x2 design consists of two treatments, with each treatment consisting of two levels and a 2x2x2 design consists of three factors (treatments) each consisting of two levels.

Other Experimental Design Structures

Experimental design is not limited to those discussed in the previous section. When an experiment is performed over a period of time, for example, with an intention to measure change, then a time series design may be applied. This type of design collects a number of observations before the treatment is applied to identify existing trends. After the treatment has been administered a number of observations are gathered to determine whether or not the trends before the treatment are similar to the trends after the treatment.

Another design is the Latin Square design, which is often used when there are a number of extraneous variables that require blocking. This design allows the researcher to manipulate the independent variables and control for two or more confounding extraneous variables. This is achieved by restricting randomisation

through row and column design. For example, Figure 4-2 illustrates that each subject receives every treatment but in a differing order. This type of design assumes that there is no or little interaction effect between variables.

Figure 4-2 Latin Square Design

		Order of Treatment		
		1	**2**	**3**
	1	A	B	C
Subject	**2**	B	C	A
	3	C	A	B

Source: Rosnow, R. L., & Rosenthal, R. (1996). *Beginning behavioral research: A conceptual primer* (Vol. 2nd Edition): Prentice-Hall.

This section has described the elements that surround different types of experiment design structures. Once the design of an experiment is established, how data will be collected requires consideration. The next section examines data collection in experiments and specifically concentrates on the method employed to collect the required data for this research.

4.4 Data Collection Methods in Experiments

While the objective of an experiment is to manipulate the independent variable(s) and observe how this affects the dependent variable(s), how the actual observation is recorded can alter, dependent on the design and purpose of the research. One process for collecting data is by means of observing the participants. When using observation in functionalist research it is important that the researcher conducts their observation in a non-participant manner and remain isolated from those individuals being observed. The researcher can collect their data through methods like video or audio recording of participants and transcribe to a grid-like tool the different effects a treatment has. Caution must be used with observation to ensure that the researcher does not become involved with the phenomena being studied and thereby too subjective.

A second method for data collection in an experiment setting is that of surveys. More specifically self-reports or self administered questionnaires can be used to assess the effectiveness of the experimental manipulations (Podsakoff & Organ, 1986). With this approach participants can complete a pre-test and or post-test self-administered questionnaire. This allows the researcher to directly question participants in relation to the constructs being manipulated; either before and or after the manipulation and with or without the participants knowing specifically what manipulation they were exposed to. This method of data collection is often used when the researcher cannot observe the effect of the treatment, for example, change in a participant's attitude. The next section briefly outlines the principal components of surveys inclusive of the types of surveys available and errors that can occur in survey research. The survey method selected for data collection, self-administered questionnaires, is also described.

4.4.1 Surveys

A survey method can be used in both positivistic and phenomenological research. It is an appropriate methodology when the population of a study is potentially large and or impossible to reach and a representative sample may constitute the whole (Hussey & Hussey, 1997). Surveys allow for the examination of phenomena in a natural setting and can be descriptive, identifying characteristics and totalling the occurrence of constructs, or analytical, investigating potential correlation between variables (Pinsonneault & Kraemer, 1993). Descriptive surveys are not designed to test theory rather their intention is to determine distributions or frequencies of phenomena in a setting. For example, a descriptive survey could be used to ascertain how many employees in a company use email as a method to share knowledge. In contrast, the aim of analytical or explanatory surveys is to test theory and explain directional cause and effect relationships amongst variables. This type of survey not only seeks to answer 'does the hypothesised relationship exist' but also 'why relationships exists' (Pinsonneault & Kraemer, 1993).

Surveys are grouped into either cross-sectional or longitudinal dependent on the temporal basis of the study (Zikmund, 2003). Cross-sectional surveys are performed

at a single point in time, creating a 'snapshot' of the phenomena being studied. Because this type of survey is only undertaken at a single point in time, it is usually less costly to administer. However, it does not contain the same depth of data that can be collected using a longitudinal survey, which studies phenomena over a period of time. A longitudinal survey often is aimed at examining continuity of respondent's responses and subsequent changes in their responses. This type of survey is good for studying medium to long term trends, but is usually more costly to administer due to the lengthy time required to collect the data.

Surveys can be administered in a number of ways. The most common form of survey is the mail or self-administered questionnaire, although other forms of surveys include:

- face-to-face interviewing respondents either using door-to-door, or interception methods in malls;
- telephone interviews; and
- internet and computer technology.

Hussey and Hussey (1997) suggest that when deciding if a questionnaire is a suitable method to gather data, it is important to consider: the type of questions; the sample size required; the design of questionnaire inclusive of instructions; the methods of distribution; tests of validity and reliability; the methods for data collection; and potential non-response bias. Generally there are tradeoffs between each collection method in terms quality, costs and degree of researcher interaction with the respondents. The summarised advantages and disadvantages of each method are outlined in Table 4-6.

Table 4-6 Survey Data Collection Methods

	Door-to-door Personal Interview	Mall Intercept Personal Interview	Telephone Interview	Self-administered Mail Survey	Internet Survey
Speed of data collection	Moderate	Fast	Very Fast	Slow; researcher has no control over return rate	Instantaneous 24/7
Geographic flexibility	Limited to moderate	Confined, possible urban bias	High	High	High (worldwide)
Respondent cooperation	Excellent	Moderate to low	Good	Moderate; poorly designed questionnaire will have low response rate	Varies depending on Web site; high from panels
Versatility of questioning	Quite versatile	Extremely versatile	Moderate	Not versatile; requires highly standardised format	Extremely versatile
Questionnaire length	Long	Moderate to long	Moderate	Varies depending on incentive	Moderate; length customised based on answers
Item non-response rate	Low	Medium	Medium	High	Software can assure none
Possibility for respondent misunderstanding	Low	Low	Average	High; no interviewer present for clarification	High
Degree of interview influence	High	High	Moderate	None; interview absent	None
Supervision of interviewers	Moderate	Moderate to high	High, especially with central-locations	Not applicable	Not applicable
Anonymity of respondent	Low	Low	Moderate	High	Respondent can be either anonymous or known
Ease of call-back or follow-up	Difficult	Difficult	Easy	Easy but takes time	Difficult, unless email address is known
Cost	Highest	Moderate to high	Low to moderate	Lowest	Low
Special features	Visual materials may be shown or demonstrated; extended probing possible	Viewing of video materials possible	Simplified fieldwork and supervision for data collection; adaptable to computer technology	Respondent may answer questions at own convenience has time to reflect on answers	Streaming media software allow use of graphics and animation

Source: Zikmund, W.G. (2003) *Business Research Methods*, Thomson, South-West, page 228

Generally the self-administered questionnaire allows for distribution to a large sample with minor financial outlay. The face-to-face method is more costly, both in terms of execution and costs associated with paying the interviewers for their time. Further, this type of data collection method can decrease objectivity of a study, as interviewers may influence and bias the answers of participants. Research performed under a positivistic approach should recognise the potential limitation of using face-to-face surveys methods and the potential this has to compromise the theoretical underpinnings of functionalist research.

There are a number of errors that can occur in survey research. These can be categorised into random sampling errors, errors that occur due to the sample not being a true representation of the population, or systematic errors which can result from imperfections in the design or administration of the survey. Both of these types of errors can have a major effect on the reliability of the survey findings. For instance, Rosnow and Rosenthal (1996) state that "random errors tends to push measurement up and down around an exact value, so that the average of all measurements … is very close to the exact value" and "systematic error … tends to push measurement in the same direction and causes the average or mean value to be too big or too small" (p.122). Therefore, over repeated measurement, random sampling errors may cancel out, but systematic errors will not and will affect all measurement in approximately the same manner. Systematic errors or bias can be divided into those errors that are associated with the respondent and those errors that are administrative or related to how the survey was performed. Respondent error includes responding to, or not responding to a survey.

The Total Design Method (Dillman, 1978) is an approach that is designed to increase the response rate. This approach involves careful construction of the survey, including question wording, use of open versus closed questions, response categories, questionnaire layout and the implementation of the survey. When conducting mail-out questionnaires the approach suggests that 4-stages should be performed. The first is the initial mail out of the questionnaire instrument which includes a detailed letter informing respondents of the importance of the survey. The second stage is a one week reminder postcard. The third stage, at three weeks, is a letter and

replacement questionnaire. Finally, at seven weeks a further letter and replacement survey should be mailed out.

Following the Total Design Method can assist the researcher to deal with response bias errors. These errors occur when respondents tend to answer questions in a certain manner and careful design of questions and scales can assist in reducing this type of error. According to Zikmund (2003) there are five types of response bias that require consideration when conducting a survey.

1. Acquiescence bias – participants tend to agree or affirm positively towards all the questions.
2. Extremity bias – participants use extremes when responding to the questions.
3. Interviewer bias – interviewers may bias the participants and influence their answers, masking a true answer.
4. Auspices bias – participants are influenced by the organisation that is the central reason of the study.
5. Social desirability bias – participant create a socially desirable impression in their answer either consciously or subconsciously.

However, because each of these types of errors are not mutually exclusive and may interact with each other, the process of reducing and managing bias is difficult for the researcher.

The final types of errors that researchers must recognise are administrative errors. These types of errors relate to: data processing; the interviewer in interview-based surveys making errors or cheating; and sample selection. Good questionnaire design and protocols can assist to reduce the first two types of errors. Sampling procedures such as defining the target population, random and probability sampling and good use of statistical procedures can assist to reduce sample selection errors (Zikmund, 2003).

4.4.2 Selected Survey Method

For the purpose of this thesis, cross-sectional, analytical, self-administered questionnaires were considered the most appropriate method for collecting participant's attitudes towards knowledge received from the question responses. This method ensured that the researcher was isolated from the phenomena being studied and therefore remained objective in their approach to the overall study. Furthermore, this data collection method allowed for hypotheses testing. The progressive three study approach is described in the next section.

4.5 Progression of Studies

To investigate the research question and test the posed hypotheses (described in Chapter 3) a progression of three studies was undertaken. This progressive approach was considered appropriate as experiments often trade-off internal and external validity (to obtain internal validity often there is the need to forgo external validity and visa versa) and the author desired strong internal validity as well as the ability to generalise the findings to a wide population (external validity). To achieve this it was proposed to first use a laboratory experiment to investigate the posed relationship between question response structure and recipient attitude before this same relationship was tested in the field. By initiating the investigation in a laboratory setting it was proposed to develop a contrived scenario case, so as to assist with control of potential extraneous variables; such variables may distort a true representation of the relationship being studied and reduce internal validity. Further, only the main purported hypotheses (H_{1a}, H_{1b} and H_{1c}) would be tested in the laboratory experiment, other potential influencing variables as suggested in the research model would be tested in the field.

After the laboratory experiment it was proposed to use the same contrived case and implement the study again using a field experiment. The purpose of this second study was to ascertain if the findings from the laboratory could be replicated in the field, increasing overall external validity of the findings. Study Two would also investigate a recipient's cognitive style as a suggested moderator between question

response structure and recipient attitude (see the research model Chapter 3). Finally, it was proposed to perform a third experiment. This experiment would be conducted in the field and would use real job-related knowledge rather than the contrived case, again with an objective of replicating the overall findings. This final study would not only examine the other two factors suggested to influence recipient attitude - organisational culture/climate and a recipient's prior knowledge, but would also test the attitude-intention relationship as purported in the Theory of Reasoned Action.

Table 4-7 describes the commonality and differences between the three studies. As it can be seen from the table each subsequent study was designed to build on the limitations of its predecessor, increasing in complexity as the environment moved from the laboratory to the field and the knowledge context from the contrived case to real task-related knowledge. This progressive approach allowed for greater control over the constructs being studied during the initial stages, increasing potential internal validity of the findings. The latter studies traded-off this internal validity for greater external validity. In the two field experiments additional hypotheses were tested. These additional hypotheses, together with rationale supporting them, are described within the Chapter that reports on the respective study.

Table 4-7 Progression of Experiments

	Objective	Experiment Environment & Design	Sample	Knowledge Context	Internal Validity Issues	External Validity Issues
Study 1 (Chapter 5)	Test hypotheses H_{1a} H_{1b} & H_{1c} in a timely, cost effective manner. Ascertain if there is a relationship between question response structure & recipient attitude.	*Laboratory* Subset of the Post-test-only-control group design.	Students	*Scenario Case* Strategic Knowledge Contrived Vertical Knowledge Flow	Measure only recipient attitude, controlling for other variables through the use of the scenario case. Selection of the treatment that a participant receives is random reducing selection validity, blind control.	Contrived case has limited mundane realism relating to real-world situations. Limited ability to generalise the findings past that of the laboratory due to use of students together with the contrived scenario.
Study 2 (Chapter 6)	Replicate the results of Study One (test H_{1a} H_{1b} & H_{1c}) using non-student participants. Include other variables that may interact with recipient attitude towards shared knowledge, e.g. cognitive style.	*Field* Subset of the Post-test-only-control group design.	Employees across multiple companies, with varying positions & job responsibilities.	*Scenario Case* Strategic Knowledge Contrived Vertical Knowledge Flow	Introduction of other variables that may interact with recipient attitude & create noise (cognitive style). Introduction of possible other unexamined variables due to the use of the field environment. These may reduce internal validity. Selection of the treatment that a participant receives is random reducing selection validity, blind control.	Contrived case has limited mundane realism relating to real-world situations. If replication occurs, slight increase in ability to generalise the results to a wider population. However, still restricted with the contrived scenario.
Study 3 (Chapter 7)	Test hypotheses H_{1a} H_{1b} & H_{1c} in a single organisation using real shared knowledge relevant to recipient's job responsibilities. Increase complexity of experiment to reflect reality. Test whether attitude towards shared knowledge is a good predictor of intention to use that knowledge in the future.	*Field* Subset of the Post-test-only-control group design.	Employees in a single organisation	*Organisation Specific* Operational Knowledge Horizontal Knowledge Flow	With a change in the knowledge context to operational other unexplained variables may interact with recipient attitude reducing internal validity, e.g. recipient prior knowledge and perceived organisational climate. Introduction of additional relationship – is attitude is a good predictor of intention?	Real knowledge may only be relevant to other similar organisations limiting generalisation. If replication occurs overall the results of the three experiments have greater external validly & and could be generalised to wider business population, with various types of shared knowledge contexts – strategic and operational.

4.6 Chapter Summary

The purpose of this chapter was three-fold. First, the philosophical and methodological issues that face the social science researcher were described. This included discussion on the positivism phenomenological debate, the 4-paradigms approach of Burrell and Morgan (1979) and the quantitative-qualitative stance to research. The outcome of examining these philosophical issues was that the position taken by this author for this thesis could be justified. The viewpoint embraced was that of positivism, embracing a functionalist approach to research. This approach considers knowledge to be found through searching for causal relationship between phenomena, using an objective stance where the researcher is external to the subjects being studied, focusing on facts and using statistical methods of inquiry.

The second objective of this chapter was to examine in detail a research method that would adhere to the positivism stance taken. Taking into consideration the elements that were required to examine the research question and hypotheses as outlined in Chapter 3, an experiment methodology was selected. The fundamental structural elements surrounding this type of research method were examined in detail. This included laboratory and field experiments, issues surrounding experimental validity such as internal, construct, external and statistical validity, and various types of experimental designs. Next, data collection techniques available for use within an experiment method were described and the appropriateness of surveys and survey methods elaborated upon.

The final objective of this chapter was to describe the three study progressive approach taken to data collection. This approach allowed for issues associated with internal and external validity to be dealt with more proactively, as the experiment environment moved from the laboratory to the field, increasing subsequently in complexity. The commonalities and differences between the three experiments were outlined and described.

The three studies are described in the following three chapters. Although each study subsequently builds on the findings of its predecessor, each is considered

independent and therefore written up as an individual chapter. In each chapter the research method undertaken is described inclusive of any additional hypotheses[15], experiment design, instrument, measures, data collection procedures and issues surrounding validity, reliability and limitations of the design. The results from each experiment are presented followed by a general discussion of the findings. Chapter, 8 consolidates the overall findings from the three experiments and Chapter 9 discusses the implications of the results.

[15] Additional hypotheses do not include the main hypotheses H_{1a} H_{1b} and H_{1c}.

— CHAPTER FIVE —

STUDY ONE

5.1 Introduction

This chapter describes the first empirical study[16] undertaken to investigate the research question described in Chapter 3:

> Does the structure of a question to which the source of the knowledge responds, influence the recipient's attitude towards the knowledge received?

The chapter is outlined as follows. First the objectives of the study are described, followed by the experiment design, including the instrument used and the measures employed. Data collection methods are then outlined and issues surrounding the validity, reliability and limitations of the design discussed. The results are then presented and the chapter concludes with a discussion of the findings together with limitations of the study.

5.2 Objective

The main objective of this study was to ascertain whether or not there was a relationship between question response structure and recipient attitude. A subsidiary objective was to develop a robust method for collecting data to test the proposed relationship. A search of the literature had failed to reveal any studies that had used a two-stage data collection process similar to that proposed to test the relationship

[16] The author would like to acknowledge that some of the findings reported in this section have been published by the author under the title "An empirical study of the impact of question structure on recipient attitude during knowledge sharing" in *The Electronic Journal of Knowledge Management*, 2005, Volume 3, Issue 1, p.1-10.

between question response structure and recipient attitude. This process is described below.

5.3 Method

The method employed to test the main hypotheses posed in Chapter 3 was that of a laboratory experiment. No additional hypotheses beyond those outlined in the Chapter 3 were tested in this study. The next subsection describes the experiment design which was divided into two stages: the first involved collecting knowledge from the source individuals; and the second the dissemination of this knowledge to recipient individuals via a self-administered questionnaire. This is followed by the measure employed, the data collection procedures and issues surrounding validity, reliability and limitations of the design.

5.3.1 Experiment Design

A laboratory experiment was used to test the three hypotheses (H_{1a}, H_{1b} and H_{1c}). The upside of using a laboratory environment was greater control over external variables, such as knowledge context and participant demographic. However, although this may assist with increasing the internal validity of the findings, there is a compromise and trade-off with external validity and the ability to generalise the findings, as with any controlled experiment.

In this experiment prior to evaluating recipient attitude towards knowledge received, there was a need for knowledge to be shared. It was considered that the design of the overall study would be more robust if knowledge was shared from real participants rather than the author fabricating this knowledge. In addition, it was recognised that people respond to questions differently. For example, if two people who have a similar knowledge base are presented with the same question, person A may respond in a different manner than person B, given that they may have differing viewpoints and or mental models. This variation between responses was considered difficult to fabricate and consequently two stages were structured into the design process: first the collection of knowledge from one group of participants; and the

second the sharing of this knowledge with a different group of participants. The first stage involved the development of questions that would be used to collect knowledge, the administering of these questions and the collection of the responses. The second stage used the collected responses and measured recipient attitude towards the knowledge they received when provided with the responses. Each stage is described in more detail below.

Stage 1 – Case & Question Development

In stage one instructions, a scenario business case and three corresponding questions relevant to the scenario were developed (refer to Appendix A: Item 1 – Instruction Sheet and Appendix A: Item 2 – Scenario Case). The purpose of the scenario case was to provide background information and context from which questions could be asked and subsequent responses provided. The case provided information about a new hypothetical investment opportunity, not specifically related to any one organisational function. It was easy to comprehend and the length was kept to one A4 page. The generic nature of the case removed the requirement to involve specialised individuals as participants in the study and the questions asked the respondents to articulate their knowledge on issues implicit in the case. Next, three questions that related to the case were developed (refer to Appendix A: Item 3 – Questions & Response Structure). The questions were designed to elicit the opinion and knowledge of respondents on whether or not there were any major risks associated with the investment and consequently their recommendation on whether or not to proceed with the proposed investment.

To test the three hypotheses (H_{1a}, H_{1b} and H_{1c}) there was a requirement to develop three questionnaires for stage one. Each questionnaire contained the same instructions, scenario case and questions, however, the question structure and subsequent question response structure altered. For example, the first questionnaire had the three questions, but respondents could only answer the questions in a binary manner, by circling the response categories 'Yes' or 'No'. The second questionnaire did not contain any response categories; rather blank lines were left for the respondent's answer, thereby creating an open-ended question response structure. The third questionnaire – directed response structure - had the same blank lines for

the response structure as open-ended but also directed the respondents on how to structure their response. For example, for the question: 'Are there any significant risks embedded in or associated with this project?' the follow-on directed question stated: 'If yes, what are they and how could they be reduced? If no, why are there none?' This additional direction was designed to provide the respondent with a prescribed method or manner in which they should respond.

To ensure that the scenario case and corresponding questions were understandable a pre-test was performed using all three questionnaires. Participants in the pre-test included a number of students, academics and business managers. The case and questions were considered appropriate by all participants and the minor suggestions resulted in a number of small phrase changes to the scenario case.

Since the purpose of stage one was only to obtain shared knowledge in the form of responses to the questions, the target number of usable responses was: 4 responses to the binary structured questionnaires; 4 to the open-ended; and 4 to the directed. It was considered that this would provide enough shared knowledge for each question response structure for the following reasons. First, fewer than four responses may lack in variation, not providing enough depth or breadth in the knowledge that would be used in stage two. In contrast, too many responses would increase the time and effort involved for participants in stage two to process the responses (processing 4 responses to a question would be easier than processing 5, 6 or 7) and may reduce the return rate of the questionnaire.

Stage 1 – Data Collection (Responses to Questions)

To achieve the aforementioned target of four responses to each of the question structure questionnaires (binary, open-ended and directed) 5 participants were provided with the binary questionnaire, 5 the open-ended and 5 the directed (totalling 15 participants). It was considered by the author that five questionnaires in each question structure category would compensate for participant non-response; if this was not the case there would be a requirement to re-evaluate the number of

participants in each question response category. Potential participants were approached by the author and asked if they would like to take part in the study. Participants included lecturers and postgraduate students within the Management School that the author attended. Since the scenario case and questions were not specific to any one functional area of expertise or level of prior knowledge, it was considered that both lecturers and postgraduate students could be classified as members of the sample population. Especially since in the real world often collecting knowledge about business issues requires wide spanning of the organisation; knowledge may not always be contained within one domain of expertise or one hierarchical level.

Participants that verbally agreed to participate were presented with the questionnaire package and an internal mail envelope which they could use to return the questionnaire. This method of obtaining participants does encounter sampling bias problems, since those that verbally agreed to take part in the survey would be more inclined to complete and return the questionnaire. However, this was not considered an issue in view of the fact that the purpose of the first stage was to only collect knowledge from participants; knowledge that would form part of the second stage of the study. Whether or not a participant wanted to contribute was of no significance to the research.

Thirteen completed questionnaires were returned within one week (86% return rate). Of those returned, 4 were binary, 5 open-ended and 4 directed, all of which were usable. It was decided by the author to not use the last returned open-ended questionnaires. Therefore for each of the question response structures (binary, open-ended and directed), 4 responses were used in stage two (refer to Appendix A: Item 4 – Question Responses).

Stage 2 – Experiment Design Structure

The second phase of the study used the response data collected in stage one. Data was grouped by question response structure resulting in three treatments – binary

responses (X_1), open-ended responses (X_2) and directed responses (X_3). The experiment design structure was considered to be a subset of the post-test-only control group experiment design (see Section 4.3.2), as it used the same random allocation of treatments however, no control group was used[17]. This design was considered the most appropriate for the following reasons. First, this design structure did not require a pre-test. A pre-test of stage two participants prior to applying the questionnaire, be it binary, open-ended or directed, was not considered appropriate since problems arose when deciding what structure of question responses should be utilised in the pre-test. Further, it was not the purpose of the experiment to observe and measure the difference between pre and post-test, rather the objective was to measure the difference between three treatments (O_1, O_2 and O_3). The final experimental design that was used is illustrated in Figure 5-1.

Figure 5-1 Experiment Design

R	X_1	O_1
	X_2	O_2
	X_3	O_3

In this design the participants were randomly assigned to one of the three questionnaire treatments X_1, X_2, X_3 (binary, open-ended or directed). The randomisation of the design ensured that participants did not know what type of treatment they were receiving (blind control). Participants (also referred to as the recipients of the shared knowledge) then responded to the measurement instrument (self-administered questionnaire) which measured their attitude towards future use of the knowledge they perceived they had gained from the responses. This design allowed for investigation of the three purported hypotheses (H_{1a}, H_{1b} and H_{1c}) by examining the difference in attitude between those recipients that received the binary treatment (O_1), those that received the open-ended (O_2) and those that received the directed treatments (O_3).

[17] No control group was used as it was questionable as to which question response structure a control group would received – should they have binary, open-ended, directed or a combination of all three?

Stage 2 – Instrument

Three questionnaires were developed to meet the criteria of the design – X_1, X_2 and X_3. Each questionnaire contained identical instructions and measurement instrument, but differing in the treatment provided (refer to Appendix A: Item 5 – Questionnaire – Recipient). For example, the first questionnaire only contained responses that were of a binary structure, the second questionnaire only the open-ended responses and the last questionnaire directed responses.

Instructions provided in the questionnaire informed participants that they were to imagine that they were a senior manager in a fictitious organisation and they had to make a recommendation to senior management on whether or not to invest in a new company. Because they were not knowledgeable about this new investment company, they had questioned four of their staff who they considered to be appropriate knowledgeable experts. The questions and responses from the staff were provided and although the scenario was contrived the knowledge flow was vertical from the staff to the senior manager (the recipient or respondent of the knowledge)[18]. The respondents were informed that their decision to invest should be based on the knowledge they had received from the corresponding question responses. With this decision in mind, they were then asked to complete the questionnaire instrument.

The instrument (refer to Appendix A: Item 5 – Questionnaire - Recipient) was designed so that items Q1-Q4 and Q8-Q13 were intended to measure aspects of recipient satisfaction with the knowledge received from the question responses. This included a recipient's satisfaction with how sufficient, relevant and accurate they perceived the shared knowledge, as contained in the responses, to be. Items Q5, Q6 and Q7 were intended to measure the participant's perceived importance that they placed on the relevance and availability of knowledge for decision-making. Items Q14-Q18 comprised the already operationalised measure attitude from the Theory of

[18] According to Schulz (2001) vertical knowledge flows - from subordinates to managers - reveal knowledge about new opportunities, discontinuity or uncertainty. The scenario new investment opportunity used in this study, together with the knowledge in the question responses coming from subordinates, supports the notion that the knowledge flow, although contrived is vertical.

Reasoned Action (TRA) (Fishbein & Ajzen, 1975). These items were intended to measure a recipient's attitude towards future use of the shared knowledge. All items were measured on a Likert scale with 1 = strongly disagree, though 4 = neutral, to 7 = strongly agree. Further description of the measures can be found in the next section.

A pilot study of the three questionnaires was undertaken using participants from both the academic and business environments. Each questionnaire type – binary, open-ended and directed – was pilot tested and no changes were suggested.

5.3.2 Measures

Recipient Attitude

Fundamental to the study was the requirement to assess the measure 'attitude' of the recipient. While prior studies have examined the attitude of the source towards sharing their knowledge (see Bock & Kim, 2002; Connelly, 2000; Kolekofski & Heminger, 2003; Ryu et al., 2003), the attitude of the recipient towards receiving the knowledge has received limited exposure. To assess the recipient's attitude towards the knowledge received, the 5-item attitude measure developed by Fishbein and Ajzen (1975) was adapted and used[19]. The actual 'attitude' measured was a recipient's attitude towards the future use of the received knowledge. By examining the attitude towards future use there was no requirement for the recipient to immediately use the knowledge[20]. This significantly departs from earlier studies that have generally examined knowledge transfer.

Recipient Satisfaction

This study also explored a recipient's satisfaction with the knowledge they received from the question responses, together with the importance they place on receiving relevant knowledge. While recipient satisfaction did not form part of the research

[19] See Chapter 3, Gap Analysis & Research Model, for more detail on the Theory of Reasoned Action and the construct attitude.
[20] See Chapter 3 for more detail on the difference between measuring knowledge sharing and knowledge transfer.

model (Chapter 3), some consider satisfaction to be a similar construct to attitude, with satisfaction usually measured in information systems research and attitude in psychological research (Melone, 1990). Since research on knowledge sharing has been reported in information systems journals it was considered that satisfaction as a measure should at least be investigated. However, few studies have empirically examined satisfaction in the context of knowledge sharing and at the time of the study the author was unaware of any direct usable measure. Therefore, a number of items that comprise the perceived satisfaction measure proposed by Becerra-Fernandez and Sabherwal (2001) were adapted and included in the survey instrument.

5.3.3 Data Collection Procedures

The three questionnaires in stage two (binary, open-ended and directed) were distributed to students of a third year business management class during a normal scheduled lecture hour. Prior to distribution the three questionnaire types had been randomly sorted to ensure that the likelihood of a participant receiving a binary, open-ended or directed survey was comparable. The total number of students enrolled in the course was 168. Exactly one hundred students (60% of the total class) were present on the day of data collection and 100 surveys were distributed. Students were verbally informed that their contribution was voluntary and this was again reiterated on a separate participation sheet, allowing them the right to decline involvement. There was no incentive provided to students for completing the questionnaire.

Since the self-administered questionnaire was being completed at a single point of time – during the scheduled class – there was no requirement to use the Total Design Method (Dillman, 1978). Subsequently there was no follow-up with either those students who were not in class on the day or those that did not wish to participate.

5.3.4 Validity, Reliability and Limitations with Design

In an attempt to ensure reliability and validity of the measurement system, multi-item scales were used and a number of items negatively worded. In addition, the measure for recipient attitude was drawn from a validated scale used both in the knowledge management literature and the broader psychology and management arenas.

This study also attempted to minimise experimental validity issues by making use of the post-test only design with no control group. This design reduces potential history, maturation and mortality validity issues and eliminates problems with pre-test designs (Cook & Campbell, 1976).

The use of the contrived scenario case introduces the issue of whether or not participants are responding accurately and not biasing their answer with either socially desirable answers or acquiescence bias. However, using a scenario inherently means that there is no direct consequence of the response to the participant – they will not gain extra grades, lose face etc, – therefore reducing any need to answer in a socially desirable manner.

A final limitation with the design is the trade-off between internal validity by using a laboratory environment and the ability to externally generalise the findings. This experiment has traded the ability to generalise the findings in attempt to gain internal validity.

5.4 Results

There were ninety-seven responses to the 100 questionnaires distributed in stage two, with 90 complete and usable. Of those usable 30 were binary, 31 open-ended and 29 directed.

Demographics

General characteristics of the students that responded to the survey were not collected for the following reason. The purpose of the study was to investigate in a timely yet statistically valid manner, if indeed there was a relationship between question response structure and recipient attitude. This was achieved by administering the questionnaire during a scheduled lecture hour for third year management students. To ensure completion of the survey during this scheduled time without impacting on teaching, no demographic variables were collected.

Correlations

The mean and standard deviation for each item is reported along with their inter-item correlations (Table 5-1). Items Q17 and Q18 (items that comprise part of the attitude measure) were negatively worded and transformed for analysis. Results reveal high correlation at $p<0.01$ between items Q14-Q18, corresponding to the attitude measure. Items Q10 and Q11, which both contained the word 'accurate' were highly correlated at $r=0.703$, $p<0.01$. Generally, except for items Q5, Q6 and Q7 which measured aspects of the importance placed on knowledge, most items were significantly correlated with each other. Interestingly, item Q5 (relevant knowledge is important) was not correlated with any other items except Q6 (available knowledge is important). Item Q6 did not correlate with the other items except Q5 and Q7.

In summary, the significant correlations reported in the matrix suggest multi-collinearity amongst a number of the items. To reduce these items into possible factors, factor analysis was performed.

Table 5-1 Correlation Matrix and Descriptive Statistics

	Mean	Std Dev	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18
Q1	4.59	1.483	1																	
Q2	3.36	1.417	.439**	1																
Q3	4.66	1.350	.383**	.194	1															
Q4	4.26	1.387	.560**	.336*	.354**	1														
Q5	6.44	.672	.039	-.003	.010	.154	1													
Q6	6.20	.864	.100	.006	.050	.088	.484**	1												
Q7	6.12	.910	.004	-.165	.007	.278**	.314	.455**	1											
Q8	3.58	1.390	.454**	.448**	.203	.401**	.143	.034	-.181	1										
Q9	2.96	1.365	.446**	.456**	.309**	.386**	-.015	-.002	-.104	.641**	1									
Q10	3.40	1.305	.376**	.518**	.296**	.247*	-.038	.008	-.193	.559**	.553**	1								
Q11	3.82	1.303	.340**	.345**	.290**	.212*	.027	.112.	-.095	.504*	.356**	.703**	1							
Q12	2.90	1.407	.206	.323**	.301**	.209*	-.083	.072	-.148	.311**	.431**	.493**	.493**	1						
Q13	4.07	1.444	.286**	.208*	.427**	.300**	.073	.124	.165	.288**	.383**	.409**	.442**	.413**	1					
Q14	3.56	1.462	.329**	.213*	.172	.356**	-.037	-.027	-.060	.393**	.474**	.359**	.288**	.268*	.397**	1				
Q15	3.53	1.432	.380**	.188	.201	.327**	.054	-.033	-.128	.448**	.432**	.167	.202	.211*	.314**	.753**	1			
Q16	3.57	1.492	.411**	.281**	.321**	.391**	.071	-.071	-.110	.463**	.476*	.263*	.237*	.252*	.394*	.761**	.877**	1		
Q17	4.21	1.590	.318**	.231*	.113	.429**	-.026	-.080	.029	.270*	.279*	.121	.073	-.016	.199	.606**	.587**	.655**	1	
Q18	4.60	1.585	.359**	.129	.234*	.512**	.021	.010	.143	.310**	.298**	.100	.134	.057	.321**	.499**	.491**	.520**	.796**	1

n=90

** Correlation is significant at the 0.01 level (2-tailed) / * Correlation is significant at the 0.05 level (2-tailed)

5.4.1 Factor Analysis

To investigate further the correlations between the items, principal-component factor analysis using the statistical package SPSS (version 11) was performed to determine any common underlying factors. Bartlett's test of Sphericity was significant at 870.619 ($p<0.05$) which together with a Kaiser-Meyer-Olkin measure of sampling adequacy (KMO=0.801, $p<0.01$) suggested that the data may be factorable. Using Varimax rotation and Kaiser normalisation after three iterations a stable factor structure was derived (Churchill, 1979; Taylor & Wright, 2004). After the first iteration three items were dropped from the analysis because they did not meet the general guidelines of individual loadings greater than 0.35 or cross-loading of less than 0.35 (Kim & Mueller, 1978). A further three items were dropped after the second iteration due to complex cross-loadings. After the third and final iteration 12 of the initial 18 items loaded onto three underlying factors (Table 5-2) and explained 68.3% of the variance (on the final iteration KMO=0.775, $p<0.05$ and Barlett's test, 584.415, $p<0.01$).

Table 5-2 Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Com-ponent	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumula-tive %**	**Total**	**% of Variance**	**Cumula-tive %**
1	4.723	39.358	39.358	4.723	39.358	39.358	3.721	31.005	31.005
2	1.970	16.414	55.771	1.970	16.414	55.771	2.968	24.735	55.740
3	1.503	12.527	68.298	1.503	12.527	68.298	1.507	12.558	68.298
4	.846	7.050	75.348						
5	.713	5.941	81.289						
6	.567	4.729	86.018						
7	.459	3.824	89.842						
8	.435	3.622	93.464						
9	.334	2.783	96.246						
10	.198	1.654	97.900						
11	.151	1.257	99.157						
12	.101	.843	100.00						

The strongest factor (explaining 31.0% of the variance after rotation) was loaded by items Q14-Q18, which comprised the construct attitude. Internal consistency was high for this factor with Cronbach's alpha=0.9032. The second factor was loaded by items Q2, Q8, Q9, Q10 and Q12 and labelled satisfaction. This factor explained 24.7% of the variance and had a reliability of alpha=0.8161. The items that

comprised recipient satisfaction were satisfied with the relevance, depth, accuracy, completeness and sufficiency of the shared knowledge.

The final factor labelled importance of knowledge, was dropped from further analysis due to its reliability (alpha=0.6385) being below the acceptable threshold (0.70) suggested by Nunnally and Bernstein (1994). Using Harmon's one-factor test (Podsakoff & Organ, 1986), common method variance was considered not to be an issue because of the high variance accounted for in both the attitude and satisfaction factors. The individual item loadings for the attitude and satisfaction factors ranged from 0.694 to 0.876 (Table 5-3) again supporting the multi-collinearity of the items that comprise the factors.

Table 5-3 Rotated Component Matrix

	Component	
Item	**Attitude**	**Satisfaction**
Q2		.694
Q8		.696
Q9		.774
Q10		.845
Q12		.703
Q14	.786	
Q15	.843	
Q16	.852	
Q17*	.876	
Q18*	.796	

* negatively worded and transformed for analysis

To determine whether or not there was any underlying difference in recipient attitude and or satisfaction towards knowledge received, given question response structure, analysis of variance (ANOVA) was performed. Results are presented in the next two sections.

5.4.2 Recipient Attitude - ANOVA

To test hypotheses H_{1a}, H_{1b} and H_{1c}, the means for the items that comprise the attitude construct were calculated. With a non-significant result [(2,87)=0.253, p>0.05] for the Levene test of homogeneity of variance, the results from the ANOVA (Table 5-4) suggest a difference in recipient attitude given question response structure with, F(2,87)=12.300, p<0.01, r=0.4690.

Table 5-4 ANOVA – Attitude with Response Structure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.399	2	16.199	12.300	**.000**
Within Groups	114.577	87	1.317		
Total	146.976	89			

To determine which attitude means differed (binary, open-ended or directed), pairwise comparisons using Tukey HSD (alpha=0.01) were performed (Table 5-5). The results revealed that recipient attitude towards the responses elicited from binary structure questions was significantly different to that from open-ended and directed, in support of hypotheses H_{1a} and H_{1c} (for both 1 and 2-tailed tests). The effect sizes for both H_{1a} and H_{1c} were large with d=1.03 and d=1.19 respectively[21]. There was no significant difference between attitude for open-ended and directed question responses, hypotheses H_{1b} was therefore not supported.

[21] Cohen's (1988) guidelines for d - 0.80 is considered a large effect (79 percentile standing and 47.4% non overlap), 0.5 is considered a medium effect (69 percentile standing and a 33% non overlap) and 0.2 a small effect (58 percentile standing and a 14.7% non overlap).

Table 5-5 Tukey HSD Multiple Comparisons – Attitude

Multiple Comparisons	Question (I)	Question (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)
Tukey HSD	Binary	Open-ended	-1.1596	.29391	**.000**
		Directed	-1.3674	.29885	**.000**
	Open-ended	Directed	-.2078	.29647	.764

Homogenous Subsets	Question Structure	N	Subset for alpha = 0.01 1	2
Tukey HSD[a,b]	Binary	30	3.0533	
	Open-ended	31		4.2129
	Directed	29		4.4207
	Sig.		1.00	.764

Means for groups in homogeneous subsets are displayed

a. Uses Harmonic Mean Sample Size = 29.978

b. The group sizes are unequal & harmonic mean of sizes is used. Type I error levels are not guaranteed.

The Likert scale for measuring attitude ranged from 1 = strongly disagree, through 4 = neutral, to 7 = strongly agree. Recipient attitude increased as the question response structure complexity increased (binary to open-ended and directed), suggesting that recipients were more favourably disposed towards the knowledge they received when questions of a complex structure were used. This difference between the three question response structures is illustrated graphically with the box plot of attitude by question response structure (Figure 5-2) and the mean plots for attitude (Figure 5-3).

Figure 5-2 Box Plots for Attitude by Question Response Structure

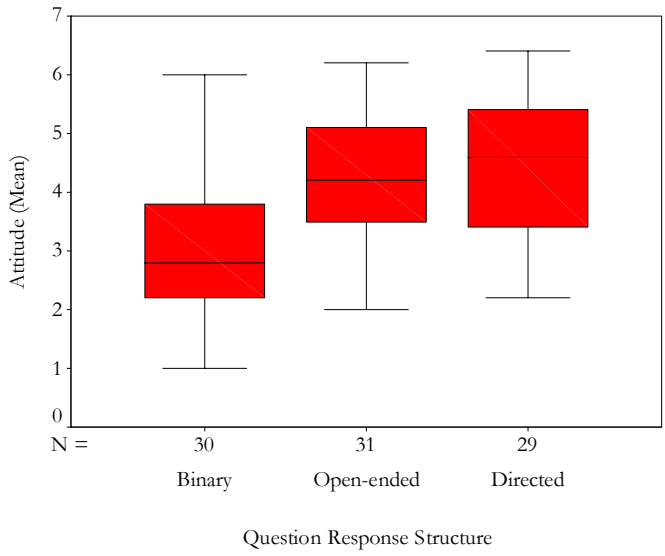
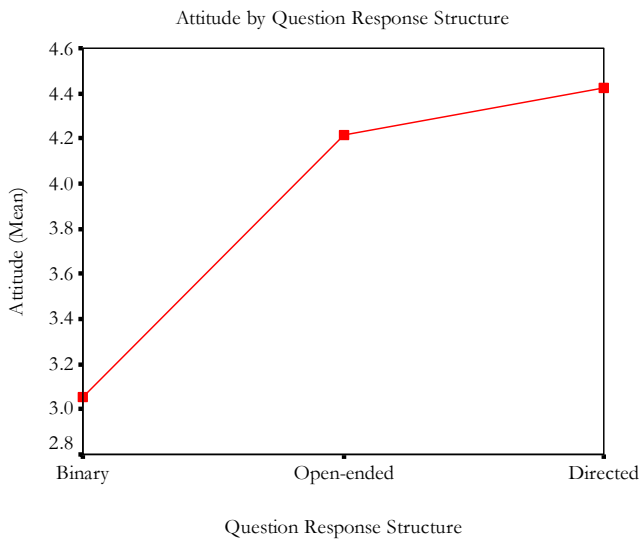


Figure 5-3 Mean Plots for Attitude



5.4.3 Recipient Satisfaction - ANOVA

Although there was no a priori hypotheses contending a relationship between question response structure and recipient satisfaction[22], ANOVA was performed to ascertain if indeed there was any influence. With homogeneity of variance just above the 0.05 level (Levene=(2,87)=2.829, p=0.065), the ANOVA revealed a difference in

[22] Satisfaction with shared knowledge was an exploratory construct.

the means with, $F(2,87)=4.288$, $p<0.01$, $r=0.2995$. Pairwise comparison at alpha=0.01 did not reveal which means differed; however, at alpha=0.05 there was significant difference between the means (Table 5-6) for binary and open-ended question response structure (1 and 2-tailed tests). There was no significant difference between binary and directed question response structure at the 2-tailed level[23]. There was no significant difference between open-ended and directed question response structures. Figure 5-4 graphs the mean plots and illustrates the difference in recipient satisfaction towards binary and open-ended question response structures.

Table 5-6 Tukey HSD Multiple Comparisons – Satisfaction

Multiple Comparisons	Question (I)	Question (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)
Tukey HSD	Binary	Open-ended	-.6968	.25837	**.023**
		Directed	-.6138	.26272	.056
	Open-ended	Directed	.0830	.26063	.946

Homogenous Subsets	Question Structure	N	Subset for alpha = 0.05 1	2
Tukey HSD[a,b]	Binary	30	2.8000	
	Directed	29	3.4138	3.4138
	Open-ended	31		3.4968
	Sig.		.054	.946

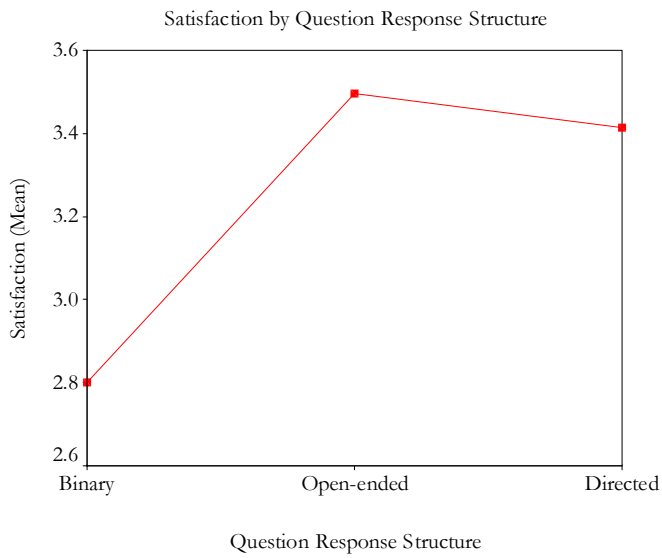
Means for groups in homogeneous subsets are displayed

a. Uses Harmonic Mean Sample Size = 29.978

b. The group sizes are unequal & harmonic mean of sizes is used. Type I error levels are not guaranteed.

[23] There were no hypotheses posed in relation to recipient satisfaction and therefore 2-tailed tests were appropriate.

Figure 5-4 Mean Plots for Satisfaction



5.4.4 Other Findings

There were a number of other interesting findings. First, the correlation matrix (Table 5-7) revealed a significant relationship between the factors attitude and satisfaction (r=0.409, p<0.01). As expected[24], both factors were also correlated with the independent variable question response structure (r=0.435, p<0.01 for attitude and r=0.241, p<0.05 for satisfaction respectively).

Table 5-7 Correlations for Question Structure, Attitude & Satisfaction

	Question Structure	Attitude	Satisfaction
Question Structure	1		
Attitude	.435**	1	
Satisfaction	.241*	.409**	1

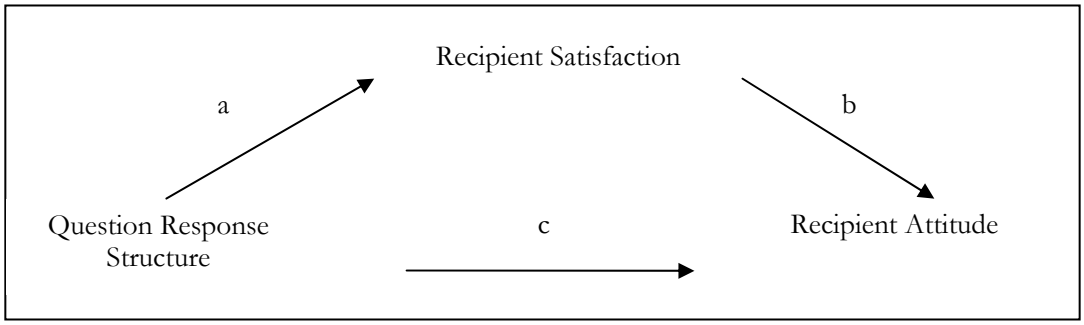
* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Since there was significant correlation between the variables it was decided to test for mediation. The Theory of Reasoned Action (TRA) purports that a person's beliefs

[24] ANOVA was significant for both recipient attitude and recipient satisfaction.

about an object are positively related to their attitude towards that object (Fishbein & Ajzen, 1975). Therefore, it is posed that if they are satisfied with the shared knowledge (they have a belief of satisfaction), that they will have a favourable attitude. The mediation model (Figure 5-5) purported that satisfaction would mediate the relationship between question response structure and recipient attitude. That is, question response structure would influence recipient satisfaction (path a) and recipient satisfaction would influence recipient attitude (path b). Earlier findings (see Section 5.4.2) already supported question response structure influencing recipient attitude (path c).

Figure 5-5 Mediation Model



Using the three condition approach suggested by Baron and Kenny[25] (1986), the results revealed only partial mediation (Table 5-8); recipient satisfaction partially mediates the relationship between question response structure and recipient attitude. This result does not support full mediation because even though the beta coefficients (question response structure → recipient attitude) reduced in absolute size (from β=0.435 to β=0.357), the reduced beta coefficient was still significant. To support full mediation the reduced beta coefficient should not be significant (Baron & Kenny, 1986).

[25] (1) The independent variable is significantly associated with the mediator variable; (2) the independent variable is significantly associated with the dependent variable; and (3) when both the independent and mediator variables are predicators of the dependent variable, the effect of the mediator must be significant.

Table 5-8 Testing the Mediation effect of Recipient Satisfaction

(1) IV → Satisfaction		(2) IV → DV		(3) IV → DV (mediator included)	
Std. ß	*t*-value	*Std. ß*	*t*-value	*Std. ß*	*t*-value
.241	2.327[a]	.0435	4.530[b]	.357	3.830[b]
Mediator	Satisfaction			0.323	3.462[c]

Notes: [a] $p<0.05$, [b] $p<0.001$, [c] $p<0.01$.
IV = question response structure / DV = recipient attitude towards knowledge
Mediator = recipient satisfaction

One potential bias error in this test is mistaking which variable is the mediator and which is the dependent variable (Baron & Kenny, 1986). Therefore it was decided to run attitude through the same test. The findings (Table 5-9) supported recipient attitude being a full mediator between question response structure and recipient satisfaction. The inconsistency of results from the two tests (which construct is the mediator?) highlights the 'reverse causal effect' (Kenny, 2006). Satisfaction may cause attitude, however equally attitude may cause satisfaction. This finding is possibly not that inconsistent with theory as there are fundamental similarities between satisfaction and attitude; the difference in use often dependent on the school of thought of the scholar, with information systems research measuring satisfaction and social and cognitive psychologists measuring attitude (Melone, 1990).

Table 5-9 Testing the Mediation effect of Recipient Attitude

(1) IV → Attitude		(2) IV → DV		(3) IV → DV (mediator included)	
Std. ß	*t*-value	*Std. ß*	*t*-value	*Std. ß*	*t*-value
.435	4.530[a]	.241	2.327[b]	.078	0.717
Mediator	Attitude			0.375	3.462[c]

Notes: [a] $p<0.001$, [b] $p<0.05$, [c] $p<0.01$.
IV=questions response structure / DV=recipient satisfaction towards knowledge
Mediator = recipient attitude

The method suggested by Smith (1982) can be used to estimate reverse causal effects. However, this approach requires the manipulation of two variables. The first variable is presumed to cause the mediator only and the second the dependent variable only. In this study no additional variables were found and therefore the approach could not be used. Further detail on the implications of the reverse causal effect of satisfaction and attitude can be found in next section. There were no other substantive findings that arose from the data.

5.5 Discussion

The results of this study support the proposed relationship between question response structure and recipient attitude towards future use of the shared knowledge. However, there were a number of additional findings that were unexpected. The first part of this section discusses the overall implications of the results relating to how recipient attitude towards the shared knowledge differed depending on question response structure. Then, the exploratory recipient satisfaction measure is discussed, followed by acknowledgement of the limitations of the study in terms of design and measures employed. Finally, some future research directions are proposed.

5.5.1 Recipient Attitude

Recipient attitude was influenced by question response structure. More specifically recipients were more favourably disposed towards shared knowledge when presented with responses from questions which were open-ended or directed in structure, compared to responses from questions that were binary in structure (showing support for hypotheses H_{1a} and H_{1c}). There was no statistical difference in recipient attitude between directed and open-ended question responses (hypothesis H_{1b} was not supported).

It is important to appreciate that in this study the recipients of the shared knowledge did not have access to the same knowledge available to the source – they did not have any knowledge about the contrived scenario case. Their decision on whether or not to invest was directly dependent on what had been shared, together with any

prior investment knowledge. However, the use of a contrived situation together with students as the sample population reduced the potential influence of prior knowledge[26], thereby increasing the relevance and importance of the actual knowledge obtained from the question responses.

Generally, the findings complement the literature on both knowledge sharing and questioning. Although the purpose of this study was not to enter the survey debate surrounding open versus closed versions of the same question, the findings of this study do enhance theory on questioning[27]. When the recipient does not have access to the same context as the source (stage two participants did not have access to the contrived scenario case, only the questions and corresponding responses) it could be construed that because open-ended or directed questions provide more detail they were of more value to the recipient having to make a decision; their attitude is more favourable towards this form of question response. For instance, since binary question responses were the least favoured (they had the lowest recipient attitude) it could be suggested that they did not contain enough detail for recipients to make a fictitious future investment decision. This seems logical since without the context of the scenario case there was potentially insufficient knowledge detail contained within a 'Yes' or 'No' response to satisfactorily interpret the implications for decision-making - whether or not to invest in the fictitious company. This supports one of the assumptions underpinning binary questions. The recipient must be in possession of enough contextual knowledge to understand the implications of a 'Yes' or 'No' response (Vinten, 1995). However, while this assumption may hold true in this study, it may not be the case in survey research where the researcher who developed the questions is also the recipient of the responses and does, therefore, have the contextual knowledge to interpret the implications of a 'Yes' or 'No' response.

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[26] Unless (students) participants had actually made past decisions to invest in real companies their prior knowledge would of been limited to that of text books and what they had been taught in course work.

[27] Although not central to this thesis, it is interesting to note that the actual content and depth of the responses to the open-ended and directed questions varied (see Appendix A: Item 4 – Question Responses). For example, in response to question 3 – "Should NuVest invest in this venture?", respondents all provided varying answers with differing levels of justification as to why. This variation in responses supports the work of Schuman and Presser (1979) who found that responses to open-ended questions differed between respondents.

As expected, recipients had a more favourable attitude towards responses in the open-ended and directed formats than those in a binary format. However, because these question responses contained more than just a 'Yes' or 'No' in them, it would not be unreasonable to assume that there was more to be gained from those responses, because there was more detail and or depth of knowledge. The open-ended and directed responses, with the exception of one source respondent's answer to one question, all contained more than four words and in most instances contained supportive justification for the corresponding answer. More detail and depth in response was also assumed to occur from the open-ended and directed questions because the source respondents could accurately respond; they were provided with the context of the scenario case from which to formulate their answers.

Open-ended and directed question responses were considered to result in a more favourable attitude as they allowed the recipient to successfully internalise the shared knowledge compared to binary responses. The responses from the complex questions (open-ended and directed) provided recipients with the opportunity to own the shared knowledge, commit themselves to it through recognition of the value of it for the decisions they were required to make[28]. After internalisation with their current knowledge base, the recipients were able to create new knowledge for future use (Cummings & Teng, 2003). On the other hand the lack of detail contained in the binary responses together with no prior contextual knowledge would make it very difficult to own and value a simple 'Yes' or 'No' response. Also, the defining structure of a binary response may have affected the ability of the source respondents (stage one) to articulate their knowledge in response to the question; thereby impacting the effectiveness of knowledge sharing. When restricting a source respondent's ability to articulate in detail their response to a question, it is easy to understand how this may influence a recipient's attitude in an unfavourable manner.

One finding that was not expected was the lack of statistical difference between recipient attitude towards open-ended responses and directed responses. In light of the view of Knippen and Green (1999), it was expected that there would be a

[28] Note the decision to invest was fictitious and the actual attitude measured was that of future use of the knowledge.

difference in attitude towards open-ended and directed question responses. That is, directed question responses would result in a more favourable attitude as the knowledge contained in the response would be more directed towards the requirements of the recipient.

In summary, attitude was examined from the perspective that the knowledge received could be used for future decision-making. From a speculative perspective the attitude of the recipient towards the knowledge received can be considered to be a proxy for the perceived value they place on the knowledge received (Augier et al., 2001). A low attitude towards received knowledge could indicate that the recipient does not perceive it to be valuable for future decision-making. On the other hand, high measures could indicate that the recipient of knowledge perceives it to be valuable for future decision-making. This supports the comments of Gupta and Govindarajan (2000) who suggest that the more valuable the shared knowledge the more likely that it will be utilised.

The overall implications of these findings suggest that when knowledge is shared in a documented manner in response to questions, the structure of the question and consequently the structure of the response matters. Questions that allow for an open-ended or directed response are more likely to result in the recipient having a more favourable attitude than responses of a binary nature. The consequence of this finding for both organisations and academic theory is elaborated on in Chapter 9 – Implications of the Findings.

5.5.2 Recipient Satisfaction

Recipient satisfaction was influenced by question response structure, with satisfaction being lowest for those responses that had a binary structure. There was a difference in recipient satisfaction between open-ended and binary question responses, but there was not significant difference between directed and binary question responses (at alpha=0.05, 2-tailed). There was also no significant difference between recipient satisfaction with open-ended and directed question responses.

Although satisfaction was an exploratory construct, the key point of interest in the findings was the relationship with attitude and the reported reverse causal effect. Of considerable interest was the highly correlated relationship between recipient attitude, recipient satisfaction and the independent variable question response structure. It was posed that satisfaction would mediate the relationship between question response structure and recipient attitude; partial mediation was found. However, the results also revealed support for full mediation of recipient attitude between question response structure and recipient satisfaction. This reverse causal effect is similar to that of the chicken and egg analogy, which construct really comes first?

On one hand it can be argued that a person's attitude towards shared knowledge may be dependent on their beliefs about how satisfied they are with the shared knowledge; how content, how certain, how sure they are about the shared knowledge predisposes them towards a viewpoint, position or attitude towards it[29]. On the other hand it can equally be argued that a person's satisfaction with shared knowledge may be dependent on their attitude towards it; a favourable attitude towards knowledge received is more than likely to also result in greater satisfaction with it[30].

This rationale also prevails if a negative attitude or dissatisfaction is examined. For example, if the recipient is dissatisfied with the shared knowledge, then they are also likely to have a negative attitude towards the knowledge. Alternatively, if they have a negative attitude towards the shared knowledge then they are also likely to be dissatisfied.

However, it is important to recognise the context in which satisfaction and attitude were measured in this study. Attitude was measured within the context that the shared knowledge would be appropriate for future decision-making. The satisfaction measure on the other hand was comprised of sufficiency, relevance, depth and accuracy of the shared knowledge. Given the items that account for satisfaction, it is

[29] The TRA contends that there are a number of beliefs that when accumulated can be used to predict an attitude. In this case satisfaction with the shared knowledge is only one belief that may be predictive of a recipient's attitude towards future use of the knowledge.
[30] The TRA does not contend that attitude predicts beliefs.

probably logical to assume a positive relationship between satisfaction and attitude. For instance, favourable satisfaction with how relevant, accurate, in depth and sufficient the shared knowledge was, could indicate a recipient's attitude. However, a favourable attitude could also indicate satisfaction with relevance, accuracy, depth and sufficiency.

It is important to recognise the schools of thought that the two constructs have evolved from and that there are fundamental similarities between them. User satisfaction towards an object in terms of its effectiveness has been employed in a number of management fields, often with effectiveness being a predictor of behaviour. On the other hand attitude towards an objective in terms of its effectiveness for example, is often the measure used in social and cognitive psychology, again in an attempt to predict behaviour towards an object (see Melone, 1990, for further discussion of the similarities between satisfaction and attitude). Therefore, it is reasonable to suggest that there is a dynamic relationship between the two, as they possibly are measuring the same, if not similar things.

5.5.3 Limitations

There are a number of limitations associated with this study, inclusive of the design, the ability to generalise the findings and the measures used. Limitations with each are described below. A number of these have already been described in Chapter 4 and rather than being true limitations form part of the progressive three study approach taken. It should be mentioned that this current study (and the subsequent next two studies) uniquely examined the attitude of the recipient towards the received knowledge when the recipient was not the designer of the questions. For this reason the researcher was able to ensure that the recipients did not have any predetermined expectations of the knowledge that was shared, consequently limiting any bias in the results. However, if the recipient is also the designer of the questions the reported findings may not be applicable.

Generalisation

The use of the laboratory setting in this study does present some issues in terms of 'to whom' should the findings be generalised? Generally, external validity of laboratory experiments is questionable due to the artificial procedures that are used to control the setting, so as to increase internal validity. However, some suggest that laboratory and field experiments are equally artificial, due to mundane and experimental realism (Dipboye & Flanagan, 1979). Whilst it could be assumed that laboratory experiments would have greater experimental realism – the study is perceived to be realistic by the participant - and field experiments greater mundane realism – the variables being studied actually can occur in real organisations, often this is not always the case. Dobbins et al. (1988) contend that field experiments may have mundane realism but may lack in experimental realism due to hypothetical situations being used and therefore, it can not always be assumed that field studies will have greater experimental realism than laboratory.

In terms of this study, the scenario case although contrived and therefore lacking in experimental realism, did represent a context that may occur in a real organisation; a new investment opportunity. Further, the scenario case was only provided to those respondents in stage one (the source individuals); the recipients in stage two were provided only the questions and corresponding responses. This situation is often the case in an organisation where the manager (recipient individual) does not have the knowledge required and must question other employees (source individuals) in order to gain this. This study, although using a contrived case, does contain an element of mundane realism and therefore external validity of the results is not necessarily trivial.

However, some would argue that using students would limit the generalisation, since the results from using students may differ from those using a non-student sample (Gordon et al., 1986). However, asking the student participants to make an investment decision employs the same types of decision principals that would occur even if a sample of non-students were used. For instance, if a non-student sample was taken such participants would still only have access to the same questions and responses. While this may be the case when using a contrived scenario, it may not be

accurate when using real company knowledge. In the latter case a sample of employees may respond differently than a sample of students, purely based on their prior organisational knowledge.

Finally, although some may question the external validity of these findings it should be remembered that laboratory experiments allow researchers to "test and refine theories and thus predict behaviour in other settings" (Dobbins et al., 1988, p.282). Consequently, the results from this laboratory experiment show support for the proposed research question (Chapter 3) and provide the basis for continuing with the progression of studies proposed.

Measures

While this research has established that question structure does influence attitude, there is a potential limitation to using such a broad dimension for the measure of attitude. The purpose of Fishbein and Ajzen's (1975) theory was to predict behaviour given attitude and intentions. Since attitude formed only one construct of the theory it may not be as stable when applied independent of the other parts. Notwithstanding this, the attitude measured in this study was 'future use of the knowledge', which may result in the behavioural act of using the knowledge in future decision-making; thus knowledge transfer.

Although exploratory, the satisfaction measure attempted to ascertain how satisfied the recipient was with the shared knowledge. Since this measure was not operationalised from the literature it has been acknowledged that the findings should be viewed with caution. However, if satisfaction has similar characteristics to the construct attitude (Melone, 1990), then it seems appropriate to continue to explore the possibilities of it as a measure; especially given the complex relationship reported between attitude and satisfaction.

5.6 Chapter Summary

This chapter presented the preliminary investigation into whether or not question response structure influences recipient attitude. A laboratory experiment using self-administered questionnaires was used to collect the data. The experiment required a two-stage approach to data collection. In the first stage a contrived scenario case with three related questions was developed and distributed to 15 respondents in order to collect knowledge. The questions were structured so that respondents had to answer either in a binary, open-ended or directed manner. After collating the responses from this stage into the three groups - binary, open-ended and directed - a questionnaire was developed and distributed to students enrolled in a 3rd year management paper. Students were randomly allocated to receiving either the binary, open-ended or directed questions responses. Response structure was not mixed.

Ninety returned usable questionnaires were statistically analysed to test the hypotheses. The results revealed support for two of the three directional hypotheses. The supported hypotheses revealed that recipients had a more favourable attitude towards knowledge when presented with open-ended or directed responses, compared to binary (support for H_{1a} and H_{1c}). There was no difference in attitude between those participants that received open-ended and those that received directed question responses (H_{1b} was not supported).

The results achieved the objective of this study; there was substantial evidence that there was a relationship between question response structure and recipient attitude. However, as noted in the discussion there were a number of unexplained findings, such as the confusing relationship between recipient satisfaction and attitude (reverse causal effect). Also as described in the limitations there was a trade-off in terms of internal and external validity of the findings. The next experiment, as described in the following chapter, takes into account these findings and limitations and continues the progression of studies into question response structure and recipient attitude.

— CHAPTER SIX —

STUDY TWO

6.1 Introduction

This chapter describes the second study undertaken to examine the purported relationship between question response structure and recipient attitude[31]. Acknowledging the lack of external validity in Study One, due to the laboratory setting, this study attempts to replicate the findings using a field experiment, which employs a wider participant population. To achieve this, the same hypotheses are tested using the same scenario case and measure for recipient attitude. While the study does include an additional factor that may moderate the relationship between question response structure and recipient attitude, cognitive style, differences between the two experiments are minimised, so as to reduce reliability and replication issues.

This chapter is outlined as follows. The following section elaborates on the objectives of the study and incorporates discussion supportive of the investigation into how a recipient's cognitive style may moderate the main relationship being studied. Next, the method and additional hypotheses are described, followed by the experiment design, data collection procedures, validity, reliability and limitations of the design. The results are then presented followed by a detailed discussion of the findings.

[31] The author would like to acknowledge that the findings and subsequent discussion reported in this chapter were presented by the author at: "Creating an Entrepreneurial Nation: The Role of Enterprise and Innovation", Hamilton, New Zealand, July 2005; and "The 6th European Knowledge Management Conference", Limerick, Ireland, September 2005, and comprise of the subsequent proceedings respectively.

6.2 Objective

The main objective of this study was to update and extend understanding of how the structure of a question asked of a source and the subsequent structure of the response, influences a recipient's attitude towards knowledge received. With the results from the laboratory experiment (Study One, Chapter 5) in mind, it was the purpose of this study to determine if these earlier findings could be replicated in a field environment. Replication in the field would not only strengthen the purported relationship between question response structure and recipient attitude, but would also counter potential limitations due to the use of a laboratory environment and student sample in Study One.

While the laboratory experiment did use a substantiated operationalised measure for the construct recipient attitude (i.e. the attitude measure expounded in the Theory of Reasoned Action), other items in the measurement instrument were exploratory in nature. Of the exploratory items, apart from those items that comprised the factor satisfaction, explaining 24% of the variance, the remaining items either did not load onto stable factor structures or were deemed too low in reliability. Further, the data revealed and interesting relationship between recipient satisfaction and recipient attitude, one that possibly requires further consideration. For this reason, a further aim of this field experiment was to explore the satisfaction construct in greater depth.

A final objective of this field experiment was to examine factors that may be distorting a true representation of the relationship between question response structure and recipient attitude. Recipient attitude accounted for 31% of the variation in the laboratory experiment and although this is significant, it suggests that there may be other variables that require consideration. The cognitive style of a recipient is one such variable that is considered in this study. According to research by Taylor (2004) the cognitive style of an individual influences the way they seek knowledge from knowledge management systems. If this is the case, then it is plausible to suggest that the way in which a recipient receives knowledge from responses to questions could also have a direct influence on their attitude. How

cognitive style is designed into the experiment is elaborated on in the following section.

6.3 Method

In consideration of the objectives of this study (i.e. replication along with further examination of recipient satisfaction and the investigation of recipient cognitive style) a field experiment was the method selected to collect data. Although using a field experiment reduces the amount of control a researcher can have over an experiment (Remenyi et al., 1998), the environment does allow for use of a wider participant population, possibly permitting greater generalisation of the findings. In an endeavour to maximise the likelihood of replication through reducing variation between the two studies, the field experiment used the same question responses that were collected in stage one of the laboratory experiment (for further information of how this data was collected refer to Chapter 5, Section 5.3.1).

The next section outlines the additional hypothesis tested in this study. Since the design of the field experiment is identical to that of the earlier laboratory the next section only summarises the design process, inclusive of additional construct measures and data collection procedures. For more detail on the experiment design refer to Chapter 5. The section concludes with a discussion on issues surrounding validity, reliability and limitations of the design.

6.3.1 Additional Hypotheses

With the purpose of this experiment to replicate the results of the laboratory experiment in the field, the same hypotheses posed in Chapter 3 will be tested. However, with the experiment moving from a controlled laboratory environment into the field, there is the possibility that other variables may distort the true relationship being tested. One such variable that is considered in this experiment is the moderating influence of a recipient's cognitive style, as presented in the research model, Chapter 3.

Cognitive style explains in part how individuals prefer to receive and process information. It has been found that the cognitive style of an individual can assist or hinder information seeking (Barkhi, 2002; Ford et al., 2002; Taylor, 2004) and that an individual's learning will be more productive when knowledge sharing and assimilation matches their cognitive style (Hayes & Allinson, 1998). If this is true, then is seems appropriate to consider how cognitive style may interact with a recipient's attitude; different styles may interact differently with recipient attitude and furthermore this could be dependent upon question response structure.

As discussed in greater detail in the literature review (Chapter 2) there is a continuing discourse into the elements that comprise cognitive style, often with this debate including evaluation of various cognitive style measurement instruments. However, for the purpose of this study, this debate was not the essence, rather a mechanism for including cognitive style into the study was. Therefore, cognitive style was narrowed to the cognitive-centred approach (van den Broeck et al., 2003) and a uni-dimensional labelling of 'intuitive' individuals and 'analytical' individuals. By reducing cognitive style to these two opposing poles, rather than the more complex labels (see Myers-Briggs Type Indicator (Myers & McCaulley, 1985), or Riding's Cognitive Styles Analysis (Ridings & Rayner, 1998)), it was considered that the purported moderating influence on question response structure and recipient attitude would be simpler to measure.

According to the literature, when using the intuitive-analytical approach it could be hypothesised that intuitive individuals will have a more favourable attitude towards question responses of a binary manner, than their analytical counterparts. This is because intuitive individuals are considered to make decisions based on feelings, not necessarily requiring the same amount of hard information (Allinson & Hayes, 1996). Analytical individuals may consider responses with a binary structure too limiting in depth to provide enough knowledge to have a highly favourable attitude. Therefore, a second hypothesis is posed:

H_2: Recipients with an analytical cognitive style will have a less favourable attitude towards knowledge received from responses to binary structure questions than recipients with an intuition cognitive style.

Although open-ended and directed question response structures were also included in the experiment, there were no hypotheses posed that related to their relationship with recipient attitude and cognitive style. The next section outlines the design of the experiment.

6.3.2 Experiment Design

With replication a significant objective it was important that the design of this study did not vary considerably from that of the earlier laboratory experiment. With this in mind, the same questions and responses developed and collected during stage one of the laboratory experiment were used for this study (for further detail see Chapter 5 Section 5.3.1). Re-use of the question responses was considered appropriate since the objective was not to analyse the context of the question response, rather it was the recipient's attitude towards the responses that was of interest. Subsequently, it did not matter who had responded to the questions. Further, by using the question responses from the laboratory experiment, the only variation between the two studies was that of the sample recipient population and the questionnaire delivery method.

The experiment had the same design as the earlier laboratory study, a post-test only without control group. This design allowed for random allocation of the three treatments – binary question responses, open-ended question responses and directed question responses. Using a self-administered survey, participants were provided with instructions that asked them to assume the role of a fictitious senior manager who had asked his/her employees for their views on an investment opportunity. They were asked to review the responses they had received from their employees and to use the knowledge they so obtained to complete the assessment questionnaire instrument.

The experiment was designed so that participants would receive either question responses that were all binary, all open-ended or all directed (the three treatments). Participants were unaware of any other form of question response except that which they received. The design of the questionnaire instrument is described next.

Instrument

The instrument used in Study One was adapted for the field experiment. Changes included a new layout, new satisfaction items, the cognitive style index (CSI) measurement instrument[32] and a section for respondent demographics (refer to Appendix B: Item 1 – Questionnaire Recipient). Again three questionnaires were developed. The first contained the binary structured question responses only, the second the open-ended question responses and the third the directed question responses. Instructions were identical across the three questionnaires; participants were informed to take on the role of a manager in a fictitious organisation and the questions and responses in the questionnaire were those that they had asked their staff. They were informed that from the responses they had to make a recommendation to the organisation's senior management team, with this recommendation in mind they were then asked to complete the survey instrument.

The instrument was designed so that the first eleven items (Q1-Q11) measured recipient satisfaction with the knowledge received in the question responses. These items were not validated in the literature, were considered exploratory and took into account the findings of the earlier laboratory experiment. Each of these items contained the word 'satisfied' in attempt to obtain the recipient's satisfaction with the knowledge they received from the responses. This was achieved by using a number of adjectives, for example satisfied with knowledge depth, reliability, content, accuracy.

Items Q12-Q16 comprised the recipient attitude measure and were worded exactly the same as in the laboratory experiment. Items Q17-Q19 were new questions that were designed to elicit a recipient's preferred response length to written questions.

[32] See Section 6.3.3 for detail on the Cognitive Style Index (CSI).

Although the items did not come directly from the literature their purpose was to assist in obtaining greater descriptive data that would assist with understanding preferences to shared information in a written format. Further, it was presupposed that response length would correlate with a recipient's cognitive style, as analytical recipients could be deemed to prefer longer responses given their profile than intuitive recipients that could be deemed to prefer shorter responses (Allinson & Hayes, 1996).

Cognitive style was measured using the Cognitive Style Index (CSI) and comprised items Q20-Q57. This measure is elaborated on in the next section. Finally, items Q58-Q61 consisted of general participant demographics, including gender, age, tenure and position.

To ensure a detailed pre-test of the instrument, both academics and business individuals were provided with all three the questionnaires and asked to comment on the word usage, ease of administration and design. The few minor changes that were suggested related to the layout and were subsequently incorporated into the final version of the instrument.

6.3.3 Measures

While the measure for recipient attitude remained the same in this study to that used in the first experiment (refer to Chapter 5, Section 5.3.2), the measure for satisfaction was expanded on. Further the measure for cognitive style (CSI) was added. The measures for recipient satisfaction and cognitive style are described in greater detail below.

Recipient Satisfaction

While it would have been desirable to have an already operationalised measure for recipient satisfaction with knowledge received, there was nothing substantially usable in the literature. In addition, although the findings from Study One revealed a number of items (reliability, depth, accuracy, completeness and sufficiency) that loaded onto the satisfaction construct that was developed, it was considered that the

results were still exploratory and required further enhancement. Therefore, after consultation with academics specialising in the area of organisational psychology, a number of additional items were developed to assist with measuring recipient satisfaction. It was proposed that the measure satisfaction would include satisfaction with a number of facets, such as reliability, accuracy, depth, detail, precision, format etc. Generally these items matched well to those used when user satisfaction towards an item is measured (Melone, 1990).

Cognitive Style

In recognition of the literature that suggests that the cognitive style of an individual may influence the way they process information, an additional measure was added to the instrument to examine the cognitive style of the participants (recipients). The Cognitive Style Index (CSI) developed by Allinson and Hayes (1996) was selected because not only was it developed with managers and business individuals in mind, it had also been validated in knowledge management literature (Taylor, 2004), educational research (Coffield et al., 2004a) and other management related fields (see Hayes *et al.*, 2003, for a detailed discussion of validation). Further, independent research had rated the CSI as one of the most robust when comparing cognitive style measures (Coffield et al., 2004a). The CSI instrument was easily attached to an existing survey and unlike other lengthy measurement instruments, for example, Myers-Briggs Type Indicator, it only took 5 to 10 minutes to complete.

The CSI measurement instrument comprised of 38 items worded as statements, with a corresponding response scale of true, false or uncertain. A score of 0, 1 or 2 was allocated to each response using the CSI score card. The theoretical maximum a participant could receive was a score of 76, which indicated a very analytical disposition, with a minimum score of 0 reflecting a very intuitive cognitive style. Rather than a continuous number scaled from 0-76, research conducted by Allinson and Hayes (1996) contend that scores greater than 42 reflected those analytical individuals, whereas participants with scores of 42 or less were designated as intuitive. Therefore a discrete variable is allocated to cognitive style, allowing for easier interpretation of the results.

6.3.4 Data Collection Procedures

Prior to choosing the sample size for this study Statistical Power Analysis on the data collected in the laboratory experiment was performed using the statistical tables provided by Cohen (1965, 1988). Given the effect size of r=0.4690 reported in the laboratory experiment, with a power of 0.80 at 0.05 two-tailed, Cohen (1965, 1988) suggests a sample size of 45. Subsequently, to achieve a return rate of approximately 45 questionnaires, it was decided to double number of questionnaires, anticipating approximately a 50% return rate. A high return rate was predicted as the sample was selected from a database belonging to The Software Life Company Ltd, of which the author of this thesis is a Director. The database comprised of individuals that were self-employed, working as consultants, employees in various organisations as well as a few retired persons. The individuals were located globally and in various fields of expertise such as risk managers, banking related employees, computer technicians and administration staff. Because this study used the contrived scenario developed in the laboratory experiment, it was considered that there was no requirement to have specialised participants. Any individual who worked in the area of business was considered appropriate. Although the author did not directly contact participants outside of the questionnaire mail-out, it was considered that recognition of the author's name associated with the study would potentially increase the number of questionnaires returned. Possible bias of the results was taken into consideration when the decision to use this database was made.

Of the 90 questionnaires sent to participants, the three question response structures (binary, open-ended and directed) were randomly allocated, with 30 of each being applied. Participants were given six weeks to respond to the questionnaire.

6.3.5 Validity, Reliability and Limitations with Design

As described in the first study, to ensure reliability and validity of the measurement system, whenever appropriate multi-item scales have been used and Cronbach's coefficient alphas calculated to ensure internal consistency. Common method bias or method variance - variance that can be attributed to the measurement method (Fiske, 1982) - can often occur in studies where all the variables are collected in a

survey from the same participants. This type of variance will be tested for by using the Harmon's one-factor test (Podsakoff *et al.*, 2003). The percentage of variance accounted for by the first factor is evaluated, using principal component analysis. This test suggests that any factor that emerges (eigenvalues greater than 1.0) and accounts for most of the covariation in the independent variable should be considered with caution (Podsakoff & Organ, 1986). Further sources of method bias that may arise from this research include social desirability, common scale formats, anchors and length (Podsakoff et al., 2003). Since, the experiment is still using a contrived scenario social desirability bias may be reduced as there is no direct impact of the reported results on the participants. That is, there is no socially desirable manner in which they should answer. Other potential bias will be addressed when the data is analysed.

Importantly, this study attempts to minimise validity and reliability issues by making use of a number of elements applied in the earlier laboratory experiment. First, the same experiment design structure was applied; post-test only with no control group. This type of design lessens potential validity issues surrounding history, maturation and mortality and eliminates pre-test validity issues of testing and instrumentation (Cook & Campbell, 1976). Second, this study used the same instructions, contrived scenario, questions and question responses as Study One.

As with the first study, the use of a scenario case is a limitation of the design, reducing possible generalisation of the results to only the scenario case. However, the fundamental purpose of this study was to attempt to replicate the findings from Study One and possibly strengthen the type of participant that the findings could be generalised to. Accordingly, it is acknowledged that there may be a trade-off between internal validity issues that can be better controlled for in a laboratory setting and external validity and the ability to generalise to a wider population.

A further limitation is the restricted database that was used to ascertain a random sample of participants. Owing to the close association of the author with the database members there is possible favoured return bias from participants. This bias may not occur if a more generalised database was employed. However, the use of

the database can be defended in the same manner as the scenario case; that being the foremost objective of this study was to attempt to replicate the findings of Study One.

6.4 Results

Forty-eight questionnaires were returned (53% response rate, all were usable), with 15 binary, 18 open-ended and 15 directed.

Demographics

Demographics (Table 6-1) show there to be a greater number of responses from men compared to women, although the percentage returned for each gender was consistent with the initial sample, suggesting no bias in gender for those returned questionnaires. There was also a satisfactory spread across each of the treatments of binary, open-ended and directed question response structure for each gender (Table 6-2). The majority of respondents regarded their position within their respective organisations to be line or middle management, which correlates with their reported age group (r=0.545, p<0.01, majority fell within 20-40 years of age) and organisational tenure (r=0.404, p<0.05, majority had <5 years). As expected respondents age was also significantly correlated with their organisation tenure, r=0.511, p<0.01.

Table 6-1 Demographic Information

Measure	Items	Frequency	Percentage
Gender	Male	29	60.4
	Female	19	39.6
Age	20-29	16	33.3
	30-39	18	37.5
	40-49	10	20.8
	50+	4	8.3
Position	Senior Management	8	16.7
	Middle Management	15	31.3
	Line Management	16	33.3
	Missing	9	18.8
Years with Company	<2	11	22.9
	2-5	14	29.2
	6-10	8	16.7
	11-15	8	16.7
	16+	2	4.2
	Missing	5	10.4

Table 6-2 Question Response Structure by Gender

Gender	Question Response Type	Frequency	Percentage
Male	Binary	10	34.5
	Open-ended	11	37.9
	Directed	8	27.6
	Total	29	100.0
Female	Binary	5	26.3
	Open-ended	7	36.8
	Directed	7	36.8
	Total	19	100.0

Correlations

The means, standard deviations and correlations among items Q1-Q18 were computed[33] (Table 6-3). As indicated in Table 6-3, there is a high correlation (at the 0.01 level, 2-tailed) for items Q12-Q16, which represent the Theory of Reasoned Action (TRA) attitude construct. This was expected given both the high correlation of the same items in Study One and results reported by other authors that have used the TRA to measure attitude towards sharing knowledge (Bock & Kim, 2002; Ryu et al., 2003).

[33] The 38 items for cognitive style (Q20-Q57) were analysed and provided with a score of analytical or intuition and are not included in the correlation matrix. Item Q19 was constant and therefore was not analysed.

Table 6-3 Correlation Matrix and Descriptive Statistics

	Mean	Std Dev	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18
Q1	3.4167	1.8199	1																	
Q2	3.2917	1.7130	.868**	1																
Q3	4.5208	1.5297	.463**	.477**	1															
Q4	4.1667	1.5205	.259	.226	.556**	1														
Q5	3.6667	1.6673	.559**	.497**	.687**	.652**	1													
Q6	3.8333	1.6546	.490**	.430**	.481**	.620**	.566**	1												
Q7	3.7917	1.7740	.456**	.511**	.668**	.455**	.703**	.474**	1											
Q8	3.7917	1.5973	.374**	.466**	.585**	.453**	.660**	.381**	.840**	1										
Q9	4.5417	1.4434	.333*	.434**	.698**	704**	.545**	.582**	.485**	.447**	1									
Q10	3.0000	1.5018	.677**	.662**	.398**	.326*	.637**	.360*	.567**	.577**	.304*	1								
Q11	5.0000	1.5604	.419**	.480**	.487**	.327*	.604**	.159	.419**	.475**	.440**	.489**	1							
Q12	4.2292	1.8247	.486**	.543**	.360*	.032	.424**	.112	.469**	.374**	.210	.621**	.477**	1						
Q13	3.8542	1.6884	.533**	.478**	.343*	.010	.474**	.105	.494**	.438**	.094	.646**	.377**	.895**	1					
Q14	3.8125	1.7340	.517**	.499**	.326*	.052	.478**	.159	.527**	.477**	.118	.719**	.447**	.902**	.935**	1				
Q15	3.7083	1.6497	.263	.270	.116	-.155	.245	-.060	.319*	.242	-.041	.429**	.435**	.663**	.673**	.719**	1			
Q16	3.0833	1.8316	.336*	.361*	.168	-.140	.297*	-.054	.361*	.263	.066	.433**	.504**	.732**	.753**	.779**	.902**	1		
Q17	1.5319	0.5043	.270	.139	-.052	-.067	.167	-.099	.091	.088	-.150	.270	.239	.344*	.413**	.428**	.417**	.389**	1	
Q18	1.5319	0.5043	.127	.063	-.108	-.095	.115	-0.99	-.101	-.020	-.180	.213	.207	.274	.336*	.304*	.391**	.366*	.573**	1

n=48

** Correlation is significant at the 0.01 level (2-tailed) / * Correlation is significant at the 0.05 level (2-tailed)

Q15 & Q16 negatively worded and transformed for analysis

Also as indicated the correlations between item Q10 and items Q12-Q16 were uniformly positive, statistically significant and reasonably high (ranging from r=0.433 to r=0.719, p<0.01). Item Q10 was also positively correlated with most other items in the table (with item Q17 and Q18 being the exceptions).

Items Q17, preferred response length and Q18, preferred response detail were positively correlated with each other (r=0.573, p<0.01). This implies that a recipient's preference to length of written responses is significantly related to their preferred amount of detail from the response. Items Q17 and Q18 were also positively correlated with items Q13-Q16, with Q17 also positively correlated with Q12. However, Q17 and Q18 were not correlated with any other items in the table.

Generally the correlations were significant enough to suggest that there were underpinning factors that could be extracted using exploratory factor analysis. It was assumed that exploratory factor analysis would extract items Q12-Q16 onto the attitude factor, since this construct was already well documented in literature.

6.4.1 Factor Analysis

Using the statistical package SPSS (version 11) exploratory factor analysis using principal component analysis with Varimax rotation and Kaiser normalisation was performed to examine the underlying factors. After three iterations, which removed seven items due to either low or complex cross-loadings[34], nine items loaded onto two factors explaining 79% of the variation (Table 6-4). Since the percentage of variance accounted for by the attitude factor was 47%, although high, common method variance does not appear to be present (Podsakoff & Organ, 1986). Kaiser-Meyer-Olkin measure of sampling adequacy (KMO=0.777) and Barlett's Test of Sphericity (394.378, p<0.05) indicated that factor analysis was useful for the data.

[34] The items removed comprise the questions developed to obtain a greater understanding of recipient satisfaction with knowledge received.

Table 6-4 Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Com-ponent	**Total**	**% of Variance**	**Cumula-tive %**	**Total**	**% of Variance**	**Cumula-tive %**	**Total**	**% of Variance**	**Cumula-tive %**
1	4.364	48.488	48.488	4.364	48.488	48.488	4.247	47.185	47.185
2	2.772	30.806	79.293	2.77	30.806	79.293	2.890	32.108	79.293
3	.539	5.990	85.283						
4	.509	5.660	90.944						
5	.336	3.728	94.672						
6	.255	2.833	97.505						
7	.103	1.142	98.646						
8	6.578E-02	.731	99.377						
9	5.606E-02	.623	100.000						

The rotation component matrix converged after three iterations with the factor attitude (Q12-Q16) having high individual item loadings ranging from 0.869 to 0.939 and the factor satisfaction (Q3, Q4, Q6 and Q9), item loadings ranging from 0.795 to 0.884 (Table 6-5). Internal consistency was good with Cronbach's alpha of 0.9508 for attitude and 0.8580 for satisfaction, respectively. Further, there was no significant correlation between the two factors, suggesting that they could be considered separate constructs, again reducing the possibility of common method bias. To examine if there is a difference between the question response structure means and the factors recipient attitude and satisfaction, analysis of variance (ANOVA) was performed. A separate ANOVA was undertaken for the attitude and satisfaction factors and the results are described below.

Table 6-5 Rotated Component Matrix

	Component	
Item	**Attitude**	**Satisfaction**
Q3		.795
Q4		.871
Q6		.795
Q9		.884
Q12	.910	
Q13	.927	
Q14	.939	
Q15*	.869	
Q16*	.915	

* negatively worded and transformed for analysis

6.4.2 Recipient Attitude – ANOVA

Analysis of variance, using the mean for the 5-item measure attitude, was performed to inspect any differences in the three treatment groups (question response structure). Homogeneity of variance was not significant, with Levene Statistic of (2,45)=1.652, $p>0.05$. Results showed a significant variation in the means of the three question response structures with, $F(2,45)=6.851$, $p<0.01$, $r=0.4831$ (Table 6-6).

Table 6-6 ANOVA – Attitude with Response Structure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.976	2	13.988	6.851	**.003**
Within Groups	91.883	45	2.042		
Total	119.859	47			

Pairwise comparison using Tukey HSD with alpha=0.05 (Table 6-7), revealed that recipient attitude towards the responses elicited from binary structured questions differed from both directed and open-ended, in support of hypotheses H_{1a} and H_{1c} (effect sizes both large with $d=1.24$ and $d=1.01$ respectively[35]). Games-Howell procedure was also performed as there were unequal sample sizes in the three groups. Results also support hypotheses H_{1a} and H_{1c}. There was no significant difference between open-ended and directed structured question responses either in the Tukey HSD or the Games-Howell procedures, therefore, hypothesis H_{1b} was not supported. Figure 6-1 shows the box plot for attitude by question response structure and Figure 6-2 graphs the mean plots for attitude.

[35] Cohen's (1988) guidelines for *d* - 0.80 is considered a large effect (79 percentile standing and 47.4% non overlap), 0.5 is considered a medium effect (69 percentile standing and a 33% non overlap) and 0.2 a small effect (58 percentile standing and a 14.7% non overlap).

Table 6-7 Tukey HSD Multiple Comparisons – Attitude

Multiple Comparisons	Question (I)	Question (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)
Tukey HSD	Binary	Open-ended	-1.7178	.49956	**.004**
		Directed	-1.5467	.52177	**.013**
	Open-ended	Directed	.1711	.49956	.937

Homogenous Subsets	Question Structure	N	Subset for alpha = 0.05 1	2
Tukey HSD[a,b]	Binary	15	3.0933	
	Directed	15		4.6400
	Open-ended	18		4.8111
	Sig.		1.000	.939

Means for groups in homogeneous subsets are displayed

a. Uses Harmonic Mean Sample Size = 15.882

b. Group sizes are unequal & harmonic mean of sizes is used. Type I error levels are not guaranteed.

Figure 6-1 Box Plots for Attitude by Question Response Structure

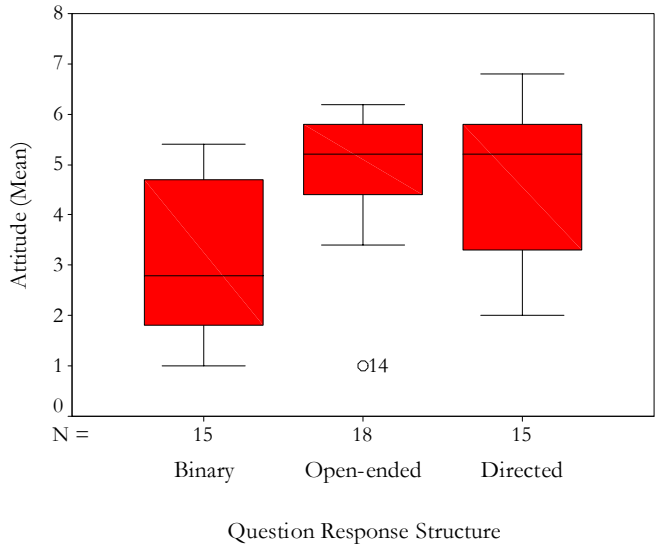
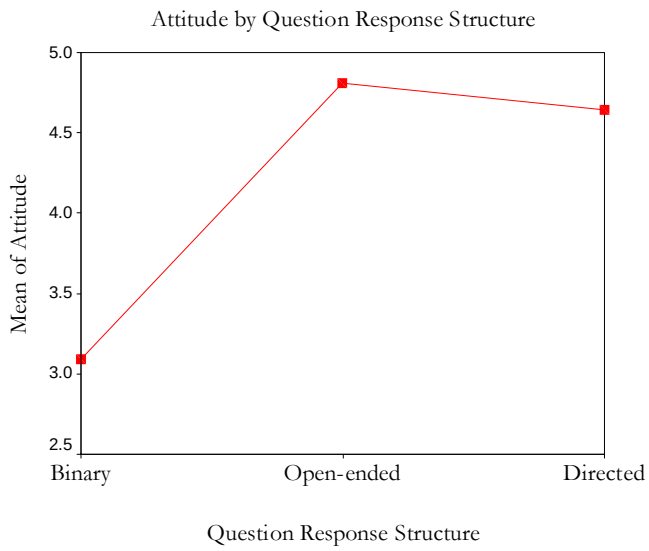


Figure 6-2 Mean Plots for Attitude



Satisfaction with Detail

The construct attitude was highly correlated with item Q10 which measured recipient perceived satisfaction with knowledge detail r=0.623 (p<0.01). Knowledge detail (Q10) was also significantly correlated with question response structure with, r=0.479 (p<0.01) respectively. This significant correlation of item Q10 with both the independent and dependent variable suggested a possible mediating effect. The three condition approach suggested by Baron and Kenny (1986) was used to assess if there was a mediating effect[36]. As indicated in Table 6-8 the beta coefficient is significant, indicating that item Q10, satisfaction with detail, does mediate the relationship between question response structure and recipient attitude.

[36] (1) the independent variable is significantly associated with the mediator variable; (2) the independent variable is significantly associated with the dependent variable; and (3) when both the independent and mediator variables are predicators of the dependent variable, the effect of the mediator must be significant.

Table 6-8 Testing the Mediation effect of Satisfaction with Detail (Q10)

(1) IV → Q10		(2) IV → DV		(3) IV → DV (mediator included)	
Std. ß	*t*-value	*Std. ß*	*t*-value	*Std. ß*	*t*-value
0.479	3.699[a]	0.387	2.846[a]	0.115	0.874
Mediator	(Q10)			0.568	4.309[b]

Notes: [a] $p < 0.01$, [b] $p < 0.001$
IV = questions response structure / DV = recipient attitude towards knowledge
Mediator = Q10

To test for reverse causal effect, recipient attitude was put through the same test to investigate whether or not it could be considered a mediator between question response structure and satisfaction with detail. Results show partial mediation for this model. The inconsistency in the results from the two tests highlights that satisfaction with detail has a complex interrelationship with recipient attitude towards knowledge received; if a recipient is satisfied with the detail they received then this can indicate their attitude, however, the reverse may also be true in that a recipient's attitude towards the knowledge received may also indicate their satisfaction with detail. These results should be considered with caution as satisfaction with detail is a singular item (Q10).

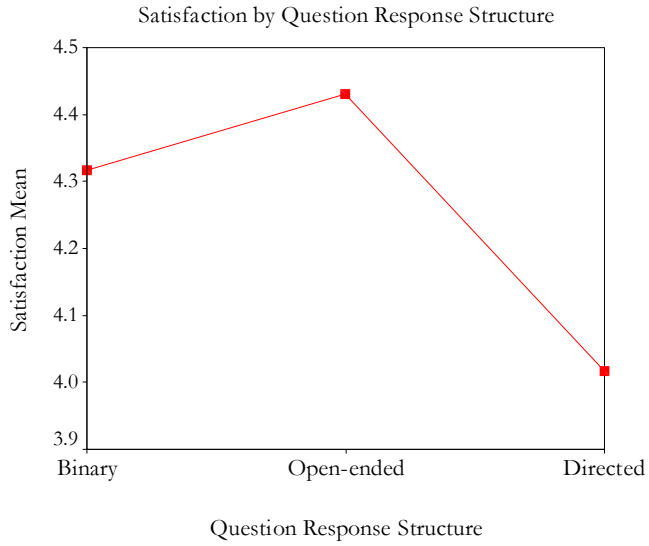
6.4.3 Recipient Satisfaction - ANOVA

Resulting from the factor analysis, the construct satisfaction was loaded with 4 items Q3, Q4, Q6 and Q9, which reflected recipient satisfaction with the relevance, accuracy, preciseness and reliability of the shared knowledge. This was considered to be satisfaction with the content of the shared knowledge.

Analysis of variance was performed to ascertain whether recipient satisfaction differed with the structure of the question response. With a Levene statistic of (2,45)=1.206, p>0.05, the ANOVA revealed no significant variation between the three means (alpha=0.05). Figure 6-3 shows the plotted means using the calculated means of binary = 4.3167, open-ended = 4.4306 and directed = 4.0167. Although

the graph of the means for satisfaction has the same directional flow as that of recipient attitude, unlike recipient attitude that least favoured binary question responses, recipient satisfaction least favoured directed question responses.

Figure 6-3 Mean Plots for Satisfaction



Since the items that comprise the satisfaction construct (Q3, Q4, Q6 and Q9) were individually correlated with item Q10 (satisfaction with detail), it was expected that collectively they would also be correlated. This was indeed the case, r=0.415, p<0.01. While recipient satisfaction with detail (Q10) was shown to potentially mediate the relationship between question response structure and attitude (see previous Section 6.4.2), the results did not indicate that recipient satisfaction with content influences recipient attitude. There was no significant correlation between satisfaction with content and either recipient attitude or question response structure, r=0.121 and r=-0.093, respectively.

6.4.4 Recipient Cognitive Style

The raw data for the 38 cognitive style items (Q20-Q57) was analysed using the Cognitive Style Index (CSI) score card and each participant was allocated a total score based on their results. The reported cognitive scores for participants ranged from 16 to 68, with a mean of 43.5, a standard deviation of 12.38 and a skewness of

negative 0.474 indicating a relatively normal distribution. Internal reliability of the 38 items was high with alpha=0.8489, which is above the 0.70 satisfactory point (Nunnally & Bernstein, 1994).

The total scores were analysed and interpreted into the categories intuition (intuitive) or analytical[37], with a score greater than 42 being analytical and a score of 42 or less intuitive (Allinson & Hayes, 1996). The correlation between the raw scores and the cognitive style score was high r=0.808, p<0.01 as expected. The frequencies for cognitive style are shown in Table 6-9. Results show there was almost an equal percentage of participants exhibiting each style with 47.9% intuitive and 52.1% analytical respectively.

Table 6-9 Cognitive Style of Participants

Cognitive Style	Frequency	Percentage
Intuition	23	47.9
Analytical	25	52.1

Because the cognitive style of participants was not pre-determined prior to the random allocation of the three questionnaires, there were no means to determine if there was an equal distribution of each question response structure amongst intuitive and analytical individuals. The result (Table 6-10) was that a greater number of intuitive participants received the directed question responses (10 intuition versus 5 analytical) and more analytical participants received the open-ended question responses (12 analytical versus 6 intuition respectively). Both intuitive and analytical participants received a similar number of binary question responses. As expected there was no significant correlation between cognitive style and question response structure (r=-0.158).

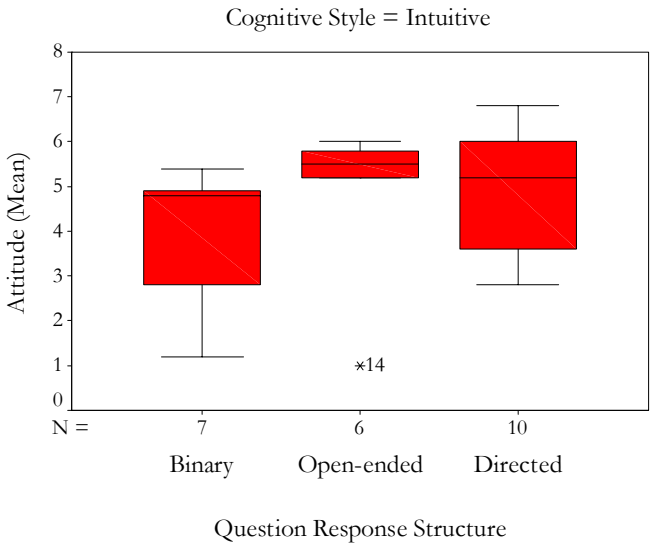
[37] The data was easier to analyse when in discrete format.

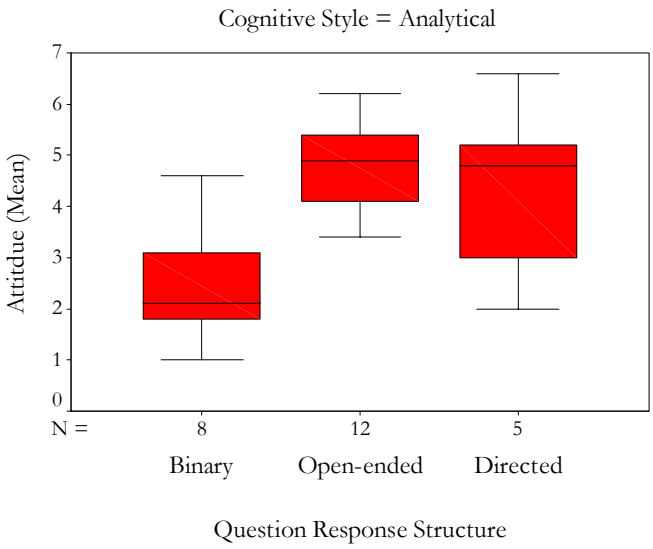
Table 6-10 Cognitive Style by Question Response Structure

Cognitive Style	Question Response Structure	Frequency	Percentage
Intuition	Binary	7	30.4
	Open-ended	6	26.1
	Directed	10	43.5
Analytical	Binary	8	32.0
	Open-ended	12	48.0
	Directed	5	20.0

Similar to the lack of relationship with question response structure, there was no significant correlation between cognitive style and recipient attitude (r=-0.177). Box plots (Figure 6-4) report the median for intuitive recipient's attitude to be similar between the three response structures with 4.8, 5.5 and 5.2 for binary, open-ended and directed respectively. However, the median attitude for analytical recipients that received the binary question response was substantially lower than both open-ended and directed (2.1, 4.9 and 4.8 respectively).

Figure 6-4 Box Plots for Cognitive Style & Question Response Structure





Recipient Attitude Controlling for Cognitive Style

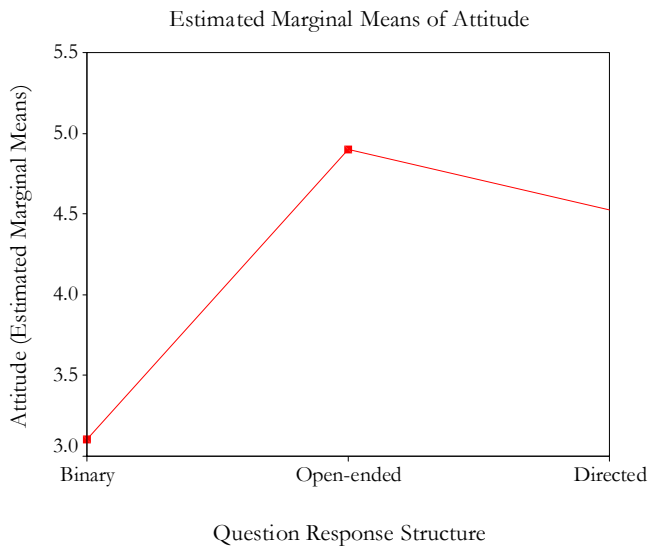
Analysis of co-variance was run to ascertain whether or not the earlier ANOVA (see Section 6.4.2) would improve if a recipient's cognitive was controlled for (Table 6-11). Results showed that the covariate cognitive style was not significantly related to recipient attitude at the 0.05 level with, $F(1,44)=2.148$, $p>0.05$. Subsequently, after controlling for cognitive style the model did not show any improvement (against the earlier ANOVA Section 6.4.2) with, $F(2,44)=7.153$, $p<0.05$, $r=0.4680$ (see Figure 6-5 for mean plots).

Table 6-11 ANCOVA - Controlling for Cognitive Style

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Corrected Model	32.253[a]	3	10.751	5.400	.003	.269
Intercept	115.359	1	115.939	57.939	.000	.568
Cognitive Style	4.277	1	4.277	2.148	.150	.047
Question Response Structure	28.483	2	14.241	7.153	**.002**	.245

[a] R Squared = 0.268 (Adjusted R Squared = **0.219**)

Figure 6-5 Mean Plots for Attitude Controlling for Cognitive Style



Recipient Attitude – Intuition–Analytical

To further explore any possible influence of cognitive style, the data was split into two groups and a further ANOVA performed. The first group contained the attitude of the analytical recipients and the second group the attitude of the intuitive recipients. Results from the intuitive group revealed no difference in the attitude means for question response structure. However, there was significant variation in the attitude means for the analytical recipient group, $F(2,22)=9.710$ $p<0.01$, $r=0.6873$ (Table 6-12).

Table 6-12 ANOVA - Attitude by Cognitive Style

		Sum of Squares	df	Mean Square	F	Sig.
Intuition	Between Groups	4.718	2	2.359	.890	.426
	Within Groups	53.028	20	2.651		
	Total	57.746	22			
Analytical	Between Groups	27.354	2	13.677	9.710	**.001**
	Within Groups	30.988	22	1.409		
	Total	58.342	24			

The post hoc test of Tukey HSD (alpha=0.05) was performed for pairwise comparison for both the analytical and intuitive recipients attitude means. While the

sample size was small (*n*=25) for the analytical recipients, the number of recipients in each treatment group also small and unequal, the results (Table 6-13) revealed a significant difference in attitude means between binary and open-ended and binary and directed[38]. There was no significant difference in any of the three treatments for the intuitive group[39].

Table 6-13 Post Hoc Test – Attitude by Cognitive Style – Analytical

Multiple Comparisons Tukey HSD	**Question (I)**	**Question (J)**	**Mean Difference (I-J)**	**Std. Error**	**Sig. (2-tailed)**
Analytical	Binary	Open-ended	-.23500*	.54171	**.001**
		Directed	-1.8700*	.67659	**.029**
	Open-ended	Directed	.4800	.63173	.731

Homogenous Subsets	**Question Structure**	**N**	**Subset foralpha = 0.05** 1	2
Tukey HSD	Binary	8	2.4500	
Analytical [a,b]	Directed	5		4.3200
	Open-ended	12		4.8000
	Sig		1.000	.722

a. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed

b. Uses harmonic Mean Sample Size = 7.347

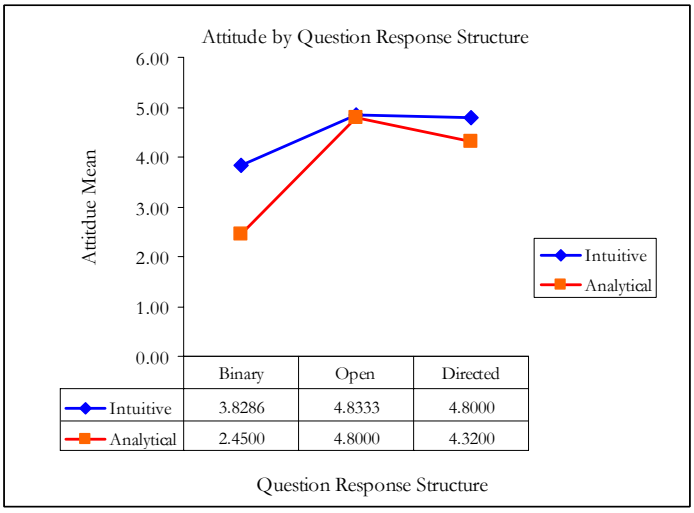
* The mean difference is significant at the 0.05 level

Figure 6-6 shows the mean plots for attitude by question response structure, comparing intuitive and analytical participants. It is interesting to note that from the graphical representation there could possibly be a difference between intuitive and analytical recipient's attitudes towards question response of a binary structure.

[38] Games-Howell can be used for unequal sample sizes. It revealed support for a difference in analytical recipient's attitude towards binary and open-ended, but not for binary and directed.

[39] Pairwise comparison is not shown for the intuitive group as there was no significant difference in the means.

Figure 6-6 Mean Plots for Attitude – Comparison of Cognitive Style



	Binary	Open	Directed
Intuitive	3.8286	4.8333	4.8000
Analytical	2.4500	4.8000	4.3200

To test if there was a difference between the attitude of those intuitive recipient's that received binary question responses and those analytical recipient's that received binary question responses, an independent *t*-test was performed (Table 6-14). With 13 degrees of freedom and Levene's test not significant ($p>0.05$) suggesting equal variances, the results were significant, $t=1.919$, $p<0.05$ (1-tailed)[40], supporting hypothesis H_2.

Table 6-14 Intuition-Analytical t-test

	Levene's Test		t-test for equality of means			
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Sig. (1-tailed)**
Equal Variances Assumed	1.679	.218	1.919	13	.077	**.039**
Equal Variances not assumed			1.871	10.525	.089	.045

Cognitive Style – Indicator of Preferred Response Length

To investigate a recipient's preferred length and detail, cognitive style and items Q17 and Q18 were analysed. The purpose of item Q17 was to ascertain a participant's preferred length of a response when receiving knowledge from others in a written

[40] Again because the hypothesis is directional, that being recipients with a analytical cognitive style will have a less favourable attitude than their intuitive counterparts to binary question response, 1-tailed is appropriate.

format. Participant could respond with either 'long' or 'short'. Item Q18 was designed to elicit a participant's preferred format, with response categories of 'detailed in format' or 'summary in format'. Both items were reversed coded, so that 'short' came before 'long' and 'summary' became before 'detail', reducing negative correlations with cognitive style (intuition was coded 1 and analytical coded 2). Correlations (Table 6-15) were high between items Q17 and Q18, a recipient's cognitive style and item Q17, but there was no significant relationship between cognitive style and item Q18.

Table 6-15 Correlation – Cognitive Style & Q17, Q18

	Q17	Q18	Cognitive Style
Q17[a]	1		
Q18[a]	.573*	1	
Cognitive Style	.453*	.196	1

* Correlation is significant at the 0.01 level (2-tailed)
[a] reversed coded

As indicated in Table 6-16, frequencies show that those participants with an intuitive cognitive style had a preference to written responses with a short format (73.9%) and summary in format (60.9%). In contrast, analytical participants preferred long written responses (68%). Independent *t*-tests indicated a statistical difference in the preference towards written response length between the two cognitive styles with, $t=3.406$, $p<0.01$. There was no statistical difference in cognitive styles to preference for summary or detail written responses.

Table 6-16 Frequencies – Cognitive Style by Q17 & Q18

Cognitive Style	Q17	Frequency	Percent	Q18	Frequency	Percent
Intuition	Short	17	73.9	Summary	14	60.9
	Long	5	21.7	Detailed	8	34.8
	Missing	1	4.3	Missing	1	4.3
	Total	23	100	Total	23	100.0
Analytical	Short	8	32.0	Summary	11	44.0
	Long	17	68.0	Detailed	14	56.0
	Total	25	100	Total	25	100.0

6.4.5 Other Findings

A number of other statistical procedures were performed to investigate the control variables: gender; position; age; and tenure. Results from each are described below.

Gender

As expected there was no significant relationship between gender and recipient attitude and subsequent analysis of co-variance did not reveal any substantial improvement in the initial ANOVA model. Further, once the data file was split by gender and ANOVA run on question response structure and recipient attitude, results showed no variance in attitude for the female data group. There was however a difference in the attitude means of those male participants with, $F(2,26)=6.503$, $p<0.05$, $r=0.5774$. Pairwise comparisons for the male participants showed support for hypotheses H_{1a} and H_{1c} but not for H_{1b}. However, it should be recognised that there were a greater number of male participants than female ($n=29$, $n=19$ respectively).

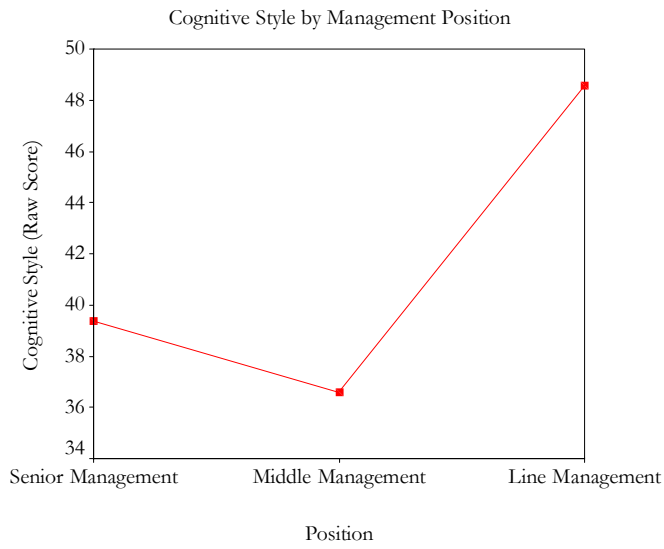
Position

Analysis of covariance was performed to ascertain if a participant's position interacted with their attitude. Results showed no support for any interaction between position and attitude. However, there was an interaction between recipient position and their cognitive style. Those recipients who reported line management

positions in their respective organisations tended to be more analytical (62.5% analytical and 37.5% intuition) than those participants in middle or senior management positions who generally were more intuitive (middle management 66.7% intuition and senior management 62.5% intuition). To test if position had an effect on cognitive style, ANOVA was performed using the raw CSI scores. Results showed that there was a difference in cognitive style, $F(2,36)=4.535$, $p<0.05$. Pairwise comparison at alpha=0.05, using Tukey HSD, Gabriel's and Hochberg's GT2[41] revealed that the cognitive style of recipients in middle management positions was significantly different to those in line management positions. Middle managers were more intuitive than line managers who were more analytical.

Figure 6-7 illustrates this difference; cognitive style ≤42 represent those recipients with an intuition style. It should be noted that the cognitive style of recipients in senior management positions was not significantly different from either middle or line management. However, there was only a small sample of recipients with senior management positions, n=8.

Figure 6-7 Cognitive Style by Position



[41] Gabriel and Hochberg GT2 are suitable when there is equal variance but sample sizes were not even (Field, 2005).

Age & Tenure

Controlling for participants age or tenure did not improve the ANOVA model. Results revealed that age and tenure were positively correlated at r=0.511, p<0.01, which was expected. There was no significant correlation between age or tenure and cognitive style, and cognitive style was not influenced by either age or a participant's tenure in their respective organisations.

6.5 Discussion

The results outlined above are consistent with those of the earlier laboratory experiment and extant theory; however, not all of the findings were expected. This section examines the implications of the results by discussing each of the significant findings: recipient attitude; recipient satisfaction; and the influence of recipient cognitive style. Next the limitations are discussed, followed by future research directions. Further comparative analysis between the two experiments can also be found in Chapter 9 – Implications of the Findings.

6.5.1 Recipient Attitude

The findings reported in this study support that of the earlier laboratory experiment in that recipient attitude is affected by question response structure. Furthermore, the results show that recipients had a more favourable attitude when presented with question responses that were open-ended or directed, compared to binary (support for hypotheses H_{1a} and H_{1c}). Like the findings reported for the laboratory experiment there was no significant statistical difference between the attitude of those recipients that received the open-ended response and those that received the directed responses, therefore H_{1b} was not supported. So what does this all mean?

It could be implied that using binary questions to elicit knowledge in a documented manner seems somewhat inconsistent. Asking such questions implicitly assumes that the recipient of the response already possesses substantial information about the source individual's environment (Vinten, 1995) and can therefore accurately interpret the response. If this is so, then it can be argued that the recipient is primarily seeking

information on status to confirm what they already know, in a manner that does not threaten their mental model. By way of contrast, open-ended or directed structured questions not only allow source individuals to articulate their knowledge, but also give the recipients an opportunity to learn and to formulate new mental models. This may result in a more favourable attitude of the recipient towards the knowledge received.

The principal contribution of these findings is the reported replication of the laboratory findings in the field. A major disadvantage of the laboratory experiment was the use of students as participants, since some argue that experiments using students as a sample population should be evaluated with caution, as there may be limited generalisation to the real world (Gordon et al., 1986). However, the field experiment used participants from all walks of life including consultants, corporate executives and line managers across a range of organisations and countries, and the results obtained fundamentally reinforce the findings of the laboratory experiment. The results also show consistency in the size of the general experimental effect (the influence of question response structure on recipient attitude), with the field study reporting r=0.4831 and the laboratory experiment r=0.4690. Cohen (1992) considered an r=0.40 to be a medium effect (with r=0.50 a large effect), one that is considered to be naturally recognised in everyday life. There was also consistency in the effect size for the supported hypotheses, d=1.03 and d=1.24 for H_{1a} (laboratory and field respectively) and d=1.19 and d=1.01 for H_{1c} (laboratory and field respectively). According to Cohen's (1988) guidelines for d (the distance between the two means in terms of standard deviations), the above effects should be considered large. See Chapter 9 for a more detailed comparative discussion of the studies.

6.5.2 Recipient Satisfaction

Recipient satisfaction was analysed using an exploratory measure that comprised initially of eleven items. What was interesting in the statistical analysis was that only four items loaded stably onto the satisfaction measure: relevance; preciseness; accuracy; and reliability. At 30.8%, the measure still explained a considerable amount of the un-rotated extraction variance. This significant amount of variance suggests

that recipient satisfaction is actually attempting to explain something within the data; however, what it is explaining is the question.

Recipient satisfaction with the knowledge shared was not influenced by question response structure, contradicting the findings of the earlier laboratory experiment (see Section 5.4.3). However, the items used to measure the satisfaction construct in this experiment were different to that of the laboratory experiment and therefore replication was not expected. Although the satisfaction means were not statistically different between the three question response structures, the direction shown graphically differed quite considerable to that of recipient attitude. For example, unlike recipient attitude, where binary question responses were the least favoured, with recipient satisfaction directed responses were the least favoured. Given the items that comprise the satisfaction construct (the content of the shared knowledge), it is plausible to imply that possibly too much detail, such as that found in the directed responses, may result in more scepticism on behalf of the recipient; they may not consider the shared knowledge in the directed responses to be as reliable, precise, accurate or relevant as that contained in the open-ended responses. This notion touches on the concept of trust within knowledge sharing. Trust in the context of this study involves the recipient having a confidence that the shared knowledge is reliable, accurate, precise and relevant to their decision-making. If they do not trust the individual sharing the knowledge (the source) then they may be more likely to be dissatisfied with the knowledge shared. It is important to note that with the scenario case the recipient's did not know who actually shared the knowledge. This lack of knowing may possibly also influence their satisfaction.

A final point which relates to satisfaction is the high correlation between recipient satisfaction with content and recipient satisfaction with detail. However, there is logical reasoning for this association. For instance, if one is satisfied with the content of a documented piece of information, then it is logical to presume they are also satisfied with the detail contained within it. However, although satisfaction with detail was found to mediate the relationship between question response structure and recipient attitude, satisfaction with content was not. The overall questionability of

issues surrounding the satisfaction construct suggests further research is required to ascertain a greater understanding of what exactly recipient satisfaction is measuring.

6.5.3 Cognitive Style

With respect to a recipient's cognitive style, the findings raise some interesting discussion issues. First, although the cognitive style of the participants was not known prior to the study, the results showed an almost even split of those analytical and those intuitive participants (48% intuition and 52% analytical respectively). This corroborates with other research that has used the CSI measure. Reported means[42] for the raw CSI measure were 41.64 for Business Students (n=202, SD=12.19), 43.26 for Brewery Managers (n=226, SD=12.11), 37.89 for Human Resource Managers (n=136, SD=14.05), 40.45 for Software Developers (n=212, SD=13.84) and 41.24 for Line Managers in government organisations (n=113, SD=13.64) (Allinson, 2004; Sadler-Smith *et al.*, 2000; Taylor, 2004). Therefore, it could be implied that individual cognitive make-up is randomly and evenly distributed amongst the general business population. Consequently if this notion is valid, when combined with theory that suggests that cognitive style influences the way we process information and knowledge (Hayes & Allinson, 1998), how cognitive style interacts with recipient attitude towards shared knowledge becomes a plausible issue.

The results revealed there to be no significant increase in the model (question response structure → recipient attitude), when controlling for cognitive style. However, when the data was split between the two cognitive styles ANOVA revealed a difference between binary and open-ended attitude means and binary and directed attitude means for analytical recipients only (still supporting H_{1a} and H_{1c}). There was no difference in attitude means for intuitive recipients.

Further, investigation found that recipients with an analytical cognitive style demonstrated a statistically less favourable attitude towards responses from binary questions, than their intuitive counterparts (t=1.919, p<0.05 (1-tailed)). This provided support for hypothesis H_2 and the moderating relationship purported in the

[42] ≤ 42 is intuition and 43 and above is analytical

research model (Chapter 3). Since an analytical disposition operates with "information being processed sequentially … depends on systematic methods of investigation … requiring step by step analysis" (Allinson & Hayes, 1996, p.122), it is rationale that analytical recipients had a lower attitude towards binary responses. They were unable to make the apparent leaps of inference that their intuitive counterparts were capable of making. These findings suggest that analytical individuals are more sensitive to question response structure than intuitive individuals.

Another interesting, although not unexpected finding was that of the relationship between individual cognitive style and preferred response length. Recipients with an analytical style preferred responses in written format to be long in length, whilst those with an intuition style preferred responses to be short. Although this finding supports the logic behind the two intuition-analytical styles, an issue it raises is: if intuitive recipients prefer shorter written response, such as binary responses which are very short, why do the results from this study show that they still have a more directionally favoured attitude towards the longer responses, such as open-ended and directed? This possibly could be due to the context of the scenario case in this study and one of the assumptions of binary question responses; that being that binary questions assume the recipient is already in possession of enough knowledge to cognitively process the response (Vinten, 1995). Subsequently, although, intuitive recipients prefer shorter responses, in this case possibly they did not possess enough prior contextual knowledge when having to make the scenario investment decision and consequently they required greater detail, such as that contained in the open-ended and directed responses. Such a result may not be the case when the shared knowledge only reinforces the current knowledge base of intuitive recipients.

A further cognitive style finding relates to recipient gender. Often gender-centred studies on cognitive style characterise females as more intuitive than men (see Hayes *et al.*, 2004, for summary). However, the results from this study do not indicate this, rather they support the findings of Hayes et al. (2004) who when investigating the cognitive style of female managers and their male associates, found that female managers were no more intuitive than their male counterparts. Further, they

reported no difference between male and female managers in terms of their general cognitive style. This also supports the work of Sadler-smith el al. (2000), who found no effect of gender when examining government employees cognitive style. In addition Taylor (2004) who examined cognitive style and Knowledge Management System usage also found generally there to be no interaction with cognitive style and gender (he did report one exception). Hayes et al. (2004), Sadler-smith el al. (2000) and Taylor (2004) all employed the CSI measure.

Finally, although there was no interaction between gender and cognitive style, the results did show an interaction between recipient position in their respective organisations and their cognitive style. Recipient's reporting line management positions were shown to be more analytical than those with middle management positions, supporting the work of Sadler-Smith et al. (2000) and Allinson and Hayes (1996). However, although recipient position correlated with their age (r=0.545, p<0.01), there was no effect of age on a recipient's cognitive style.

6.5.4 Limitations

At the same time as acknowledging the contributions that these findings make to the field of knowledge sharing, there are also a number of limitations that require recognition and discussion. This includes the ability to generalise the findings, issues with the statistical procedures used to analyse the data and concerns with the employed measures. Each issue is discussed below.

Generalisation

It was acknowledged earlier (Chapter 4) that there is a general trade-off between internal and external validity. One of the objectives of this study was to replicate the laboratory results (Chapter 5) in the field and therefore increase the overall external validity of the findings in terms of population generalisation. Notwithstanding this, to what population the results can be generalised is still a potentially contentious issue. In the laboratory study (Chapter 5), the results were generalised to the student population and the scenario case. It could be suggested that the findings were not able to be generalised past this, as the mind of the student is not the same as the

mind of working managers. Further, it could also be argued that the scenario case was not real and therefore the findings could not be generalised past that.

However, this study used the same contrived scenario from the laboratory experiment and took it to the business population. The questionnaires were sent to participants from various industries[43] and the results showed that those participants had a range of positions and tenure with their respective organisations. It could therefore be argued that overall findings for the hypotheses can now be generalised to a wider population, inclusive of those students and general business individuals. Nevertheless, there is still the issue of the use of a scenario case and how this may effect how well the findings can be generalised.

On the one hand, it can be argued that since a contrived scenario was used in both experiments (Study One and Study Two) the results are only generalisable to the scenario and may be overly simplistic, with perhaps limited relevance to a real organisation. However it can equally be argued that there were no direct consequences for the participants; their views, attitudes and decisions had no future consequence for them personally (loss of job, bonus, promotion, reputation etc). Thus, the results obtained are potentially of greater significance in the real world. The value placed upon received knowledge in situations where there are personal consequences contingent upon the decision or recommendation made, views expressed etc, is likely to be much greater than where there are no consequences. It is quite possible that in situations such as that just described, differences in a recipient's attitude towards the knowledge received from responses to binary questions compared to those received from open-ended/directed questions will be even greater than those found in these studies. It does not seem unreasonable therefore to suggest that these results possibly understate the reality of real world situations and for that reason should not be trivially dismissed.

[43] In hindsight it would have been interesting to collect data on the industry that participants were in to ascertain if there is any industry effect. This is a suggested modification for any future research.

Data Analysis Method

There are a number of issues that arise out of the data analysis methods that require consideration in terms of the limitations of this study. First, even though the sample size for this study met the requirements of Cohen (1965, 1988) for statistical power and effect size, the sample was still small. Further, once the sample was grouped for cognitive style and question response structure, the sample size for each group was too small to make any substantiated generalisations of the subsequent findings. For this reason, future studies that intend to include the cognitive style factor should bear in mind the sample size required to obtain suitable numbers in each factored grouping.

A second issue that arises from the data analysis is that of how the data was analysed. The steps taken to analyse the data in this study were still very exploratory, gradually building in complexity as potential relationships between variables were surfacing in the findings. Through analysing the relationships separately there was no single path analysis performed. This poses the question as to whether the unilateral relationships shown (though independent analysis) would also be evident when all relationships were placed into a single path model for analysis? Unfortunately due to time constraints and again sample size single path analysis was not performed for this study.

A further, possibly contentious issue surrounding the data analysis, is that of the amount of variance explained by the construct recipient attitude. Forty-eight percent of the un-rotated variance was explained by recipient attitude. Although this could be considered too high and potentially an issue of common method bias, it is important to recognise the percentage of variance explained by recipient attitude in the laboratory experiment was still high at 39% un-rotated. The instrument used for the field study removed a large number of items that did not load successfully in the laboratory study, in attempt to increase the variance explained by the two factors attitude and satisfaction. This was successfully achieved. Further, 30% of the extracted variance can be explained by the construct satisfaction, thus both factors explained a large amount of variance, not just recipient attitude.

Measures

Each measure operationalised in this study, recipient attitude and recipient cognitive style, has its critics. Limitations to using the Theory of Reasoned Action operationalised attitude measure for recipient attitude have been discussed in the limitations section of Chapter 5 (see Section 5.5.3). However, it could be suggested that by replicating the findings of the laboratory study, this has strengthened the construct validity of this measure.

With reference to the limitations of the CSI as a measure, some could argue that the uni-factorial structure of the construct may downplay theory and research that considers cognitive style as a multi-dimensional structure (Hodgkinson & Sadler-Smith, 2003). However, claims of construct inadequacy have been partially countered (see Hayes et al., 2003) and the CSI measure is considered to be one of the more robust measures of cognitive style (Coffield et al., 2004a). Notwithstanding this, future research could explore whether or not there are interactions between recipient attitude and cognitive style when using a more multi-dimensional construct. Whilst the findings should perhaps be viewed with caution, there is nevertheless a strong argument that organisations should not take for granted individual cognitive styles when disseminating knowledge.

6.6 Chapter Summary

This chapter presented the second experiment of a three study research investigation. The principal objective of this study was to ascertain if the findings from the first study, undertaken in a laboratory environment, could be replicated using a field experiment as this would increase the external validity of the overall combined results. Using the same scenario case, questions and responses gathered in the laboratory experiment, this study also aimed to analyse the possible influence of cognitive style on recipient attitude.

The forty-eight returned questionnaires were statistically analysed to test the hypotheses. The first group of hypotheses purported relationships between question response structure and recipient attitude. The results showed that recipient attitude

was less favoured to binary question responses than open-ended or directed, supporting the same hypotheses as the earlier laboratory experiment, that being H_{1a} and H_{1c}. There was no difference in attitude between those recipients that received the open-ended or directed question response (H_{1b} was not supported). The second hypothesis (H_2), also supported, asserted that there was a difference in recipient attitude towards binary question responses dependent on recipient cognitive style.

Overall, although a number of the relationships uncovered were not earlier hypothesised, there was logic to the findings. The mediating relationship of satisfaction with detail found between question response structure and recipient attitude seems sensible; if a recipient is satisfied that there is enough detail, then perhaps their attitude is more favoured than if they were not satisfied with the detail. Further, although satisfaction with content was not directly related to recipient attitude, it was highly correlated with satisfaction with detail. However, the scale for detail had a binary response category – short/long - and subsequently future research could attempt to develop a more rigorous scale.

Finally, this chapter presented both the limitations of this field experiment and acknowledged the contributions of the findings. The next chapter describes the final experiment conducted in the progressive trilogy of studies undertaken. The final study addresses and incorporates the findings and limitations described in this chapter.

— CHAPTER SEVEN —

STUDY THREE

The knowledge of the world is only to be acquired in the world, and not in the closet
-- Lord Chesterfield (Letters to His Son 1746, Published 1774)

7.1 Introduction

This chapter describes the final study undertaken to examine the relationship between question response structure and recipient attitude. Using participants from a single organisation, this experiment draws on knowledge relevant to the tasks and responsibilities required of employees. While the first two experiments made use of a contrived scenario case and elicited responses to questions about the case, this study uses shared knowledge that is company specific; knowledge about technical procedures. The use of real organisational knowledge is motivated in part by the review of the literature and the suggestion that perceived importance or relevance of knowledge may influence the value a recipient places on shared knowledge. Further, the use of real organisational knowledge may reduce, if not eliminate the potential limitations related to the apparent triviality of the contrived scenario case, as discussed in the preceding chapters.

As described in Chapter 4 this experiment, the last of three progressive experiments, tests the same hypothesised relationship between question response structure and recipient attitude. In addition, like Study Two it also includes a recipient's cognitive style and the moderating relationship this may have between question response structure and recipient attitude knowledge. Finally, the relationship between attitude and intention as purported by the Theory of Reasoned Action (TRA) is tested.

The chapter begins with a description of the objectives of this study and the intent to use non-trivial task-related knowledge. Details on the type of organisation required are outlined followed by a brief description of the company chosen. Next, the research method, the additional hypotheses to be tested, the experiment design, the instruments used, the measures, the data collection procedures and issues with respect to limitations, validity and reliability of the study are described. The results are then explained in detail, followed by a discussion of the implications of the findings.

7.2 Objective

The two studies already reported have found there to be support for the research question - question response structure does influence recipient attitude. More specifically, recipients have a more favourable attitude towards responses from open-ended or directed questions compared to binary question responses. However, these findings were obtained using a contrived scenario, there being no direct or potential consequence to the participant from their responses to the questionnaire; there was no personal cost or potential personal cost associated with the answers they provided. The literature suggests that the more relevant the shared knowledge is to the requirements of the recipients, the greater the value they place on the knowledge (Augier et al., 2001). Further, if the shared knowledge is relevant the more likely it is that the recipients will use the knowledge (Schulz, 2003). For this reason, as well as the issue of external validity, the principal objective of the study described in this chapter was to evaluate the relationship between recipient attitude and question response structure using real task-related shared knowledge[44]. If the results from this study were to replicate those of the earlier two studies then the notion that question response structure does matter when sharing knowledge has considerable support.

A second objective of the current study was to investigate further the potential influence of an individual's cognitive style upon the receiving of shared knowledge. The results reported in Chapter 6 (Study Two) found that cognitive style moderated

[44] It was envisaged that the task-related knowledge could involve either vertical or horizontal knowledge flows and this would be dependent on the knowledge context selected.

the relationship between question response structure and recipient attitude for binary responses only. Cognitive style was also found to be highly correlated with a recipient's preferred response length when receiving knowledge. Such findings contend that cognitive style is potentially an important construct in the context of receiving shared knowledge. Since, this study intends to investigate the relationship using real knowledge rather than the contrived scenario, it was considered appropriate that the influence of cognitive style was again examined.

Third, the findings in terms of recipient satisfaction with the shared knowledge differed between Study One and Study Two (this was not unexpected given that the measure for satisfaction was not the same in each experiment). In the Study One satisfaction was found to have a complex relationship with recipient attitude. In contrast recipient satisfaction was found to have no relationship with recipient attitude in Study Two. However, satisfaction with detail (a singular item) was found to mediate the relationship between question response structure and recipient attitude. To account for these contrasting findings, the construct satisfaction is investigated further in this study.

Finally, this study explores whether or not recipient attitude towards the shared knowledge is a reliable predictor of intention to use the shared knowledge in the future (as per the Theory of Reasoned Action (TRA) and described in Chapter 3). If this is the case, given the nature of the theory favourable intention could be used to predict the behavioural act of using the knowledge and therefore foretell the likelihood of knowledge transfer. This is significant since an objective of sharing knowledge within the context of an organisation is to provide the recipient with knowledge that can assist them in their job related decision-making. Any findings linking attitude and intention would not only enhance the importance of understanding knowledge sharing as a component of knowledge transfer, but moreover, given the findings of the earlier experiments this would strengthen the significance of question response structure in the knowledge sharing process[45].

[45] Intention was not examined in the earlier two experiments as the knowledge context was contrived and therefore intention to use this knowledge in the future was not a realistic measure.

7.2.1 Background to Site Selection

A number of experimental design criteria influenced the selection of a suitable site. First and foremost, the context of the shared knowledge had to be relevant to a large number of staff. Results from the earlier two experiments suggested that a sample size of approximately 45 would be required to achieve a 0.80 power and overall experiment effect size of r=0.4. With the three treatments groups (question response structures) and a good response rate similar to that achieved in the two earlier experiments, it was decided that the selected site should have at least 90 employees to which the shared knowledge context was relevant.

The second factor relevant was the actual context of the knowledge that was to be shared. An important part of the experimental design procedure was obtaining knowledge from source individuals. It was considered desirable that these individuals be experts in their field to ensure that they could respond in an accurate and appropriate manner to the posed questions. Further, it was also important that this shared knowledge could be codified; the source individuals had to be able to document their knowledge in response to the questions. As with the earlier experiments there was also a requirement to have a large enough population of experts (source individuals) to ensure that there was at least 2-3 individuals in each question response group (binary, open-ended and directed). Therefore, the selected site had to have at least nine employees that had expert knowledge in the selected knowledge context.

A third and critically important requirement was top management support. This study required an organisation with at least one hundred employees and without support from management there was the potential for the project to fail due to low response rate. Top management support was considered to be necessary to ensure the support of the internal resources required to assist with the development of an appropriate knowledge context, verify the applicability of the developed questions and provide an employee/participant list.

Finally, it was considered desirable that the selected site was a New Zealand based company. This would assist to reduce costs and minimised the administrative time

and effort required to complete the study. With each of these criteria in mind, the selected company is described below.

Company Details

The organisation selected for this study was Resene Paints Limited. Locally owned and operated, Resene is one of the largest privately owned companies in New Zealand. It manufactures and sells paint, together with related products through its retail Colorshops and franchise outlets. The company also has wholly-owned subsidiaries in New Zealand, Australia and Fiji as well as a number of other ventures.

Resene had over 600 employees located throughout New Zealand at the time of the study, with its Head Office based in Wellington. Also based at the Head Office was their technical and research and development team, which had over 10 employees. Overall the company was considered appropriate as there were enough technical employees (or source individuals) and retail staff (recipient individuals) for the requirements of the study.

The Managing Director of Resene was contacted and provided with a brief of the project. Upon accepting the project a meeting was scheduled with a contact person based at Head Office. This person co-ordinated all the internal requirements for the study and provided the necessary contacts. After this meeting all correspondence was conducted via phone conversations, email and mail. Further detail on the design of the questions and the knowledge context is described in the following method section.

7.3 Method

The design of this study was more complex than that of the earlier two experiments, primarily because there was a requirement to frame an appropriate knowledge context that was applicable to the organisation. This required close discussion with key employees to ensure that the questions and their subsequent response structures would fulfil their purpose:

- the source individual could articulate their knowledge; and

- the recipient could understand and process this knowledge.

The additional hypotheses tested in this study are outlined in the next section. Then, the design of the experiment is described followed by the measures and data collection procedures. The section concludes with a discussion of issues relating to validity, reliability and limitations with the overall experiment design.

7.3.1 Additional Hypotheses

As with the earlier two experiments the main objective of this study was to empirically examine the influence of question response structure on recipient attitude towards knowledge received. To achieve this, the same hypotheses tested in Studies One and Two (Chapter 5 and 6) were tested (H_{1a}, H_{1b}, H_{1c}). Further, in Study Two hypothesis H_2 was posed and tested. This hypothesis purported that a recipient's cognitive style would moderate the relationship between question response structure and recipient attitude for binary question responses. More specifically, recipients with an analytical cognitive style would be less favourably disposed to question responses of a binary structure than their intuitive counterparts. Since the knowledge context for this experiment would differ from that of Study Two, hypothesis H_2 was tested again.

The results from Study Two suggested that recipients with an intuitive cognitive style prefer written responses that are short and to the point. In contrast, analytical recipients prefer longer responses. To test this further, the following hypotheses are posed:

H_{3a}: When receiving knowledge in a written format, recipients with an analytical cognitive style will prefer long to short responses.

H_{3b}: When receiving knowledge in a written format, recipients with an intuition cognitive style will prefer short to long responses.

The findings from Study Two suggested that if a recipient was satisfied with the detail of the shared knowledge, then this could be used to predict their attitude towards the knowledge received. The results also demonstrated that the structure of the question response provided to a recipient (binary, open-ended or directed) could be used to predict their perceived satisfaction with detail, i.e. satisfaction with detail mediates the relationship between question response structure and recipient attitude. Consequently the following hypothesis is posed:

H_4: Recipient's perceived satisfaction with the detail they receive from the question responses will mediate the relationship between question response structure and recipient attitude.

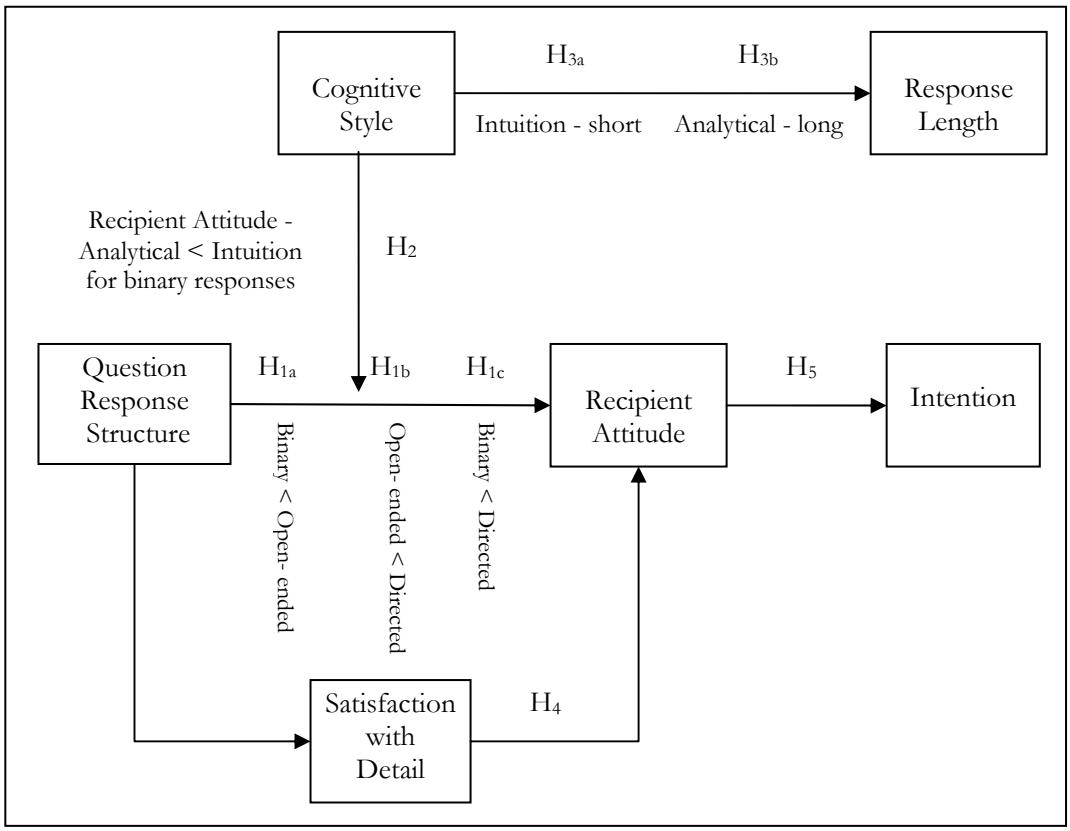
The attitude measure used in this study forms part of the Theory of Reasoned Action (Fishbein & Ajzen, 1975). This theory assumes that behaviour is determined by an individual's intention to perform, or not to perform a particular behaviour. Intention can be determined by an individual's attitude towards performing a particular behaviour. In the context of this study, the attitude measured was that of the recipient's attitude towards the future use of the knowledge. When employing the Theory of Reasoned Action (TRA), it can be postulated that a recipient with a favourable attitude towards received knowledge would also have a favourable intention towards using the knowledge and intention, therefore, could be potentially predictive of the behavioural act of using the knowledge.

Although it is the focus of this thesis to examine knowledge sharing, not knowledge transfer (the latter involves knowledge sharing plus actual knowledge use), it is still appropriate to consider a recipient's intention to use the knowledge in the future, since intention does not involve the actual behavioural act of use. Consequently, the following hypothesis involving attitude and intention is posed:

H_5: Recipient attitude towards the knowledge received will positively affect their intention to use the knowledge.

Figure 7-1 illustrates the purported relationships and hypotheses[46]. The next section describes how the experiment was designed to investigate the hypotheses enumerated above.

Figure 7-1 Purported Hypotheses Model



7.3.2 Experiment Design

In a manner similar to that employed in the first study there was a requirement to both collect and assimilate knowledge prior to distributing this knowledge to recipients for evaluation. This was achieved by splitting the experiment into two stages. The first stage involved developing a relevant organisational knowledge context to provide a basis for the questions, selecting a sample population of source individuals and collecting responses to the questions from these individuals. The second stage involved the compilation of the responses to the questions and

[46] The influence of organisational culture as posed in the research model in Chapter 3 is not included in the hypotheses model (Figure 7-1) as it could not be examined within a single company; culture is an organisational level phenomena. A recipient's perception of organisational culture and their prior knowledge are examined, although no hypothesised relationships with recipient attitude are posed.

distribution of them to a second sample of participants - the recipients. More detail on each of the stages is outlined below.

Stage 1 – Case & Question Development

The initial requirement of this stage was to develop an organisational knowledge context; a knowledge area that would be relevant to a number of Resene's employees. The requirement of this knowledge context was twofold. First, there had to be a group of employees that could be considered experts in the area and therefore could appropriately share their knowledge when responding to the questions. Second, this shared knowledge had to be relevant to a second group of employees – this group of employees had to be able to internalise and understand the implications of the questions and responses.

After discussion with a number of Resene staff it was decided that paint tinting was a knowledge context that would be highly relevant to this study. First, there was a group of expert technical research and development (R&D) staff based at Head Office that could appropriately respond to questions surrounding paint tinting at Resene. Second, having up-to-date knowledge on paint tinting was crucial to any employee that worked in the retail function at Resene; such operational knowledge was required to successfully sell various brands of the company's paint. Unlike, Studies One and Two where the knowledge flow between the source and recipient, although contrived, was vertical in direction, the knowledge flow in this study is horizontal in direction, between two organisational units (R&D and Retail).

Once the knowledge context was selected, five questions that related to paint tinting procedures at Resene were developed[47], together with a cover letter (refer to Appendix C: Item 1 – Letter (Stage One)). Each question was structured to allow for either a binary, open-ended or directed response format (Appendix C: Item 2 – Questions & Response Structure). Three corresponding questionnaires were designed. The first questionnaire contained the five questions relating to paint tinting allowing for a binary response of 'Yes' or 'No' only. The second

[47] The questions were developed with the input of a senior technical staff member at Resene.

questionnaire again contained the five questions and allowed space for open-ended responses, and the final questionnaire contained the five questions with their directed structure and allowed space for the response. All three questionnaires contained the same instructions (Appendix C: Item 3 – Questionnaire - Source).

As well as the main five questions on paint tinting procedures at Resene, there were a number of other questions in the questionnaire instrument. These additional questions were used to collect data on employee perception on the prevailing organisational climate towards sharing knowledge, how well they believed they could share their knowledge on paint tinting, as well as general demographics. Perception of organisational climate was considered appropriate for this last experiment for the following reasons. First, owing to the fictitious knowledge context used in the first two experiments perception of organisational climate towards sharing was not gathered as the results would be meaningless; participants in the sample were lecturers and post-graduate students. Second, an organisations climate towards sharing is regarded to influence effectiveness of knowledge work (Janz & Prasarnphanich, 2003; Sveiby & Simons, 2002). If participants do not consider their organisational climate to be one that promotes sharing, it is more than likely that they will limit the amount of knowledge they share, if they share at all. Therefore, understanding their perception of organisational climate towards sharing knowledge is important.

All three questionnaires were pre-tested by employees at Resene Head Office, with suggestions resulting in a number of word changes in the instructions section.

Stage 1 – Data Collection (Responses to Questions)

The sample population from which participants could be selected was limited to employees from the technical research and development (R&D) department at Resene Head Office. Since a number of these employees had already participated in the design and testing of the questionnaire they were considered ineligible to participate further in the study. Nine employees were selected and subsequently posted a letter with either the binary, open-ended or directed questionnaire (3 received the binary, 3 the open-ended and 3 the directed). An internal mail envelope

was provided for completed questionnaires and addressed to Resene Head Office; returned questionnaires were sent back in bulk to the author. Participants were informed in the questionnaire that although the responses would be used in stage two, their personal details would be kept confidential.

A follow-up email sent to the participants after 2 weeks (Appendix C: Item 4 – Follow-up Email) revealed that three of the initial participants either did not consider that they had enough expertise to answer the questions or they were not available. Consequently, in consultation with Resene staff an additional three new employees were selected and sent an appropriate questionnaire.

Eight completed questionnaires were finally received, comprising of 2 binary, 3 open-ended and 3 directed question responses. Owing to the fact that there were only 2 binary questionnaires returned, it was decided to cull the last two received open-ended and directed responses, leaving 2 usable responses for each of the three question structures (Appendix C: Item 5 – Question Responses). Although it was not the purpose of this study to examine the responses of the participants to the additional questions on organisational culture, ability to share and demographics, general data can be found in Appendix C: Item 6 – Results Stage One.

Stage 2 – Experiment Design Structure

The responses collected in stage one were grouped by question response structure into binary responses, open-ended response and directed responses. The same experimental structure identical to that outlined in Studies One and Two was used - post-test only without a control group, with allocation of the treatments being random (for further detail on this design, refer to Chapter 5, Section 5.3.1).

Stage 2 – Instrument

As with the earlier experiments three questionnaires were developed, each containing identical instructions and measurement instrument, but differing in the question response treatment provided (refer to Appendix C: Item 7 – Questionnaire –

Recipient). The questionnaire instrument was designed so that items Q1-Q5 comprised the construct attitude. Items Q6-Q11, although still exploratory were intended to measure a recipient's perceived satisfaction with the shared knowledge. Preferred response format was measured with items Q12-Q15, using a 7-point Likert scale. This scale differed from that used in Study Two, which only allowed for closed response (e.g. short or long). However, it was anticipated that a Likert scale would provide better information for statistical analysis.

The Theory of Reasoned Action construct intention was measured using items Q16-Q20 (see the next section for more detail). Items Q21-Q26 also measured attitude but used the original scale suggested by Fishbein and Ajzen (1975), that being a 7-point Likert scale anchored at either end by alternative adjectives (e.g. harmful-beneficial, worthless-valuable). The reason for including this scale was to ensure that the scale that had been used to measure attitude in this and the earlier two experiments was validated. It was expected that items from both scales that measured attitude would be highly correlated.

In this experiment it was deemed necessary to measure a recipient's perceived prior contextual knowledge (Q27-Q32) because if a participant considered themselves already an expert in the context of paint tinting (prior knowledge) then they may have a less (or more) favourable attitude towards the shared knowledge. For example, they may consider that the shared knowledge does not add to their knowledge base. Similarly, a recipient's perception of the organisation's climate of sharing was also considered important (Q33-Q37) since this can indicate how open the organisation is towards sharing and receiving knowledge (Sveiby & Simons, 2002). The prior knowledge and organisational climate measures are described in more detail in the next section.

The cognitive style of the recipients was measured using the CSI index (Q38-Q77). Finally, general demographics, such as gender, age, number of years with the company, position and general store location comprised of items Q78-Q82. The instrument was pre-tested and there were only a few minor changes made to word usage.

As with the preceding experiments, common method bias was tested during data analysis using Harmon's one-factor test (Podsakoff et al., 2003). However, to reduce possible social desirability bias, participants were informed on the information page to answer as honestly as possible, even if this involved a negative response. They were also informed that only aggregate statistics would be reported thus maintaining individual confidentiality.

7.3.3 Measures

The operationalised measures used in the study included those used in the earlier experiments (recipient attitude, recipient satisfaction and cognitive style) as well as a number of additional constructs (alternative attitude measure, recipient intention, prior knowledge and perception of organisational climate). Each measure is described below.

Recipient Attitude

As with the earlier two experiments recipient attitude towards knowledge received was measured using the operationalised construct attitude from the Theory of Reasoned Action (TRA). This was measured using a 5 item 7-point Likert Scale, with 1 = strongly disagree, through 4 = neutral, to 7 = strongly agree. Although this scale is similar to that used by others to measure attitude towards sharing knowledge (Bock & Kim, 2002) it does not conform exactly to the original scale (Fishbein & Ajzen, 1975). Therefore, to validate this scale the original attitude scale was also included and labelled alternative attitude. This scale[48] comprises of a 7-point Likert scale which is anchored by adjectives at either end of the scale. The adjectives used included those used in the attitude measure for Studies One and Two together with those used by Ryu et al. (2003) in their study of knowledge sharing in hospitals. As mentioned earlier, it was expected that both attitude constructs and the items that comprise them would be highly correlated. A high correlation would endorse the

[48] The scale originally presented by Fishbein and Ajzen (1978).

validity of the attitude scale that was employed in this and the two earlier experiments.

Recipient Intention

The TRA purports that attitude towards a behavioural act is a predecessor of an individual's intention to perform that behavioural act. To date, each experiment has looked only at shared knowledge - recipients have not been asked directly to use the knowledge (called knowledge transfer). Although this thesis is only concerned with knowledge sharing, it was considered important in terms of future research to determine if recipient attitude towards knowledge received was indeed an indicator of intention to use the knowledge. Understanding factors that may potentially inhibit knowledge sharing has significance in determining the success of knowledge transfer.

Intention to use the knowledge was measured using a 7-point Likert scale anchored with terms such as 'extremely unlikely' or 'strongly agree' and 'extremely likely' or 'strongly disagree'. The items were worded to ascertain whether recipients intended to use the knowledge in the future as part of their job with Resene. For example, did they 'intent to', 'will try to', 'plan to use' the knowledge in the future when dealing with customers?

Recipient Satisfaction

Recipient satisfaction was measured using 6 items that were developed in the earlier two experiments. Four of the items were those that comprised the satisfaction measure from Study Two and the final two were items that were highly correlated with other items in the same study. A 7-point Likert scale was used with 1 = strongly disagree, through 4 = neutral, to 7 = strongly agree. Satisfaction with detail was measured using a single item.

Cognitive Style

A recipient's cognitive style was measured using the CSI index construct (Allinson & Hayes, 1996), the same measure used in Study Two. The CSI measure has been used in other knowledge management related studies (Taylor, 2004) and is considered to

be a robust measure of cognitive style (Coffield et al., 2004a). This construct comprises of 38 items measured on a scale of true, false, uncertain and provided with a score of 0, 1 or 2. A score of greater than 42 constitutes an analytical cognitive style, with a score of 42 or less an intuition cognitive style.

Prior Knowledge

Prior contextual knowledge was measured using 6 items. The purpose of the measure was to ascertain if participants already considered themselves experts on paint tinting. If this was true then it could have a negative or positive effect on their attitude towards the shared knowledge. For instance, participants with a prior knowledge may have a less favourable attitude as the shared knowledge may not significantly contribute to their current knowledge base. Examples of the items that comprise this measure include:

- in terms of paint tinting procedures, I consider myself to be an expert; and
- there is still more I can learn in terms of paint tinting procedures.

All items were measured on a 7-point Likert scale anchored with 1 = strongly disagree, through 4 = neutral, to 7 = strongly agree.

Perception of Organisational Climate

Organisational climate comprised of 5 items rated on a 7-point Likert scale with 1 = strongly disagree, through 4 = neutral, to 7 = strongly agree. The items were adapted from the pre-validated work of Connelly and Kelloway (2003). Since organisational culture/climate could not be examined in this study (only one company was used), the recipient's perception of the organisational culture/climate towards knowledge sharing was measured. The items used focused specifically on the recipient's perception of knowledge sharing within the organisation and did not include items to measure social interaction and perceived management commitment.

7.3.4 Data Collection Procedures

A list comprised of 97 Resene employees with their location and general title was sent to the author. This size was considered adequate to meet Cohen's (1965, 1988)

statistical power criteria of 0.80 based upon the effect sizes of the two earlier experiments r=0.4690 and r=0.4831. Each employee on the list was randomly allocated to either the binary, open-ended or directed questionnaire. Using the Total Design Method (Dillman, 1978) a cover letter was designed and posted to participants together with the questionnaire and a self-addressed return envelope (see Appendix C: Item 8 – Letter (Stage Two)). Similar to stage one, the return envelopes were addressed to Resene Head Office and were posted back to the author in bulk. Thirty-two binary and directed questionnaires and thirty-three open-ended questionnaires were posted. After two weeks participants were sent a follow-up postcard (see Appendix C: Item 9 – Follow-up Postcard) which resulted in two participants contacting Resene Head Office and requesting a new questionnaire be sent to them. No final follow-up letter and questionnaire - as per the Total Design Method - was sent as by this stage in the process the response rate was already acceptable. At no stage during the process did the author have any direct contact with any of the participants.

7.3.5 Validity, Reliability and Limitations with Design

As with the earlier experiments a number of steps were taken to reduce validity and reliability threats. First, the same design structure was used (post-test only with no control group) since this type of design reduces potential validity issues with history, maturation, mortality, instrumentation and testing (Cook & Campbell, 1976). Second, wherever possible multi-item scales drawn from the literature were used and Cronbach coefficient alphas calculated to ensure internal consistency.

However, in terms of validity there is a trade-off in terms of the ability to generalise the findings (external validity) and the internal validity of this experiment. For instance, in using real organisational knowledge as the knowledge context for this experiment, there is the possibility that there may be other variables that distort a true representation of the relationship between question response structure and recipient attitude. These variables are difficult, if not impossible to control for and therefore influence and possibly reduce the internal validity of the experiment.

Notwithstanding this, use of real organisational knowledge has the potential to increase the external validity of the findings.

Finally, although real organisational knowledge was shared, there is a limitation with the context of this shared knowledge. The author was restricted to selecting a knowledge context that would work both for the study and also for Resene. The use of paint tinting procedures as the knowledge context in this experiment is a variance with the knowledge context used in the two earlier studies. This type of knowledge is operational (paint tinting is intrinsically part of the day-to-day knowledge requirements of Resene's employees, without which they could not fulfil their job responsibilities) and involved horizontal knowledge flows. The two earlier experiments used knowledge that was more strategic in nature and although contrived, the knowledge flows were vertical. This difference in focus between operational and strategic knowledge and horizontal and vertical knowledge flows is potentially a limitation to overall generalisation and replication of the results.

7.4 Results

Seventy-five questionnaires were returned within 8 weeks[49], with 55% returned within the first three weeks. Two were returned unopened as the employees had left the organisation. Of the remaining seventy-three, 14 were deemed unusable due to incomplete responses and a further 2 were considered biased as the participants had not consistently answered the questions. For example, the participants had circled 7 for each of the first 5 questions, however, question 4 and 5 were reversed worded and subsequently if the participants had been consistent they would have circled 1 for these questions; this inconsistency was throughout the questionnaire for the rejected respondents. There were 56 final usable questionnaires; 18 binary, 19 open-ended and 19 directed. Unfortunately, this relatively small usable sample size has the potential to influence the type of statistical analysis that can be performed on the data[50].

[49] A further 3 questionnaires were received after the 8 week cut-off period and were not analysed.
[50] Path analysis on the hypotheses model may be difficult to conduct and may be prone to statistical errors.

Demographics

The initial sample population of 97 had a ratio of approximately 75% male to 25% female, a ratio that was maintained in the final usable responses - 42 males to 14 females (Table 7-1). Approximately half of the respondents reported their age to be above 40, with almost twenty percent of employees over the age of 50, which is not inconsistent with the respondent's roles: branch manager, shop manager, area manager, and sales and architectural representatives. After coding the employee's tenure into 6 categories (<1, 1-2, 3-4, 5-9, 10-14, and 15+ years)[51], a third of the respondent reported over 10 years employment with the company and only a quarter had less than 3 years.

Table 7-1 Demographic Information

Measure	Items	Frequency	Percentage
Gender	Male	42	75.0
	Female	14	25.0
Age	20-29	4	7.1
	30-39	25	44.6
	40-49	16	28.6
	50+	11	19.6
Years with Company	<1	4	7.1
	1-2	10	17.9
	3-4	11	19.6
	5-9	12	21.4
	10-14	9	16.1
	15+	10	17.9
Position	Branch Manager	10	17.9
	Shop Manager	14	25.0
	Area Manager	4	7.1
	Sales Representative	18	32.1
	Architectural Representative	4	7.1
	Region Representative	0	0.0
	Other	6	10.7

Since the questionnaires were randomly distributed variation of question response type and gender was not unexpected. Of the male respondents there was a reasonable even distribution of the three question response structure types; 15

[51] The groups sizes are not even, however, the purpose was to ascertain those participants that had greater knowledge on paint tinting. It was considered that those with >3 years with the company would already have substantial knowledge on paint tinting when compared to those with less than 3 years experience.

binary, 15 directed and 12 open-ended (Table 7-2). This distribution was not as even for the female sample, with 3 binary, 4 directed and 7 open-ended question responses.

Table 7-2 Question Response Structure by Gender

Gender	Question Response Type	Frequency	Percentage
Male	Binary	15	35.7
	Open-ended	12	28.6
	Directed	15	35.7
	Total	42	100.0
Female	Binary	3	21.4
	Open-ended	7	50.0
	Directed	4	38.6
	Total	14	100.0

Correlations

The means, standard deviations and correlations for items Q1-Q37 were computed (Table 7-3)[52]. There were a number of significant correlations between the items at both the 0.01 and 0.05 levels (2-tailed) suggesting multi-collinearity and supporting factor analysis. As expected items Q1-Q5 which represented the attitude measure were highly correlated. This was also the case of the items that comprise the alternative attitude measure (Q21-26).

Items Q16-Q20 which comprise the intention to use the knowledge construct were all significantly correlated at the 0.01 level, with the exception of items Q17 and Q18, suggesting overall multi-collinearity. Generally the items that comprise intention (Q16-Q20) correlated with the items that comprise attitude (Q1-Q5) with item Q17 being an exception (Q17 did not correlate with any of the attitude items (Q1-Q5)). Similar correlation patterns were found with the alternative attitude measure (Q21-Q26).

[52] The 38 items for cognitive style (Q38-Q75) were analysed separately and provide with a score of analytical or intuitive and are not included in the correlation matrix. The demographic data, items Q76-Q80 were also not included in the correlation matrix.

Table 7-3 Correlation Matrix and Descriptive Statistics

	Mean	Std Dev	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
Q1	5.0536	1.2124	1																		
Q2	5.0714	1.2484	.718**	1																	
Q3	5.0714	1.2039	.732**	.807**	1																
Q4	5.0536	1.6450	.445**	.343**	.356**	1															
Q5	5.4821	1.6513	.541**	.406**	.330*	.807**	1														
Q6	4.9286	1.3053	.646**	.494**	.617**	.451**	.565**	1													
Q7	4.7679	1.0786	.399**	.323*	.419**	.304*	.411**	.660**	1												
Q8	4.3036	1.1897	.190	.401**	.429**	.140	.091	.459**	.722**	1											
Q9	4.8393	1.2617	.255	.354	.271*	.101	.160	.346**	.493**	.554**	1										
Q10	4.1429	1.4576	.315*	.254	.460**	.217	.197	.569**	.646**	.635**	.566**	1									
Q11	4.2321	1.4011	.335*	.302*	.389**	.263	.202	.576**	.578**	.677**	.556**	.802**	1								
Q12	3.3393	1.1326	-.093	-.056	-.018	.097	.096	-.131	-.068	-.199	-.063	-.239	-.222	1							
Q13	4.000	1.5840	-.085	.018	.057	.188	.049	-.123	.043	.116	.064	-.055	.049	.284*	1						
Q14	5.1964	1.4450	.004	.083	.065	.034	-.002	-.012	-.005	.250	.127	.004	.237	-.297*	.222	1					
Q15	4.6071	1.2458	-.299*	-.192	-.151	-.123	-.207	-.152	-.137	-.065	.121	.031	.137	.238	-.064	.185	1				
Q16	4.8929	1.7021	.461**	.431**	.492**	.255	.232	.389**	.194	.169	.076	.138	.224	-.037	.040	.297*	-.080	1			
Q17	4.643	1.9350	.222	.076	.212	.106	.219	.337*	.270*	.159	.039	.266*	.281*	-.410	.131	.103	.077	.363**	1		
Q18	4.6071	1.8555	.349**	.381**	.395**	.281*	.116	.191	.035	.129	-.105	-.019	.099	-.082	-.043	.240	-.210	.511**	.021	1	
Q19	4.7857	1.7961	.373**	.266*	.302*	.182	.262	.350**	.180	.116	.025	.213	.287*	-.107	-.006	.276*	-.055	.599**	.620**	.422**	1

… see over page for continuation of matrix …

Table 7-3 Correlation Matrix and Description Statistics continued...

	Mean	Std Dev	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
Q20	5.0714	1.7772	.420**	.440**	.524**	.310*	.385**	.449**	.274*	.213	.021	.101	.198	-.003	.149	.207	-.176	.670**	.350**	.588**	.523**
Q21	5.5179	1.2357	.309*	.447**	.390**	.174	.241	.328*	.351**	.435**	.344*	.552**	.444**	-.115	-.028	.278*	-.043	.502**	.133	.273*	.264*
Q22	5.0179	1.1984	.137	.181	.176	.064	.152	.223	.102	.238	.303*	.342**	.355**	-.339*	-.105	.323*	-.056	.117	.216	-.005	.145
Q23	5.3036	1.2493	.397**	.510**	.481**	.381**	.474**	.448**	.269*	.341*	.354**	.375**	.478**	-.087	.018	.349**	.008	.477**	.354**	.296*	.499**
Q24	5.2679	1.6786	.448**	.468**	.458**	.475**	.490**	.449**	.236	.223	.218	.229	.367**	-.125	-.027	.428**	.034	.659**	.157	.455**	.375**
Q25	5.2500	1.5983	.978**	.465**	.454**	.354**	.394**	.340*	.150	.218	.201	.195	.225	-.028	.007	.270*	.014	.591**	.121	.389**	.285*
Q26	4.8929	1.2162	.201	.223	.229	.194	.262	.384**	.161	.224	.297*	.327*	.442**	-.237	-.009	.343**	.008	.223	.222	-.035	.247
Q27	4.6429	1.6117	-.325*	-.258	-.174	-.192	-.166	-.211	-.081	-.009	.052	.069	.053	-.082	.292*	.031	.128	-.379**	-.097	-.327*	-.140
Q28	4.6429	1.6671	-.223	-.223	-.277*	.041	.064	-.054	.004	-.073	-.080	-.083	-.065	-.060	-.124	-.084	.098	-.321*	-.173	-.322*	-.232
Q29	5.9107	1.2545	-.308*	-.298*	-.333*	-.156	-.154	-.337*	-.204	-.213	-.101	-.152	-.174	-.106	.174	-.060	-.011	-.286*	-.200	-.242	-.130
Q30	2.2679	1.0870	-.149	-.175	-.154	-.323*	-.266*	-.153	-.070	.006	.112	.125	-.077	-.223	.042	.047	-.015	-.161	-.103	-.163	-.119
Q31	3.6182	1.7373	.540**	.408**	.443**	.390**	.367**	.457**	.206	.146	.208	.247	.322*	-.156	-.058	.291*	-.111	.517**	.122	.436**	.292*
Q32	5.6607	1.8119	-.107	-.134	-.005	-.055	-.054	.005	-.004	-.044	.095	.067	.046	.056	.184	-.099	.133	-.148	-.053	-.251	-.107
Q33	6.000	1.1599	-.052	-.100	-.065	-.162	-.123	.180	-.102	.000	.075	-.022	-.056	-.194	.109	.217	.025	.028	.340*	.008	.236
Q34	5.4643	1.3068	.076	.135	.152	-.079	-.021	.276	-.038	.095	.134	.070	.119	-.280*	.158	.240	-.065	.031	.258	.122	.105
Q35	5.3036	1.0941	.138	.130	.135	.051	.119	.385**	.015	.110	.089	.052	.084	-.261	.073	.146	-.111	-.041	.121	-.003	.052
Q36	6.1607	.8480	.080	.144	.167	.072	.048	.109	.061	.275*	.127	-.019	.106	.056	.230	.285*	.078	.000	.264*	-.040	.119
Q37	5.3571	1.3270	.270*	.116	.177	.224	.327*	.382**	.135	-.093	.230	.048	.121	.051	.138	.190	.097	.074	.168	.036	.139

… see over page for continuation of matrix …

Table 7-3 Correlation Matrix and Description Statistics continued...

	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37
Q20	1																	
Q21	.438**	1																
Q22	.102	.534**	1															
Q23	.490**	.685**	.604**	1														
Q24	.585**	.730**	.422**	.706**	1													
Q25	.576**	.780**	.415**	.644**	.835**	1												
Q26	.264*	.485**	.750**	.596**	.522**	.435**	1											
Q27	-.245	-.161	-.016	-.189	-.260	-.191	-.140	1										
Q28	-.237	-.120	.112	-.122	-.141	-.082	.017	.466**	1									
Q29	-.209	-.216	-.205	-.388**	-.291*	-.243	-.197	.694**	.324*	1								
Q30	-.292*	-.024	.122	-.155	-.190	-.060	-.019	.315*	.184	.165	1							
Q31	.388**	.566**	.291*	.512**	.672**	.604**	.341*	-.411**	-.283*	-.547**	-.133	1						
Q32	-.111	-.050	.028	-.130	-.029	.061	.090	.618**	.579**	.450**	.305*	-.264	1					
Q33	.068	-.203	.052	0.63	-.131	-.206	.052	-.019	-.188	-.112	.144	-.015	-.087	1				
Q34	.072	-.005	.146	.202	-.008	-.100	.043	.037	-.114	-.118	.128	.121	.720**	.720**	1			
Q35	.062	-.078	.107	.157	-.095	-.148	.066	-.061	-.089	-.139	.053	.130	.673**	.673**	.739**	1		
Q36	.077	.093	.158	.159	.122	.104	.105	.056	.054	-.106	-.126	.036	.259	.259	.227	.182	1	
Q37	.151	-.115	-.004	.175	.193	-.034	.024	.035	-.023	-.166	-.168	.176	.461**	.461**	.532**	.487**	.207	1

n=56

** Correlation is significant at the 0.01 level (2-tailed) / * Correlation is significant at the 0.05 level (2-tailed)

Q4, Q5, Q17, Q19, Q22, Q23, Q26, Q28, Q30, Q32, Q34 negatively worded and transformed for analysis

The matrix revealed there to be a significant correlation at the 0.01 level between the six items that were developed to measure satisfaction (Q6-Q11) again suggesting multi-collinearity. There was also correlation between some of the satisfaction items and those of items that comprise both attitude and the alternative attitude scale. However, not all items correlated.

The prior knowledge items Q27-Q32, generally showed multi-collinearity with each other with the exception of Q30, which was significantly correlated with items Q27 and Q32 only ($p<0.05$). Item Q31, which measured 'increase in knowledge on paint tinting procedures', was negatively correlated with items Q27-Q30, which were intended to measure a respondent's perception of their own expertise in paint tinting. If a respondent considered themselves an expert, implicitly the relationship between these items should be negative; the shared knowledge did not increase their knowledge base. Item Q31 was highly positively correlated with attitude (Q1-Q5), alternative attitude (Q21-Q26) and with the exception of item Q17, with the intention to used knowledge construct (Q16-20).

Organisational climate was represented by items Q33-Q37 with inter-correlations occurring between items Q33, Q34, Q35 and Q37. Item Q36 was not significantly correlated with any of the above items.

There was little significant correlation between items Q12-Q15 which was intended to measure respondent preferred response format. The exceptions to this were item Q12, the preferred length of response and item Q13 the preferred detail of the response which were correlated at $r=0.284$ ($p<0.05$). There was also a negative correlation between items Q12 and Q14 which measured a respondent's preference to content that reassured their current knowledge base. Finally, the matrix revealed high correlation between item Q14 which measured 'when receiving knowledge in a written format I prefer the knowledge to reassure my current knowledge base' and the six items that comprise the alternative attitude (Q21-Q26). Interestingly there was no significant correlation between item Q14 and the attitude items (Q1-Q5).

Attitude

The means for the attitude construct (items Q1-Q5) were calculated and Cronbach's alpha was considered to be satisfactory at 0.8475. The means for the alternative attitude scale were also calculated (Q21-Q26), with good internal reliability (Cronbach alpha=0.9005). As expected the two attitude measures were significantly correlated with each other, r=0.51, p<0.01.

The purpose of including the alternative attitude measure (items Q21-Q26) was to validate the measurement scale that had been used to measure recipient attitude in the current and past two experiments. To test for any significant difference in the two attitude measures paired sample t-tests were performed. Results confirmed there to be no significant difference between the two attitude means, t=-0.423, p=0.674, there being no basis, therefore, for questioning the validity of the scale used to measure recipient attitude in the first two experiments. Although the findings pertaining to recipient attitude reported in the rest of the section reflect the original attitude measure (Q1-Q5), the same statistical analysis was a run on the alternative attitude measure with no significant differences found.

7.4.1 Factor Analysis

Principal component analysis with Varimax rotation and Kaiser normalisation was performed using SPSS (version 11.0) to determine underlying loadings for the constructs that were developed to measure prior knowledge, organisational climate and satisfaction[53]. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO=0.669) and Bartlett's Test of Sphericity (455.023, p<0.01) indicated that factor analysis could be usefully applied to the data. After two iterations which resulted in three items being dropped due to complex cross-loadings, six items loaded onto the satisfaction factor (Q6-Q11), four onto the prior knowledge factor (Q27-Q29, Q32) and four onto the organisational climate factor (Q33-Q35, Q37), with satisfactory loadings on each factor (Table 7-4). The satisfaction factor, after

[53] Items Q12-Q15 were left out of the factor analysis as they were deemed not to be factors and neither were the items that comprise the cognitive style index (Q38-Q75), attitude (Q1-5) or alternative attitude (Q21-26) included as they were already operationalised measures.

rotation accounted for 28.7% of the variance, prior knowledge accounted for 21% of the variance and organisational climate 18% of the variance.

Table 7-4 Rotated Component Matrix

	Component		
Item	**Satisfaction**	**Climate**	**Prior Knowledge**
Q6	.709		
Q7	.847		
Q8	.832		
Q9	.708		
Q10	.875		
Q11	.868		
Q27			.891
Q28*			.704
Q29			.755
Q32*			.833
Q33		.852	
Q34*		.892	
Q35		.862	
Q37		.726	

* negatively worded and transformed for analysis

7.4.2 Recipient Attitude - ANOVA

Analysis of variance was performed to ascertain if there was any difference in the three question response structure means. The Levene Statistic of 6.526, $p<0.05$, indicated that homogeneity of variance had been violated and consequently the Welch and Brown-Forsythe F-ratios were calculated (Table 7-5). Brown-Forsythe F-ratio showed a significant effect of the question response structure on recipient attitude, $F(2, 39.142)=3.808$, $p<0.05$, but the more robust Welch F-ratio did not reveal any effect, $F(2, 32.921)=3.047$, $p>0.05$. Overall effect size was not calculated due to unequal sample size in each group and the apparent violation of homogeneity of variance.

Table 7-5 Equality of Means – Attitude with Question Response Structure

	Statistic[a]	df1	df2	Sig.
Welch	3.047	2	32.921	.061
Brown-Forsythe	3.808	2	39.142	**.031**

[a.] Asymptotically F distributed

Pairwise comparison using Games-Howell (Table 7-6) revealed a significant difference between binary and open-ended question responses at $p<0.05$ (1-tailed), in support of hypothesis $H_{1a.}$ Based on Cohen's (1988) guidelines, the effect size was considered large (>0.80) at $d=0.87$. The post hoc tests of Dunnett T3 and Tamhane were also performed and revealed a significant difference in recipient attitude towards binary and open-ended question responses at $p<0.05$ (1-tailed), again supporting hypothesis H_{1a}. The Games-Howell procedure is suggested to be the most powerful of the three tests and is considered to be accurate when sample sizes are not equal (Field, 2005). Although there was no significant difference between the binary and directed means at $p<0.05$ (1-tailed), there was support for hypothesis H_{1c} at the 10% level ($p<0.1$), with a moderate effect measure, $d=0.61$. Hypothesis H_{1b} was not supported.

Table 7-6 Games-Howell Multiple Comparisons – Attitude

Multiple Comparisons	Question (I)	Question (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)	Sig. (1-tailed)
Games-Howell	Binary	Open-ended	-.9269	.37197	**.050**	**.025**
		Directed	-.7164	.39545	.183	**.092**
	Open-ended	Binary	.9269	.37197	**.050**	**.025**
		Directed	.2105	.27174	.721	.361
	Directed	Binary	.7164	.39545	.183	**.092**
		Open-ended	-.2105	.27174	.721	.361

The pairwise comparisons only showed support for hypothesis H_{1c} at $p<0.1$ and although less robust and more prone to Type I error, independent *t*-tests were performed because each of the three hypotheses H_{1a}, H_{1b} and H_{1c} purported specific directional relationships between two of the question response structures. For example, H_{1a} purported that open-ended question responses would result in a more

favourable attitude than binary question responses, H_{1b} directed more favourable than open-ended and H_{1c} directed more favourable than binary.

Results from the independent *t*-test of the binary and directed means, assuming non-equal variances, revealed a significant difference, $t(29.295)=-1.812$, $p<0.05$ (1-tailed). Although this test may not be considered as rigorous as the Games-Howell procedure, the findings indicate support, albeit not strong, for hypothesis H_{1c}; recipient attitude is more favourable to question responses of a directed structure than those responses of a binary structure. An independent *t*-test also supported hypothesis H_{1a} ($t(25.160)=-2.492$, $p<0.01$ (1-tailed), assuming non-equal variance). However, hypothesis H_{1b} was still not supported.

Box plots for attitude by question response structure (Figure 7-2) graphically highlight the close proximity of the medians for open-ended and directed structured question responses. The mean plots for attitude are graphed in Figure 7-3.

Figure 7-2 Box Plots for Attitude by Question Response Structure

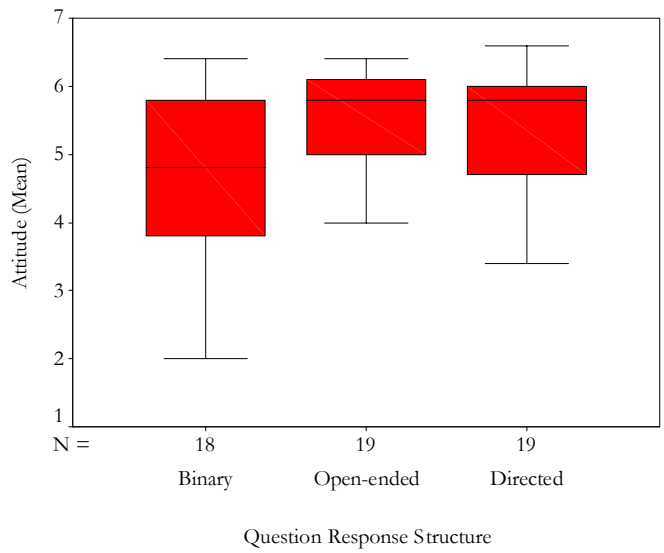
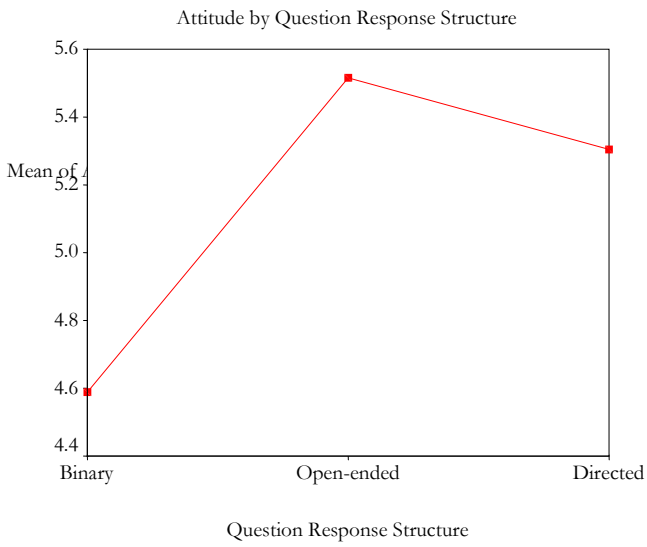


Figure 7-3 Mean Plots for Attitude



Satisfaction with Detail

Hypothesis H_4 posed satisfaction with detail to be a mediator between question response structure and recipient attitude. To test this relationship it was necessary for the mediating construct (satisfaction with detail) to be significantly correlated with both the independent and dependent variables (Baron & Kenny, 1986). Although satisfaction with detail (Q11) was correlated with recipient attitude r=0.364, p<0.01, there was no significant correlation with question response structure r=0.139 and consequently mediation cannot be test for. Hypothesis H_4 is not supported. Since satisfaction with detail was a single item this does present an issue when conducting path analysis.

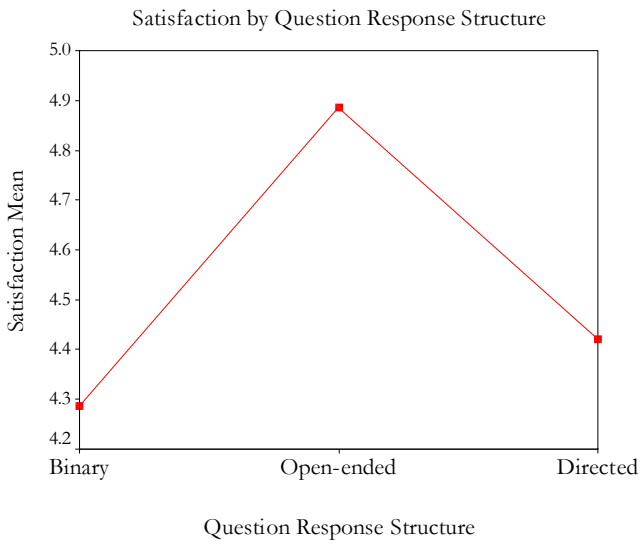
An unexpected finding was that satisfaction with detail was one of the items that loaded onto the satisfaction construct[54], which was not the case in Study Two. As already mentioned in Chapter 6, the findings from Study Two relating to satisfaction with detail should be viewed with caution.

[54] See earlier factor analysis.

7.4.3 Recipient Satisfaction - ANOVA

The mean for recipient satisfaction was calculated using the items that loaded onto the factor satisfaction (Q6-Q11). ANOVA did not reveal any significant difference between the means for the three question response structures, $F(2,53)=1.748$, $p>0.05$. Mean plots for recipient satisfaction are illustrated in Figure 7-4.

Figure 7-4 Mean Plots for Satisfaction



Although recipient satisfaction correlated with recipient attitude, $r=0.497$, $p<0.01$, it was not correlated with question response structure, $r=0.049$, $p>0.05$ and therefore could not be tested for a possible mediating effect. Satisfaction was correlated with intention, $r=0.288$, $p>0.05$, but it was not correlated with prior knowledge or organisational climate, $r=-0.077$, $p>0.05$ and $r=0.146$, $p>0.05$ respectively.

7.4.4 Recipient Intention

A recipient's intention to use knowledge they received from the responses was found to be correlated (Table 7-7) with their attitude towards the knowledge ($r=0.491$, $p<0.01$) and their perceived satisfaction with the shared knowledge ($r=0.288$, $p<0.05$).

Table 7-7 Correlations –Intention, Attitude & Satisfaction

	Intention	Attitude	Satisfaction
Intention	1		
Attitude	.491**	1	
Satisfaction	.288*	.497**	1

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

To test hypothesis H_5, - attitude is a predecessor and predictor of intention - confirmatory factor analysis (CFA) would be an appropriate statistical procedure. Although CFA was conducted and the results showed support for attitude being a good predictor of intention to use the knowledge, for an accurate reportable result a sample size greater than that used in this study is required[55]. However, given that the measures operationalised for attitude and intention were those that comprised the TRA and there is significant support for the theory in the literature (attitude being a predecessor of intention), when the strong correlation between attitude and intention is also taken into account, hypothesis H_5 is supported; attitude predicts intention. Further, given the significant correlation, the regression model, as expected revealed that attitude was a good predictor of intention, accounting for 24% of the variation. When satisfaction was introduced into the model it did not significantly increase the model's accuracy and β was not significant.

Interestingly question response structure was not significantly correlated with intention, r=0.172, p>0.05 and therefore the test for attitude as a mediator between question response structure and intention could not be performed.

7.4.5 Recipient Cognitive Style

The cognitive style of the participants was unknown prior to random allocation of the three treatments (binary, open-ended and directed). The raw reported cognitive style scores had a normal distribution ranging from 21 to 62, with a mean of 42.0, standard deviation of 9.14 and skewness of -0.080. Internal reliability was not considered good with alpha=0.6925 for the 38 item measure. It was, however, just

[55] Unfortunately, the selected site – Resene – dictated the sample size available for this experiment.

under the 0.70 satisfactory point (Nunnally & Bernstein, 1994) and therefore further analysis on the CSI measure was undertaken.

The raw score for each participant's cognitive style was analysed using the CSI score card and converted into either intuition or analytical, with a score greater than 42 labelled analytical and less than or equal to 42, intuition (Allinson & Hayes, 1996). Correlation between the raw score and converted CSI score was high as expected by definition at r=0.771 p<0.01. There was an acceptable distribution of the two styles across subjects with 46.4% intuition and 53.6% analytical respectively (Table 7-8). The distribution of cognitive style for the three question response treatments was also acceptable (Table 7-9).

Table 7-8 Cognitive Style of Participants

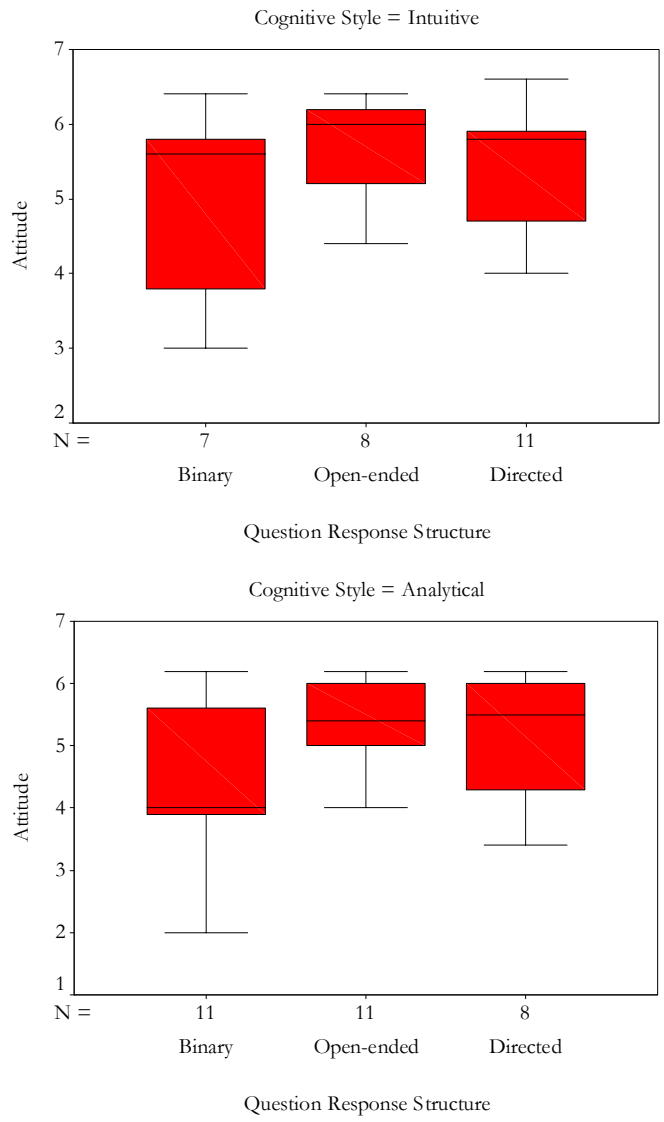
Cognitive Style	Frequency	Percentage
Intuition	26	46.4
Analytical	30	53.6

Table 7-9 Cognitive Style by Question Response Structure

Cognitive Style	Question Response Structure	Frequency	Percentage
Intuition	Binary	7	26.9
	Open-ended	8	30.8
	Directed	11	42.3
Analytical	Binary	11	36.7
	Open-ended	11	36.7
	Directed	8	26.7

There was no significant correlation between cognitive style and either question response structure or recipient attitude with r=-0.156 and r=0.261 respectively. Box plots (Figure 7-5) show the median and spread for recipient attitude towards the three question responses for both intuitive and analytical respondents. Apart from binary question responses, where the median for intuitive respondents was higher than analytical respondents, the results show similar medians and spreads across the two cognitive styles.

Figure 7-5 Box Plots for Cognitive Style & Question Response Structure



Recipient Attitude Controlling for Cognitive Style

Analysis of co-variance (Table 7-10) was run to ascertain whether or not cognitive style had any influence on recipient attitude given question response structure. With $F(2,53)=3.680$, $p<0.05$, *partial eta*=0.3521 there was not really any improvement in the earlier ANOVA when controlling for cognitive style. As with the earlier statistical procedures pairwise comparison ($p<0.05$) revealed support for hypotheses H_{1a} and H_{1c}, but there was no support for hypothesis H_{1b}.

Table 7-10 ANCOVA - Controlling for Cognitive Style

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Corrected Model	10.364	3	3.455	3.132	.033	.153
Intercept	167.783	1	167.783	152.116	.000	.745
Cognitive Style	1.697	1	1.697	1.538	.220	.029
Question Response Structure	57.356	2	4.059	3.680	**.032**	.124

[a] R Squared = 0.153 (Adjusted R Squared = 0.104)

Recipient Attitude – Intuition–Analytical

In a manner similar to that employed in Study Two the data was split into two groups. The first contained the intuitive recipient's data and the second the analytical. ANOVAs were performed on each group to determine whether or not there were significant differences in recipient's attitude towards question responses of differing structures. There were no significant differences in the attitude means for either the intuitive recipient group or the analytical recipient group, which is in contrast to the results of the overall ANOVA reported in Section 7.4.2 where there were differences.

To test hypothesis H_2 and evaluate whether or not analytical and intuitive recipients had differing attitudes towards responses of a binary question format, independent *t*-tests were performed (mean attitude for intuitive cognitive style = 4.8857 and mean attitude for analytical cognitive style = 4.4000). Although there were uneven sample sizes in each group (n=7 for intuition and n=11 for analytical), results revealed no significant difference between the two means, $t(16)=0.702$, $p>0.1$ (equal variances). Cognitive style did not moderate the relationship between question response structure and recipient attitude for binary question responses and hypothesis H_2 was not supported.

Cognitive Style and Preferred Length

The hypotheses (H_{3a} and H_{3b}) that purported that a recipient's cognitive style could be used to predict their preferred length to written responses were formulated in

response to the findings of Study Two. The preferred length of response for the receiving of knowledge in written format was measured by item Q12 and the preferred amount of detail was measured using item Q13. Correlations (Table 7-11) revealed a small, but significant relationship between items Q12 and Q13 (r=0.284, p<0.05), suggesting that a recipient's preference to length is partially related to their preferred amount of detail. Of considerable interest, however, was the lack of correlation between preferred response length (Q12) and cognitive style.

Table 7-11 Correlation – Cognitive Style & Q12, Q13

	Q12	Q13	Cognitive Style
Q12	1		
Q13	.284*	1	
Cognitive Style	.154	.182	1

* Correlation is significant at the 0.05 level (2-tailed)

To test hypotheses H_{3a} and H_{3b} the mean for item Q12 was calculated for the intuitive and analytical recipients, 3.1538 and 3.500 respectively, and independent t-tests performed. There was no significant difference (t=-1.144, p>0.05) between the two means and hypotheses H_{3a} and H_{3b} therefore were not supported; preferred response length was not predicted by recipient cognitive style.

It should be noted that the manner in which items Q12 and Q13 were measured differed in this study compared to Study Two. This study used a 7-point Likert scale anchored with 'extremely short' through to 'extremely long', whereas Study Two used two categories for responses - 'short' and 'long'. The objective of the Likert scale was to reduce the bi-polar effect and provide better information for statistical analysis.

7.4.6 Other Findings

Other findings include:

- prior knowledge and knowledge newness;
- prior knowledge and tenure; and
- perception of organisational climate.

There were also a number of findings related to participant's demographic makeup. The results from each are described below.

Prior Knowledge and Knowledge Newness

Perceived prior knowledge was negatively correlated with item Q31, r=-0.45, p<0.01, which is of interest because item Q31 measured: 'the information I gained from the responses has increased my knowledge on paint tinting procedures'. With an overall mean of 5.2153 (SD=1.276) for prior knowledge corresponding to 'somewhat agree' and a mean of 3.6182 (SD=1.737) for newness of knowledge equating to 'somewhat disagree' on the Likert scale, it is possible to interpret this finding to mean that respondents considered themselves generally competent with paint tinting procedures and the shared knowledge was generally not new. Therefore, the more they already knew the less they learnt from the shared knowledge.

Knowledge newness (Q31) was positively correlated with question response structure as expected, r=0.314, p<0.05 and had a mean of 2.444 (SD=1.617) for binary question responses, 4.611 (SD=1.461) for open-ended question responses and 3.799 (SD=1.475) for directed question responses. Knowledge newness (Q31) was also highly correlated with attitude r=0.531, p<0.01, suggesting that the newer the shared knowledge the more favourable the attitude of the recipient[56].

A recipient's attitude towards the knowledge was not significantly correlated with their prior knowledge, r=-0.236, p>0.05 and neither was prior knowledge correlated with question response structure (r=-0.121, p>0.05). However, prior knowledge was found to be negatively correlated with a recipient's intention to use the knowledge in the future r=-0.340, p<0.05. These findings suggest that although prior knowledge was not related to a recipient's attitude, a recipient who has a prior knowledge is less likely to have an intention to use the shared knowledge in the future.

Prior Knowledge and Tenure

[56] Knowledge newness (Q31) also correlated with a recipient intention, r=0.457, p<0.01.

The results revealed a significant, although not strong, positive relationship between a recipient's perceived prior knowledge on paint tinting and their number of years with the organisation, r=0.374, p<0.01. To investigate this relationship further ANOVA was performed to ascertain if number of years influenced perceived prior knowledge. Results revealed there to be a difference in the means, $F(5,5)=5.352$, p<0.01 and post hoc comparisons at alpha=0.05 showed a difference between those respondents who had less than three years experience and those with three years or more experience. Respondents with three years or more tenure considered themselves to have considerable prior knowledge on paint tinting procedures, compared to those respondents with less than three years tenure. This finding is consistent with the general learning that the individuals would obtain as a part of their tenure with the organisation. There was no correlation between knowledge newness (Q31) and a recipient's tenure with Resene, r=0.46, p>0.05.

Perception of Organisational Climate

The recipient's perception of the organisational climate towards sharing was considered good ('somewhat agree') with an overall mean of 5.5313 (SD=1.02143), but organisational climate was not correlated with either recipient attitude towards the knowledge or intention to use the knowledge (r=0.177, r=0.166 respectively). Further, there was no correlation between a recipient's prior knowledge and their perception of the organisational climate. The employees of Resene appear, therefore, to be generally happy with the perceived prevailing organisational climate towards the sharing of knowledge. However, it should be noted that the impact of an organisational level variable like climate towards sharing and the influence that this may or may not have on recipient attitude cannot be assessed in a single organisational study.

Gender

Gender did not influence recipient attitude towards the knowledge received and recipient cognitive style was relatively evenly distributed with 57% of both males and females having an analytical disposition and 43% for both genders being intuitive. An independent t-test with unequal variance, revealed no significant difference between the cognitive style of the two genders, $t(21.854)=0.907$, p>0.05.

Position

ANOVA (Levene Statistic, $p>0.05$) revealed a difference in the cognitive style of recipients dependent on their position within Resene, $F(5,50)=2.445$, $p<0.05$. Post hoc comparisons showed that shop managers were more analytical in their cognitive style compared to area and branch managers who had a more intuitive style ($p<0.1$).

Age

The age of a recipient did not interact with any of the other constructs, but as reported earlier, age was highly correlated with the number of years a participant had been employed with Resene, $r=0.48$, $p<0.01$.

Location

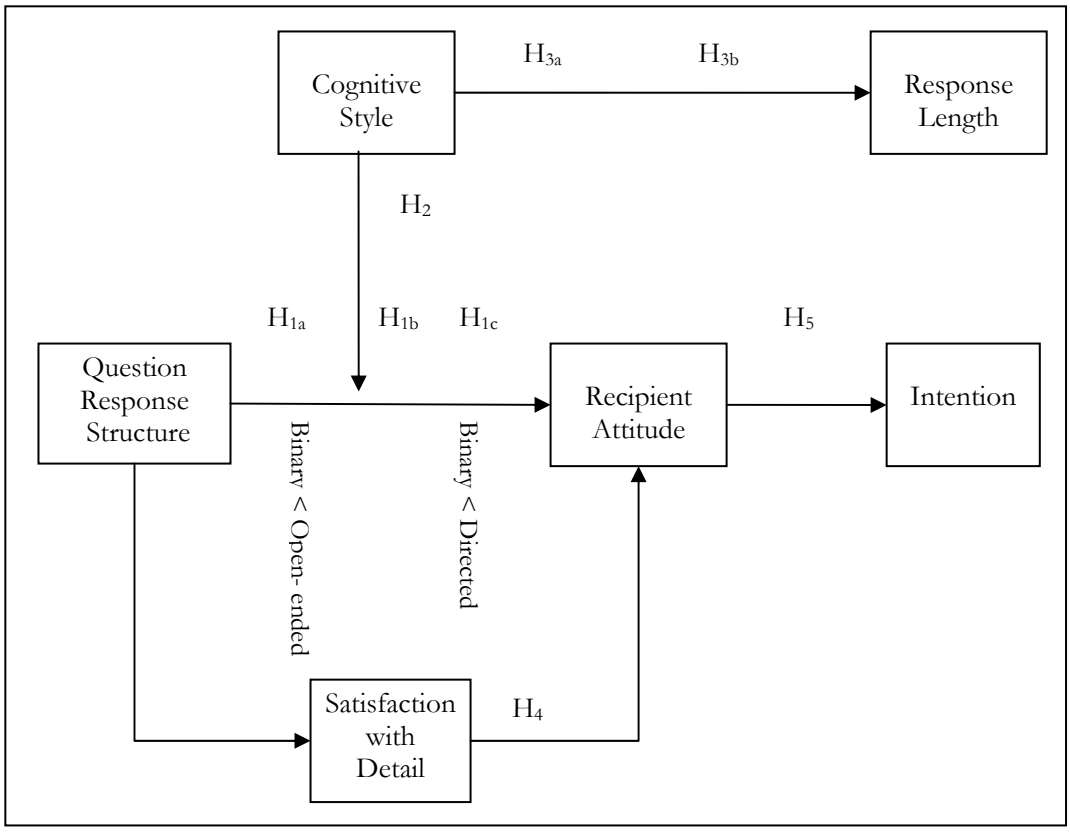
The geographical location[57] of the participant was not found to interact with any of the constructs.

7.4.7 Summary of Findings

The relationships supported in this study, including the hypotheses are illustrated in Figure 7-6.

[57] Geographical location was categorised into regions, rather than actual store location.

Figure 7-6 Supported Hypotheses & Relationships



7.5 Discussion

The results from this experiment, like those of the earlier two studies, support the notion that question response structure influences recipient attitude towards shared knowledge. However, there were results, recipient cognitive style in particular, that conflicted with the findings reported in Study Two. This section briefly examines the implications of these findings and discusses recipient attitude, recipient satisfaction, cognitive style and recipient intention to use the shared knowledge. Then the limitations of the study are described together with potential directions for future research. To avoid excessive replication a more detailed comparative analysis of the three experiments can be found in Chapter 8, with implications both for business and academia in Chapter 9.

7.5.1 Recipient Attitude

The findings reported in this study support and replicate the results found in the earlier two experiments. Hypothesis H_{1a} was supported ($p<0.05$) indicating that recipients had a more favoured attitude towards knowledge shared when provided with open-ended question responses compared to binary. Pairwise comparisons from the ANOVA at $p<0.1$ and independent *t*-test at $p<0.05$, showed overall support for hypothesis H_{1c}; recipients having a more favourable attitude towards knowledge when presented with directed rather than binary responses. As in the earlier two studies there was no support for hypothesis H_{1b}; there being no difference in attitude between open-ended and directed question responses.

The slope of the three attitude means was similar to that found in Study Two with open-ended question responses having the most favoured attitude followed closely by directed and then binary. However, in this study the means for recipient attitude were higher than those found in Study Two, suggesting the existence of a more favourable attitude towards the knowledge received. When the knowledge context is taken into account, perhaps this should have been expected. For instance, the knowledge context used in this study – paint tinting – was considered operational knowledge as it formed part of the daily decision-making requirements of Resene's employees; paint tinting can be considered to be a programmed decision. Whereas, in Studies One and Two the scenario case and contrived situation dealt with knowledge that was more strategic in nature; an investment decision can be considered to be non-programmed. This difference in knowledge context is examined further in Chapter 9.

What was noticeable about the results in this study compared to the earlier two studies was the smaller individual effect size (*d*) for each of the supported hypotheses (H_{1a} and H_{1c}). One possible reason for this lies with the trade-off between external and internal validity that almost invariably occurs when experiments are conducted in the field. In the earlier two studies the contrived case provided greater control over the knowledge context that was shared which was not the case with the painting tinting knowledge context used in this study; participants already had some operational knowledge and competency on paint tinting. For instance, the shared

knowledge may have reinforced a recipient's current paint tinting knowledge and therefore it is not unreasonable to expect participants to have a greater ability to process the implications of a binary response thus fulfilling the primary assumption of binary questions; the recipient is already in possession of enough prior knowledge to understand the implications of a 'Yes' or 'No' response (Vinten, 1995). When the knowledge context is understood the smaller individual effect sizes for H_{1a} and H_{1c} are not unreasonable because the probability that the recipient can process the binary responses is probably greater.

Absence of a relationship between a recipient's perception of the organisational climate towards knowledge sharing and their attitude towards future use of the shared knowledge could be argued to be inconsistent with the research model posed in Chapter 3. While the literature contends that organisational culture/climate influences both the source and the recipient of shared knowledge (Ipe, 2003), the findings reported here suggest this to not be the case. Perception of organisational climate does not influence a recipient's attitude. However, this finding may be different if organisational culture was tested at the right level; it is an organisational phenomenon and should be tested across organisations rather than being tested at an individual perception level. Moreover, the findings reported in this study may be rationale given that the recipient has less to lose compared to the source. A source relinquishes the power of owning the knowledge when they share it (Davenport & Prusak, 1998), a considerably greater opportunity cost than the recipient who gains from the sharing and has the ability to increase their knowledge base.

Interestingly though, a recipient's perception of the organisational climate was not related to their intention to use the shared knowledge in the future. This finding is inconsistent with the Theory of Reasoned Action (TRA) that purports that subjective norms or perceived organisational climate influences an individual's intention, i.e. their intention to use the shared knowledge in the future. This absence of relationship could be due to the measure of perceived organisational climate employed in this study. The perceived organisational climate measure was adapted from the work of Connelly and Kelloway (2003) and was not consistent with the subjective norm measure suggested in the TRA.

Although the recipients in this study considered themselves competent in terms of painting tinting procedures their prior knowledge did not influence their attitude as suggested in the research model (Chapter 3). Their prior knowledge was however, related in a negative manner to the newness of the shared knowledge (the more prior knowledge the less new the shared knowledge). Newness of the shared knowledge was positively related to both question response structure and recipient attitude. This suggests that although prior knowledge did not directly influence recipient attitude there was possibly an indirect influence through the newness of the shared knowledge; the newer the shared knowledge the more favourable the attitude of the recipient.

While not explicitly measured in this study, the prior knowledge of the recipients did provide them with a level of personal absorptive capacity and subsequent ability to internalise and process the implications of the shared knowledge. Cohen and Levinthal (1990) suggest that:

> "some portion of that prior knowledge should be very closely related to the new knowledge to facilitate assimilation, and some fraction of that knowledge must be fairly diverse, although still related, to permit effective, creative utilization of the new knowledge" (p.136)

Without a level of prior knowledge, there would be less ability to recognise the value of the newness of the shared knowledge and subsequently recipient attitude may differ to that reported here, in a more or less favourable manner.

Further detail on the implications of the findings relating to recipient attitude can be found in Chapter 9.

7.5.2 Recipient Satisfaction

The findings for recipient satisfaction with knowledge received were inconclusive and inconsistent in this study. Recipient satisfaction, which comprised of accuracy, relevance, precision, reliability (the same items as in Study Two), depth and detail,

was not influenced by question response structure, casting doubt upon the findings of Study One and supporting the findings of Study Two.

Perhaps one of the most interesting findings in this study was the close relationship between recipient satisfaction with the knowledge and recipient attitude (r=0.497, p<0.01). As discussed in greater depth in Chapter 5, satisfaction and attitude can be considered to be similar constructs and their use often depends on the school of thought of the researcher (Melone, 1990). Although the results from Study Two did not support a relationship between attitude and satisfaction, the results of Study One and this study do suggest a relationship between them. It is probably fair to say that satisfaction and attitude have a complex relationship, one that does not involve either in a mediator role of the other, but rather one where there are similarities in what is being measured. Notwithstanding this, the results from all three studies suggest that attitude is a more stable measure when examining the influence of question response structure on recipients during knowledge sharing.

7.5.3 Cognitive Style

Whilst there were interesting findings in terms of recipient cognitive style found in Study Two, the results in this study were mostly inconclusive. There was a relatively even distribution between the intuition-analytical styles (46% and 54%, respectively) again supporting the notion that individual cognitive make-up is randomly distributed within a population. Cognitive style was relatively evenly distributed between the genders with no statistical difference between male and female participants, which supports the findings of Study Two and extant theory (Hayes et al., 2004).

There was a relationship between a recipient's position at Resene and their cognitive style; shop managers were found to be more analytical than branch and area managers, who tended to have a more intuitive style. This finding is consistent with the level of recipient's respective positions within Resene (branch and area managers have a more senior management role than shop managers) and supports Sadler-Smith et al. (2000) and Allinson and Hayes (1996) who found that individuals in

senior management positions generally are more intuitive than those in middle and line management positions[58]. Although no general shop staff were used in the Resene sample population, in hindsight it would have been interesting to examine whether or not such individuals had an even greater analytical style than the shop managers; shop managers in this situation would have the more senior position.

Similar to the findings of Study Two there was no reported improvement in the general ANOVA model (question response structure → recipient attitude) when the co-variate cognitive style was introduced. However, unlike Study Two where cognitive style was found to moderate the relationship between question response structure and recipient attitude for binary question responses, this was not the case in this study - hypothesis H_2 was not supported. However, the operational knowledge context could possibly explain the lack of difference between the two cognitive styles. While recipients with an analytical cognitive style are purported to prefer 'hard information' or greater detail compared to their intuitive counterparts (Allinson & Hayes, 1996), in this study generally the recipients (inclusive of analytical recipients) already possessed operational knowledge on paint tinting. Therefore, it is not unreasonable to suggest that they would not need as much knowledge detail as they might if the shared knowledge was new. In the circumstances of this study, the analytical recipients probably had enough operational knowledge to cognitively process the implications of a 'Yes' or 'No' response. But if they had not had this operational knowledge is possible that they would have required greater detail or 'hard information'. However, none of this changes the findings of this current study. There was a smaller difference (one that was not significant) between analytical and intuitive recipient's attitude towards binary question responses than that found earlier in Study Two. Subsequently there was no support for cognitive style having a moderating relationship between question response structure and recipient attitude.

An unexpected finding was the lack of support for hypotheses H_{3a} and H_{3b}. In Study Two, analytical recipients preferred longer written responses and intuitive recipients,

[58] Study Two also reported recipients in a senior management position to have a more intuitive cognitive style compared to recipients in lower management positions who generally had a more analytical style.

short written responses, which was not the case in this study. This could be due to the different scales used between the two studies; Study Two used a binary scale with 'short' and 'long' as the response categories, whilst a 7-point Likert scale anchored by 'extremely short' to 'extremely long' was used in this study. The use of the Likert scale possibly reduced the extremity or polarity of the response, allowing participants to be more accurate with their answer. It is also possible that the manner in which the organisation generally sends out information to employees may influence their preference to written length and subsequently explain the lack of difference between the two cognitive styles. Overall the results revealed that both analytical and intuitive recipients do not like written responses that are too detailed, preferring responses that are shorter in length.

Whilst not significantly different, intuitive recipients preferred a response length that was closer to a 'short' type of response and analytical recipients preferred a response length that was closer to a 'long' response (3.1538 and 3.5000 respectively). Chapter 9 elaborates further on recipient cognitive style and recipient attitude towards knowledge received.

7.5.4 Recipient Intention

While it was not the purpose of this study to test the TRA, it was hypothesised that a recipient's attitude towards the shared knowledge would be a good predictor of their intention to use that knowledge (hypothesis H_5). The results showed support for this relationship. It is important to recall that this study examined recipient attitude towards shared knowledge; the recipient was not asked to use the knowledge as this would by definition be knowledge transfer (Argote & Ingram, 2000; Darr & Kurtzberg, 2000). However, according to the TRA a behavioural act towards an object, such as use of knowledge in this case, can be predicted by an individual's intention to perform that behavioural act (Fishbein & Ajzen, 1975), i.e. use the knowledge. Also attitude towards the object or the shared knowledge in this case, is a predictor of an individual's intention to use the knowledge. When viewed in light of the findings of this study the following can be implied: since attitude was a good predictor of intention to use knowledge, favourable intention will result in the

behavioural act of using the knowledge. This behavioural act of using the knowledge is by definition knowledge transfer (knowledge has been shared and knowledge has been used). Therefore, by measuring attitude towards shared knowledge in terms of future use of that knowledge, eventual knowledge transfer may be predicted.

This predictive relationship of attitude, intention and behaviour in the context of knowledge sharing and transfer is significant. First, it highlights the importance of understanding variables that impede or enhance knowledge sharing since sharing by definition precedes transfer. Second, measuring attitude towards future use of knowledge rather than actual use of the knowledge may reduce problems associated with what constitutes an appropriate measure for knowledge transfer. For example, when using the individual as the unit of analysis for knowledge transfer, should individuals be asked to what extent they have used the shared knowledge, or should they be tested on their knowledge pre and post knowledge sharing to ascertain the difference in their knowledge capacity? However, if the business unit or organisation is the unit of analysis, this approach of measuring attitude towards the knowledge may be more problematic; who within the business unit or organisation provides the attitude? Consequently, the TRA predictive approach may be limited to the context of individuals as the unit of analysis.

7.5.5 Limitations

A number of the limitations relating to this study, especially in terms of the experiment method employed, have already been discussed in the preceding two chapters (Study One and Study Two). Although it is not the intention to replicate this earlier discussion, there are a number of limitations in terms of generalisation, data analysis methods and the measures employed that are pertinent to this particular study. They are discussed below.

Generalisation

One of the issues with the earlier two studies was the use of the contrived scenario case and the potential limitations surrounding this in terms of generalisation. However, this study used real organisational shared knowledge with the results still supporting the findings of the earlier two studies.

In terms of the current study the findings could be generalised to individuals in other organisations (within related industries, e.g. retail), that have a similar situation to Resene's employees; they require shared operational knowledge for their job and task responsibilities. However, because of the strong replication of the main findings across the three studies (H_{1a}, H_{1b} and H_{1c}), overall the results could be generalised to individuals in a business context who are presented with shared knowledge required for future decision-making. This includes both strategic and operational knowledge, and vertical and horizontal knowledge flows.

It is important that it is recognised that the findings reported in this and the preceding experiments may not be generalisable past the individual as a unit of analysis. As mentioned earlier, the relationship between question response structure and recipient attitude may not reside where the recipient of the shared knowledge is a business unit or organisation.

Data Analysis Method

One significant limitation of the data analysis was the inability to perform Confirmatory Factor Analysis (CFA) to test the purported relationship between recipient attitude and intention; this was due to a small sample size. Also owing to sample size, path analysis was unable to be performed. Kline (1998) recommends an absolute minimum ratio of 10 subjects to 1 parameter for path analysis (20:1 is preferable). Six parameters are posed in the purported hypotheses model (Figure 7-1) and with a sample size of 56 the ratio is below that recommended. Other reasons for path analysis not being performed include the single item used to measure satisfaction with detail and the low Cronbach alpha for cognitive style. Further, the sample size also resulted in an inconsistency in the number of recipients for each cognitive style when grouped by question response structure; reducing the accuracy of the results. If cognitive style and recipient satisfaction with detail were to be removed from the hypotheses model there is a minor argument for performing path analysis. It should be noted that the data analysis methods used were consistent throughout this and the earlier two experiments.

Measures

One of the objectives of this study was to ascertain if the scale used to measure recipient attitude in this and in the earlier two experiments, was valid and reliable. The scale was an adaptation of the attitude construct scale suggested in the TRA. Results showed high correlation between the actual suggested attitude measure (that of the TRA) and the adapted attitude measure (that used in the three experiments). Although the adapted attitude measure was used, it is recognised that the scale may be limited to the studies in this thesis and may not be applicable when measuring attitude in a different context.

As with the earlier studies there was still no consistency in the satisfaction measure, which requires further research.

7.6 Chapter Summary

This chapter presented the final experiment used to examine the relationship between question response structure and recipient attitude. Using the setting of a single organisation – Resene Paints Ltd – the study was split into two stages. In the first stage knowledge about in-house technical procedures relating to paint tinting was collected from a number of technical employees. The employees were asked to respond to five questions on paint tinting procedures via a questionnaire and were provided with one of three response structures – binary, open-ended or directed – to which they could reply. The knowledge collected in the responses was then collated and disseminated to a second group of employees in stage two. These employees were randomly allocated to receive either binary, open-ended or directed questions and the corresponding responses.

Fifty-six returned usable questionnaires were analysed and the results revealed that question response structure did influence recipient attitude. More specifically there was support for hypothesis H_{1a} ($p<0.05$) - recipient attitude was more favourable to question responses of an open-ended structure over binary – and there was partial support for hypothesis H_{1c} ($p<0.1$) – recipient attitude was more favourable to question responses of a directed structure over binary. The results did not support

hypothesis H_{1b} (there was no significant difference between recipient attitude towards open-ended and directed question responses). These results support and replicate those found in the earlier two studies.

While the earlier field experiment (Study Two) found support for hypothesis H_2 – recipients with an analytical cognitive style will have a less favourable attitude to question responses of a binary manner than recipients with an intuitive cognitive style – this study did not. Further, in terms of cognitive style there was also no support for cognitive style being a predictor of a recipient's preferred response length (hypotheses H_{3a} and H_{3b} were not supported), again contradicting the findings of Study Two.

Although there have been some potentially interesting and complex relationships that have resulted from analysis of recipient satisfaction, like the earlier two studies the findings in this study are generally inconclusive. Moreover, unlike Study Two which supported 'satisfaction with detail' mediating the relationship between question response structure and recipient attitude, the findings from this experiment were inconclusive (no support for hypothesis H_4).

The findings did reveal that recipient attitude was a good predictor of a recipient's intention to use the shared knowledge (support for hypothesis H_5). This supports the TRA which purports that attitude is an indicator of intention and intention precedes and individual's performance of a behavioural act.

Generally the findings from this study support that of the earlier two studies and provide depth for the overall research question surrounding the influence of question response structure on recipient attitude. Further detail comparing the findings of the three experiments is described in the next chapter (Chapter 8).

— CHAPTER EIGHT —

COMBINED ANALYSIS

8.1 Introduction

As outlined in Chapter 4, Section 4.5 the research question and subsequent main hypotheses were examined in a progression of three studies which moved from a laboratory setting into two field experiments. As the studies progressed additional constructs were included in the analysis in an attempt to understand other variables that may interact with the main relationship being examined – question response structure and recipient attitude. Furthermore, the three studies differed in terms of the organisational knowledge types that were examined – strategic knowledge in Studies One and Two and operational knowledge in Study Three. Although the results showed consistent support for two of the main hypotheses across all three studies, the strength of the relationship and the experiment effect of the relationship varied as expected with internal and external validity. So as to highlight the differences in the findings between the three studies (in terms of effect sizes and level of recipient attitude), this chapter provides an overall comparative analysis of the three experiments.

The next section in this chapter presents the statistical similarities and differences in recipient attitude towards knowledge received across the three studies[59]. To do this ANOVA of recipient attitude across the experiments is performed for each question response structure. Also the effect sizes for the supported hypotheses H_{1a} and H_{1c} are restated. Finally, the chapter summarises the results from the additional tested

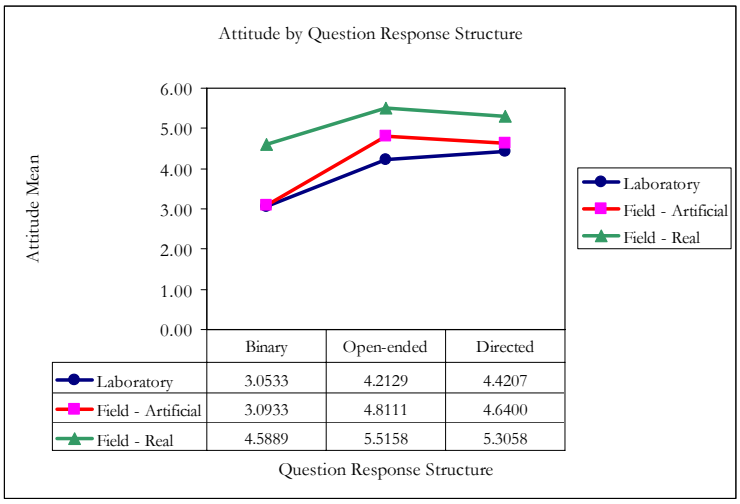
[59] The results in this section have been published by the author in the paper: Bircham-Connolly, H., Corner, J., & Bowden, S. (2006) "How does question response structure influence a recipient's attitude towards shared knowledge? A trilogy of findings" *The International Journal of Knowledge, Culture & Change Management*, Volume 6, Issue 3, p.71-78.

hypotheses: the influence of cognitive style; satisfaction; and recipient intention to use the shared knowledge in future decision-making.

8.2 Recipient Attitude – Three Experiments

Prior to discussing the implications of the overall findings of this thesis, some comparative analysis of the three studies is necessary; particularly the causal relationship between question response structure and recipient attitude. To do this, the recipient attitude means for each of the question response structures were grouped and plotted by study (Figure 8-1). The graph indicates that recipient attitude was most favourable (highest) towards knowledge received for each question response structure in Study Three (Field - Real). Moreover, recipient attitude towards responses for each of the three question structures increased from Study One (Laboratory) to Study Two (Field – Artificial) and then again from Study Two (Field – Artificial) to Study Three (Field - Real).

Figure 8-1 Mean Plots for Attitude – Comparison of Experiments



	Binary	Open-ended	Directed
Laboratory	3.0533	4.2129	4.4207
Field - Artificial	3.0933	4.8111	4.6400
Field - Real	4.5889	5.5158	5.3058

Also worthy of note, is the similarity in recipient attitude towards the question responses, across the three studies (Figure 8-1); responses to binary questions were the least favoured by recipients in all three studies. Recipient attitude for the laboratory and artificial field experiment (Study Two) was below the neutral point (4 = neutral) and recipient attitude in the real field experiment (Study Three) just above

the neutral point. Of particular interest is the mean for recipient attitude, which is overall higher in last study than in the first two studies.

Overall, the responses most favoured by recipient were from questions with an open-ended structure, with the exception of Study One where directed question responses were the most favoured. Recipient attitude towards responses of an open-ended structure in each study was above the neutral point. However, only in Study Three was recipient attitude at the somewhat agree point (5 = somewhat agree).
To evaluate if there was any significance differences in recipient attitude to question responses structure across the three studies, ANOVAs for each question response structure were performed.

8.2.1 Recipient Attitude –Binary Question Responses

With Levene's test of homogeneity of variance not violated, there was a significant difference (Table 8-1) in recipient attitude towards binary question responses between the three experiments, $F(2,60)=8.800$, $p<0.01$, $r=0.4762$.

Table 8-1 ANOVA – Attitude with Binary Response Structure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29.808	2	14.904	8.800	**.000**
Within Groups	101.622	60	1.694		
Total	131.430	62			

Post hoc pairwise comparisons using Games-Howell[60] (Table 8-2) showed that recipient attitude in the laboratory and artificial field experiments differed from the real field experiment, suggesting that there is some factor, which has not been accounted for, or just simply noise between the real field experiment and the other two.

[60] Games-Howell is appropriate as the sample sizes are uneven between the three experiments (Field, 2005). Binary question responses: Laboratory, $n=30$; Field Artificial, $n=15$; and Field Real, $n=18$.

Table 8-2 Games-Howell Multiple Comparisons – Binary Attitude

Multiple Comparisons	Experiment (I)	Experiment (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)
Games-Howell	Laboratory	Field – Artificial	-0.0400	.44056	.995
		Field – Real	-1.5356	.38917	**.001**
	Field - Artificial	Field - Real	-1.4956	.51336	**.018**

8.2.2 Recipient Attitude –Open-ended Question Responses

With Levene's test of homogeneity of variance not violated, there was a significant difference in recipient attitude towards open-ended question responses between the three experiments, $F(2,65)=8.8641$, $p<0.01$, $r=0.4583$ (Table 8-3).

Table 8-3 ANOVA – Attitude with Open-ended Response Structure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.137	2	10.069	8.641	**.000**
Within Groups	75.738	65	1.165		
Total	95.875	67			

Post hoc pairwise tests using Games-Howell (Table 8-4) revealed a significant difference between the laboratory and the real field experiments ($p<0.01$), but not between the laboratory and artificial field experiments or the artificial and real field experiments[61].

[61] Games-Howell is appropriate as the sample sizes are uneven between the three experiments (Field, 2005). Open-ended question responses: Laboratory, $n=31$; Field Artificial, $n=18$; and Field Real, $n=19$.

Table 8-4 Games-Howell Multiple Comparisons – Open-ended Attitude

Multiple Comparisons	Question (I)	Question (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)
Games-Howell	Laboratory	Field - Artificial	-.05928	.36059	.236
		Field - Real	-1.3029	.26500	**.000**
	Field – Artificial	Field - Real	-0.7047	.34002	.115

8.2.3 Recipient Attitude –Directed Question Responses

Unlike the previous two ANOVA's (binary and open-ended question responses), the test of homogeneity of variance was violated when the experiments were grouped by directed question responses (Levene Statistic=3.400, $p<0.05$). Consequently, the ANOVA (Table 8-5) was conducted using the Brown-Forsythe and Welch statistics. Results for the Welch statistic showed significant difference in recipient attitude between the three experiments ($p<0.05$). But the Brown-Forsythe statistic only supported a difference at the 0.1 significant level[62]. The post hoc test of Games-Howell with alpha=0.05 (Table 8-6) revealed a difference between the laboratory experiment and the real field experiment[63].

Table 8-5 Equality of Means – Attitude with Directed Response Structure

	Statistic[a]	df1	df2	Sig.
Welch	4.201	2	32.187	**.024**
Brown-Forsythe	2.902	2	36.988	.067

a. Asymptotically F distributed

Table 8-6 Games-Howell Multiple Comparisons – Directed Attitude

Multiple Comparisons	Question (I)	Question (J)	Mean Difference (I-J)	Std. Error	Sig. (2-tailed)
Games-Howell	Laboratory	Field - Artificial	-0.2193	.45316	.880
		Field - Real	-0.8846	.30763	**.017**
	Field – Artificial	Field - Real	-0.6653	.45009	.320

[62] Welch is more powerful than Brown-Forsythe (Field, 2005).
[63] Directed question responses: Laboratory, n=31; Field Artificial, n=18; and Field Real, n=19.

8.2.4 Effect Size

Effect sizes (Table 8-7) for the support hypotheses in each experiment (H_{1a} and H_{1c}) were considered large (Cohen, 1988)[64]. Further, with the exception of the increase in effect size for $H_{1a,}$ from 1.03 in the laboratory to 1.24 in the artificial field experiment, effect sizes generally decreased as the experimental environment moved from the laboratory to the field, which is consistent with a trade-off between internal and external validity.

Table 8-7 Effect Size (d) for Supported Hypotheses

	H_{1a}	H_{1c}
Laboratory	1.03	1.19
Field - Artificial	1.24	1.01
Field - Real	0.87	0.61

8.3 Summary of Other Hypotheses

As each progressive experiment increased in complexity in terms of the environment and knowledge context being studied, additional hypotheses were tested. A summary of the results pertaining to these additional hypotheses is provided below.

8.3.1 Cognitive Style

Hypothesis H_2 proposed that recipients with an analytical cognitive style would have a less favourable attitude towards binary question responses than their intuitive counterparts and was tested in the two field experiments (Studies Two and Three). Inconsistent results were obtained. In the artificial field experiment (Study Two) the hypothesis was supported (t=1.919, p<0.05), but not in the real field experiment (t(16)=0.702, p>0.1). However, in both of the experiments the attitude of intuitive recipients was more favourably disposed towards question responses of a binary structure than analytical recipients (intuitive = 3.8286 and analytical = 2.4500 in

[64] Cohen's guidelines for *d* - 0.80 is considered a large effect (79 percentile standing and 47.4% non overlap), 0.5 is considered a medium effect (69 percentile standing and a 33% non overlap) and 0.2 a small effect (58 percentile standing and a 14.7% non overlap).

Study Two and intuitive = 4.8857 and analytical = 4.4000 in Study 3), albeit that Study Three was not significant.

While hypotheses H_{3a} and H_{3b} (preference to short versus long written responses for a particular cognitive style) were formally tested in Study Three, data was also collected in Study Two. Analysis of Study Two data revealed that recipients with an analytical cognitive style preferred 'long' responses whilst, intuitive recipients preferred 'short' responses and if hypotheses H_{3a} and H_{3b} had been posed and tested in this study there would have been support for both. In Study Three, however, where the two hypotheses were posed and tested, the results revealed no difference in length preference between the two cognitive styles. This apparent inconsistency in the findings could be attributed to the measurement scales used in each of the two experiments; Study Three used a 7-point Likert scale (1 = extremely short to 7 = extremely long), compared to the discrete 'short-long' response category employed in Study Two.

8.3.2 Recipient Satisfaction

Recipient satisfaction with the shared knowledge was examined in all three studies. Unlike recipient attitude which was a well documented construct, the measure for recipient satisfaction was exploratory and consequently it was not until the last study that recipient satisfaction was posed in a hypothetical relationship and tested (hypothesis H_4). The hypothesis was not supported and overall inconsistent results were obtained for recipient satisfaction.

8.3.3 Recipient Intention

All three experiments used the Theory of Reasoned Action (TRA) attitude construct to measure a recipient's attitude towards the shared knowledge. In each case the knowledge received was not directly used, it was only shared and the attitude measured was an attitude towards future use of the received knowledge. Because the knowledge context used in the first two studies was contrived, measurement of recipient's intention to use the knowledge was considered illogical - the knowledge

was not real and therefore it was unlikely that it would ever be used. However, in the third study the knowledge context was real and it was therefore considered appropriate to test whether or not attitude could be used to predict intention to use received knowledge in the future (hypothesis H_5). Hypothesis H_5, was supported indicating that attitude towards shared knowledge is a useful predictor of intention to use that knowledge in the future.

8.4 Chapter Summary

This chapter assembled the findings on recipient attitude towards question response structure and performed ANOVA to ascertain if there were any statistical differences in recipient attitude across the three experiments. Results revealed a difference for each question response structure between the laboratory experiment (Study One) where a contrived case was used employing a strategic knowledge context and the real field experiment (Study Three) which used real task-related operational knowledge, specific to a single organisation. The results also revealed a difference in recipient attitude towards binary question responses between the artificial (Study Two) and real (Study Three) field experiments. The effect sizes across the three experiments for the supported hypotheses (H_{1a} and H_{1c}) were summarised and reported as generally large (according to guidelines), and were consistent with the potential trade-off between internal and external validity; for the most part decreasing as the experiment environment moved from the laboratory to the field. Finally the chapter summarised the findings from the additional hypotheses that were tested in Studies Two and Three (H_2, H_{3a}, H_{3b}, H_4 and H_5).

— CHAPTER NINE —

IMPLICATIONS OF THE FINDINGS

"The scientist is not a person who gives the right answers, he is one who asks the right questions"- Claude Levi-Strauss (1908-)

9.1 Introduction

The purpose of the three studies was to test components of the research model proposed in Chapter 3 and address the question of whether or not question structure is of importance in the knowledge sharing process. Moving from a laboratory environment (Study One) into two field experiments (Studies Two and Three) complexity gradually increased with each successive experiment; cognitive style was investigated from Study Two onwards and the context of the shared knowledge changed from that of a contrived scenario using strategic knowledge with vertical knowledge flows (Studies One and Two) to real operational knowledge with horizontal knowledge flows (Study Three). This progressive approach to testing the causal relationship between question response structure and recipient attitude enabled relatively stringent control over the constructs measured in the earlier studies, with the trade-off of external validity. The introduction of additional constructs from Study Two onwards appeared to influence internal validity, but the experiment environments used in Studies Two and Three were more aligned with reality, thereby increasing external validity of the findings.

The consistency and strength of the results suggest that there is substantial robustness in the purported relationship between question response structure and recipient attitude with overall strong validity, both internal and external. The questions that must therefore be posed are:

1. What do these findings mean?
2. How should they be interpreted?
3. How should they be used?

This chapter considers these questions by focusing upon a number of themes with the view of gaining further insight into the implications of the findings. The themes include:

- binary question responses;
- directed versus open-ended question responses;
- strategic versus operational knowledge context;
- the influence of cognitive style;
- attitude-intention (sharing-transfer); and
- what is the best question structure?

The chapter concludes by offering future research directions[65].

9.2 Binary Question Responses

It can be argued and has been argued throughout this thesis, that the use of binary questions to elicit knowledge in a documented manner is inherently inconsistent, because the implicit assumption in such questions is that the recipient of the response already possesses substantial information about the source individuals environment (Vinten, 1995) and can, therefore, accurately process the response. In the trilogy of studies reported here, the recipients of the shared knowledge did not have access to the same knowledge context as the source; the recipients were only presented with the questions that were asked of the source and their responses. Further, whilst the recipients in the last study (company specific) did have some level of prior knowledge pertaining to the knowledge context (operational), they were not the technical experts (the source individuals). Even with this operational knowledge

[65] There is not a section entitled 'Limitations'. A discussion of the limitations with each study can be found in prior chapters (Chapters 5, 6, and 7). Additional limitations relating to the implications of findings are discussed throughout this chapter.

the recipients in the last experiment preferred open-ended and directed question responses over binary responses (as hypothesised).

Recipient attitude was measured in terms of future use of the shared knowledge and unless the recipient already had substantial prior contextual knowledge[66], they could be expected to have insufficient knowledge to appreciated the full implications of a 'Yes' or 'No' response in the context of future decision-making. Too little information, as contained in the binary responses, could leave the recipient in a state they consider as ill-informed (O'Reilly, 1980), one where the shared knowledge is not valuable and therefore less favoured. When this state of uncertainty is combined with pressure for the recipient to make a decision based on the shared knowledge, they are potentially trapped, unable to be confident that the decision is the right one. Bounded rationality may cause the recipient to make a 'satisficing' decision rather than an 'optimising' one, due to lack of knowledge.

It is perhaps, therefore, not surprising that the recipients of shared knowledge were more favourably disposed towards the responses to questions of open-ended or directed question structure. Responses from questions of a complex structure appeared to provide sufficient or greater knowledge, although not necessarily complete knowledge and recipients were able to internalise the knowledge received from these question responses and better appreciated the consequential implications for future decision-making. By internalising received knowledge the recipients had the opportunity to own the shared knowledge and commit themselves to it through recognition of its value in the context of the decisions they were required to make; i.e. to recreate the knowledge for future use (Cummings & Teng, 2003).

Although the recipients of the open-ended and directed question responses were not privy to the complete context surrounding the shared knowledge (they were not the source individuals), these responses provided a knowledge context greater than that received by the recipients of the binary responses. It can be argued that a greater knowledge context enables recipients to develop reasoning that underpins the

[66] Above that of 'somewhat agree' reported in Study Three.

knowledge that has been shared as "without understanding the context, one cannot inquire into the reasoning and the assumptions behind the particular piece of knowledge" (Michailova & Hutchings, 2006, p.383).

It must be acknowledged that this rationale is applicable only to the context where the originator of the questions and the recipient are different individuals. When the two are the same (e.g. researchers developing questions and then collating the responses from participants for use in their research) such individuals should already have the contextual knowledge to interpret the response and therefore, may consider binary responses appropriate, i.e. the recipient understands the implications of a 'Yes' or 'No' response, as they developed the context in the first place. This situation, the question originator and recipient are the same person, has been used in many circumstances in the open versus closed question debate in survey research. The question often investigated is that of which question structure – open or closed - provides the best response from participants in the eyes of the researcher? Reported findings are variable. Some have found there to be no beneficial depth to the use of open-ended questions compared to closed (Dohrenwend, 1965), whilst others have found responses to closed questions to be influenced by the choices presented (Foddy, 1993) and responses to open versions of the same question can also differ (Schuman & Presser, 1979).

Any inconsistencies in the open versus closed debate are probably context related. The context of market surveys for example is not directly applicable to organisations that aspire to share knowledge for decision-making through the use of formal questioning. In many organisational situations the person required to make decisions based upon the knowledge received is not the designer of the questions whether implicit or explicit. For example, a finance director may make the final decision on whether or not to channel company funds into a project, but it is more than likely that someone else designed the questions (implicit and or explicit) and gathered the required knowledge from company employees.

9.3 Directed versus Open-ended Question Responses

In spite of the suggestion in the literature that directed questions allow greater control over the context of the response providing more clarity in communication (Knippen & Green, 1999), the findings in this study do not support this contention; there being no significant difference in recipient attitude towards directed question responses than that towards open-ended question responses. There are a number of potential reasons for this, including but not limited to the maturity of the participants (source and recipient), the length associated with directed question responses and the design of the directed questions.

9.3.1 Maturity & Experience of Participants

The maturity and experience of the participants in the studies must be separated into that of the sources of knowledge and that of the receivers of knowledge. From the recipients of knowledge perspective, the sources of knowledge did not share or communicate knowledge significantly better through the directed compared to the open-ended response structure. However, the sources of knowledge for Studies One and Two, which used the same source of knowledge respondents, were educated and mature individuals, not only capable of articulating their thoughts, but also prepared to share them. Further, the sources of knowledge in Study Three were acknowledged technical experts in their field, again willing to share their knowledge. It is possible to conclude that the sources of knowledge used in the three studies reported here did not need guidance on what knowledge they should share and that they were sufficiently mature to appreciate the implications of what they shared. They knew how to share given the question structure presented to them.

In Study Three the source individuals were surveyed on their perception of the organisational climate towards the sharing of knowledge. While the sample size was too small for statistical analysis and it was not the objective of this study to investigate the source individual, in general these individuals perceived the organisational climate to be supportive of knowledge sharing. The question then

becomes, in what circumstances is the guidance implicit in the directed question beneficial to the response process and consequently to the sharing of knowledge? Since research in this area is limited, the discussion on the use of directed questions is very subjective and possibly only provides insight into future research opportunities.

The directed question response may potentially result in a more favourable attitude compared to open-ended when the source that is sharing their knowledge lacks maturity, confidence and or experience in the knowledge context (which was not the case in the three studies reported in this thesis). In this situation, directed questions may result in the source of knowledge constructing a response that better communicates (shares) context knowledge with the recipient; i.e. the source is directed in the manner in which they should be respond (Knippen & Green, 1999). Again, in the circumstance under discussion, questions of an open-ended structure may not provide enough guidance to the source of knowledge to enable them to respond in a manner that would provide the recipient with the knowledge they require, potentially resulting in a less favoured attitude by the recipient. Once the source individual has gained enough maturity or experience in the knowledge context the directed question structure may no longer result in recipients having a more favoured attitude compared to the open-ended question structure; the latter may suffice.

The maturity and experience of the recipients of knowledge may also be significant. It is not unreasonable to conjecture that the students used in the first study, because of their relative lack of experience compared to the general populace, sought and possibly required more guidance from the question responses to be able to make a future decision. Their preference and subsequent attitude, albeit not significant, was for the directed question response format over that of open-ended. If the source individuals in Study One had also lacked in experience and maturity (they did not), their responses to the open-ended and directed questions may have resulted in the recipients having a significantly different attitude towards the two question structures. Directed question responses may indeed assist and guide the source individual in articulating their knowledge in the best possible way and recipients may

look at this type of question response more favourably than open-ended which may not have the guidance required.

9.3.2 Response Length

A conceivable explanation for why in the last two studies directed question responses were not as favoured as open-ended (albeit not significant), pertains to length. Directed question responses contained more words and consequently the length was greater than the responses to the open-ended questions (see Appendix D). It could be argued that the additional length from the directed responses was cumbersome for the recipients to process and therefore resulted in a less favoured attitude, albeit not significant. Too much information, as potentially contained in the directed responses could result in information overload, making it more time-consuming to process directed responses (especially when the recipients of the knowledge were, with the exception of the first study, mature individuals).

This may be a feasible explanation given research into response length. Gendall et al. (1996) found that additional response length does not necessarily equate to greater generation of new ideas. However, since there was not a large difference in word length between open-ended and directed responses (less than 300 words in Studies One and Two and approximately 120 words in Study Three), it is the view of this author that the length and number of words in the responses to directed questions did not contribute in any way to the findings reported.

Future research could offer more insight into this area by performing further studies using a Latin Square experiment design; recipients would be provided with all three question response structures in varying orders and their attitude towards the three responses measured and compared. This research may provide greater insight into the difference, if any, in recipient attitude towards open-ended and directed responses and would strengthen the overall findings of this study.

9.3.3 Limitations with the Directed Question Design

It is also possible that lack of difference between the two complex question structures is due to the design of the directed questions; the author may not have been explicit enough with the wording of the directed questions. The design of the question is fundamental to obtaining the type of response required (Dillman, 1978) and consequently enhanced direction in the question formulation may have provided greater guidance for the type of answer required.

9.4 Strategic versus Operational Knowledge Context

The implications of the differing knowledge contexts used in the three studies are of considerable and potentially far-reaching interest. The contrived case used in the first two studies provided greater control over the knowledge context that was shared. It was strategic in nature and required non-programmed decision-making compared to the non-controlled real operational knowledge that required programmed decision-making in Study Three. Further, the context of the two types of knowledge, strategic and operational, supports the knowledge flows in the respective studies (Schulz, 2001). The knowledge flow in Studies One and Two was vertical, from fictitious staff (the source individuals) to the recipient, who was asked to take on the role of a senior manager. This differed to the knowledge flow in Study Three, which was horizontal, from the research and development (R&D) team (source individuals) to the retail staff (the recipients). Schulz (2001) considers knowledge about opportunities, discontinuity and uncertainty to have a vertical flow of knowledge up hierarchies, whilst operational day-to-day knowledge flows in a horizontal manner. The difference in knowledge context could contribute to the statistically more favourable recipient attitude to all three question response structures in the last study (see Chapter 8 for the statistics).

The recipients in the last study were already in possession of operational knowledge associated with the knowledge context, specifically their operational task-related responsibilities, whereas the recipients in the first two studies had no prior exposure

to the knowledge context. This knowledge context in the last study could be reasonably expected to interact with a recipient's personal absorptive capacity providing them with a greater ability to absorb, combine and process the shared knowledge. A potential outcome of this enhanced absorptive capacity is greater understanding of the shared knowledge in terms of its applicability to future decision-making, for all three question response structures. The recipients of shared knowledge in the last study could be expected to have greater ability to understand the implication of a binary question response and therefore, it is not unexpected that their attitude towards such responses was more favourable than that reported in the first two studies (Chapter 8 reported a difference in recipient attitude towards binary question responses between Studies One and Three and Studies Two and Three).

Overall, not only did the recipients of knowledge in Study Three consider themselves competent in the conduct of their day-to-day operational-programmed activities, they also actively used this knowledge in their day-to-day decision-making. This is in direct contrast to the contrived case the recipients of the first two studies were faced with, where there was less knowledge context and the knowledge they received was strategic and non-programmed. Although the case was fictitious, the recipients were faced with an uncertain environment where their decisions were based on conflicting information (Bennett III, 1998). There were conflicting responses from the source individuals to certain questions.

The reported effect sizes reinforce the influence that knowledge contexts made in the three studies. The strategic knowledge context used in the first two studies reported large effect sizes between binary and open-ended and binary and directed (d=1.03 and d=1.24 for binary-open-ended and d=1.19 and d=1.01 for binary-directed, Studies One and Two respectively). This indicates the recipients required the knowledge contained in the complex question responses. The knowledge received from the binary responses was insufficient to make the future strategic decisions. This is further reinforced by the reported recipient attitude mean which was low towards binary question responses (3.0533 and 3.0933 respectively for Studies One and Two; equating to 'disagree' on the Likert Scale).

In contrast, the reported effect sizes between binary and open-ended and binary and directed were not as large in Study Three (d=0.87 and d=0.61 respectively). This is consistent with the operational knowledge context and it is not unreasonable that the recipients would be in a better position to process the implications of binary responses. This is further reinforced by the reported recipient attitude mean of 4.5889, reflecting 'neutral' on the Likert scale. Therefore, the suggestion that in the first two studies the recipients wanted and indeed required the knowledge provided by the responses to questions of complex structure is not unreasonable. Neither is it unreasonable to suggest that the overall more favourable attitude towards shared knowledge in the last study reflected not only the knowledge context but also the culture of the organisation towards the sharing of knowledge and its use in day-to-day decision-making.

9.5 The Influence of Cognitive Style

The literature suggests that cognitive style influences the manner in which individuals seek out information for decision-making (Barkhi, 2002; Ford et al., 2002; Taylor, 2004). Numerous models have been developed to understand and categorise an individual's cognitive style, the most basic version of which defines cognitive style in a uni-dimensional manner, such as analytical-intuitive (Schweiger, 1983) and left-brain-right-brain (Leonard & Strauss, 1997). On the basis that cognitive style has been found to influence the manner in which individual seek information, this thesis also considered that cognitive style could possibly influence a recipient's attitude towards knowledge received given question response structure; it might explain in part, a recipient's attitude. Recipient cognitive style was measured in Studies Two and Three, with variable and inconclusive results.

In Study Two (contrived case) those recipients with an intuitive cognitive style were, as hypothesised, more favourably disposed towards binary question responses than those recipients with an analytical cognitive style. This finding is consistent with both theory and recent empirical research into the knowledge seeking behaviours of individuals. The contention in theory is that analytical recipients require more 'hard' information and step-by-step analysis to assist with their decision-making (Allinson

& Hayes, 1996). It is therefore, not unreasonable to suggest that there would be insufficient information in 'Yes' or 'No' binary responses for them to have a highly favourable attitude towards making future decisions using this knowledge. Further, with the use of a contrived case in this study and a knowledge context where the recipients had limited prior knowledge (except for their own life experience), it is again not unreasonable that analytical recipients may be less than favourably disposed towards the received knowledge, because they may be incapable of being satisfied unless they have sufficient knowledge to make an informed decision. The findings from this study also corroborate those that have found that cognitive style influences the manner in which individuals seek out information and knowledge (Barkhi, 2002; Ford et al., 2002; Taylor, 2004).

What was interesting, however, was that the findings of Study Two were not replicated in the last study; there being no difference between the two cognitive styles, in terms of recipient attitude towards binary question responses. This apparent inconsistency can possibly be attributed to the operational knowledge context discussed in the preceding section and subsequently a recipient's personal absorptive capacity. The recipients considered themselves somewhat competent in the knowledge context of paint tinting and while they were not experts, this level of prior competency may have enhanced their ability to absorb, process and understand the implications of a binary response. The shared knowledge reinforced what they already knew and while prior knowledge was not related to recipient attitude, the compounded interaction of a recipient's prior knowledge, the knowledge context and their personal absorptive capacity (not examined in this study) may have, in a combined manner influenced attitude. Therefore, it is not unreasonable that although analytical recipients generally require more hard information, in the context of Study Three they had enough knowledge and absorptive capacity to process the implications of the binary responses and subsequently there was no statistical difference between their attitude and that of their intuitive counterparts.

With inconclusive findings it is difficult to elaborate too far on potential implications of individual cognitive style to knowledge sharing, except to mention that binary questions responses are not advisable for analytical recipients, as such individuals

prefer greater information. However, although binary question responses may be applicable to recipients with an intuitive cognitive style, the findings reported here still indicate that open-ended and directed question responses still are more favoured, both by intuitive and analytical recipients. Possibly the findings from the studies reported here provide direction for future research into cognitive style and knowledge sharing, beyond that already conducted on knowledge seeking behaviours. For instance, there is the potential to investigate whether or not the cognitive style of the question designer influences their preferred question structure. It is plausible to suggest that an analytical question designer, who may or may not be the recipient of the shared responses, may have a preference to using open-ended or directed structured questions over binary, since by definition they require more hard information to assist with decision-making compared to their intuitive counterparts (Allinson & Hayes, 1996).

9.6 Attitude-Intention (Sharing-Transfer)

Whilst it was not the objective of this study to investigate knowledge transfer, the last study did provide some evidence that attitude towards knowledge may act as a useful predictor of a person's intention to use received knowledge in decision-making. If an individual uses the knowledge, then knowledge can by definition be said to have been transferred (Argote & Ingram, 2000; Darr & Kurtzberg, 2000).

In Study Three a recipient's attitude towards the shared knowledge was a found to be a good predictor of their intention to use that knowledge in the future, a relationship that has considerable significance to the broader area of knowledge transfer. While the three studies comprising this thesis did not measure knowledge transfer directly, they did employ the measure of attitude that comprises the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975). In essence, Fishbein and Ajzen (1975) proposed that behavioural acts could be predicted from an individual's attitude and intention towards performing that behaviour. Their theory has been corroborated in a range of circumstances, including knowledge sharing (Bock & Kim, 2002; Ryu et al., 2003). If this theory is applied to the context of this study, a highly favourable

attitude towards received (shared) knowledge, which in turn is strongly correlated with intention to use the knowledge, means that the behaviour of using or completing the transfer of received knowledge is also likely to occur. A favourable attitude towards received knowledge can therefore be considered to be a proxy for successful knowledge transfer. This supports the work of others that contend that if shared knowledge is added to the recipient's knowledge bank where they can retrieve it to make decisions in the future (Spink *et al.*, 2002), then the more favourably disposed they are towards this knowledge or the more valuable the knowledge is to them, the more likely it is that they will utilise it (Gupta & Govindarajan, 2000).

This predictive relationship of attitude, intention and behaviour in the context of knowledge sharing is of considerable significance and highlights the importance of understanding other variables such as trust, culture, etc, that potentially impede or enhance knowledge sharing, since sharing by definition precedes transfer[67]. Further, measuring attitude towards future use of knowledge rather than actual use of the knowledge may reduce the problems and issues associated with what does and what does not constitute an appropriate measure for knowledge transfer. For example, when using the individual as the unit of analysis for knowledge transfer, should individuals be asked to what extent they have used the shared knowledge, or should they be tested on their knowledge pre and post knowledge sharing to ascertain the difference in their knowledge capacity?

9.7 What is the Best Question Structure?

The big question addressed by this study is:

What is the best question structure to use?

[67] Although data on a recipient's perception of the organisational culture/climate was collected in Study Three, the construct was not examined in detail. Further, trust was not considered a separate variable from organisational culture/climate; it was assumed that a favourable organisational culture/climate towards sharing would include high levels of trust. However, future research should examine these constructs separately.

It must be recognised at the outset that any discussion and response to this question must be considered in the context of an organisation's environment. In today's global economy businesses are competing in an environment of increasing uncertainty and discontinuity. Some suggest that employees are being asked to take on more complex interactions and to deal with more and more ambiguity (Johnson et al., 2005); decision-making is moving from that of programmed to non-programmed and operational to strategic. At the same time, employees are increasingly being asked to use their experience and tacit knowledge, together with that of others in the decision-making process. In this environment of uncertainty and discontinuity, it cannot be assumed that the recipient possesses all knowledge. To the contrary, they are often searching for new knowledge to reduce uncertainty and to assist with decision-making. Furthermore, they may not realise that there is valuable relevant knowledge available to them until that knowledge has been articulated by a source individual. The use of complex structured questions and their responses is no longer optional, it is essential, as they provide a way for the recipient to learn and to apply what they have learnt to their task-related responsibilities. In the absence of learning through the sharing of knowledge, the ability of the individual and the organisation to sustain their competitiveness in an increasingly competitive global environment is questionable.

Organisational context and factors such as the 'span of managerial control' must be included in any discussion on how best to elicit knowledge. Span of control has been interpreted and measured in a number of manners (see Ouchi & Dowling, 1974), however, it is generally considered to be the number of subordinates that directly report to a manager. In a small-medium enterprise (SME)[68] for example, the manager (frequently also the owner) generally has a wide span of control and often has considerable contextual knowledge relating to employees' job responsibilities; more than likely having at some time performed the role of the employee. In this circumstance, when knowledge is shared by the source individual (employee) in response to questions, the assumption that the recipient (manager/owner) has sufficient contextual knowledge to understand the implications of a 'Yes' or 'No'

[68] Although SMEs have a wide range of size definitions worldwide, in New Zealand SMEs are defined to employee less than 20 full-time employees (Ministry Of Economic Development, 2005).

response is not unreasonable. The binary 'Yes' or 'No' question and subsequent response may be absolutely applicable in this circumstance, as the owner has prior knowledge and the potential absorptive capacity to integrate the implications of the response into their decision-making processes. However, the above scenario may not be applicable in the case of larger organisations where more often than not managers have a narrow span of control, often directly proportional to their functional area and siloed by their direct job responsibilities.

Managers with a narrow span of control may still have enough contextual knowledge to understand a 'Yes' or 'No' response from their immediate subordinates, but almost invariably in larger organisations the knowledge required for decision-making resides with employees that are outside direct chains of command; employees that are the source of required knowledge often report to managers in other functional or organisational silos or to intermediary managers who report to other managers etc. When a manager requires knowledge to be shared from employees that do not directly report to them, then questions and responses of a more complex structure are possibly required (for both vertical and horizontal knowledge flows). Such questions implicitly provide a structure where greater amounts of knowledge can be shared by employees and these questions do not assume that the manager has complete contextual understanding of the employee's environment (as is assumed with binary questions).

Questions of open-ended or directed structures become even more applicable to knowledge sharing in substantial hierarchically structured organisations. In these organisations the more complex the hierarchy the more potential there is for knowledge to be suppressed since "the more layers of authority through which facts must pass before they reach the decision maker, the greater the danger that they will be suppressed, modified, or softened so as not to displease the 'brass'" (Bower, 2003, p.114). Senior managers today can no longer hide (blame) their subordinates for wrong decisions/actions and unfiltered and unmodified knowledge is becoming increasingly of paramount importance as the public spotlight focuses more and more

upon governance and compliance[69]. This environment requires senior managers to be accountable for the decisions/actions of their employees. The dilemma that many managers may face daily is how do they know what they need to know, but do not know. An example of where question structure is becoming even more significant to the sharing of knowledge is the Financial Market.

In the United Kingdom, The Financial Services Authority (FSA) is a statutory body mandated by government to provide market confidence in the financial markets through the protection of customers, public awareness of the financial system and reduction in financial crime (www.fsa.gov.uk). To comply with requirements of their mandate, the FSA requires regular assurance/confirmation from individual financial institutions (i.e. banks), that policies and procedures are being adhered to. Senior managers are required to complete and signoff reports that state that their organisation's activities are in compliance with FSA regulation. But rarely do these managers have a span of control that extends to the front-line staff who on a daily basis are confronted by potential money laundering or terrorist financing activities. All too often these managers use a binary question format to obtain the information they use in their reports (Bircham & Connolly, 2006), because all that is required by the regulation is affirmation that the organisation has complied with regulation. A 'Yes' or 'No' binary structured question is all that is required – or is it?

When employees (source individuals) are provided with a binary response category of 'Yes, we have complied' or 'No, we have not complied', they are often faced with the binary dilemma, which has its roots in self-interest, self-preservation and aligns with agency theory. In its simplest form the binary dilemma arises when a correct (truthful) answer may subsequently result in an organisation or employee being disadvantaged in some way. If an employee, for example, has failed or been unable to comply with a regulation and there are perceived personal consequences (loss of reputation, goal conflict, promotion, bonuses, etc), then factors including the employee's values, risk of being found out, perceived organisational culture/climate, perceived level of trust with managers etc, are possible determinants of the response

[69] A significant amount of compliance legislation has come about with the collapse of a number of large organisations e.g. Enron and Arthur Anderson.

that will be given. According to agency theory, the agent, or employee in this example, will seek to maximise their individual utility, at the expense of the principal or manager (Jensen & Meckling, 1976). When the principal is seeking out knowledge from the agent, the asymmetry of power resides with the agent. The agent decides whether or not knowledge is shared. The binary structured question compounds the agency issue by not allowing the agent to provide reasoning for their response choice.

If questions of a complex structure (open-ended and directed) were to be used, managers could potentially ask their employees to articulate why or why not certain policies were or were not complied with, thereby providing supplementary knowledge that could be used to mitigate or rectify the non-compliance event. This knowledge cannot be shared if questions of a binary format were to be used. Although there is always the possibility that the employee will not share knowledge about non-compliance (again self-interest and self-preservation – reputation, bonus etc), such complex question structures do engender greater transparency in an organisation. It is more difficult to fudge or hide the truth. Further, questions of a complex structure present a mechanism to reduce agent (employee) self-serving behaviour, making them (the agent) more accountable and allowing the balance of power to be brought back to the principal (manager).

To conclude the FSA example, not only would senior managers be in a better position to be accountable for their decisions (they can respond to the FSA report honestly and to the best of their knowledge), but the sources of knowledge (their employees) are confronted with the requirement to be responsible and accountable for their actions. The supporting documentation with their words becomes an audit trail and the excuse of 'I accidentally ticked the wrong box' is invalidated. Complex question structures allow senior managers to widen not necessarily their span of control but possibly their span of influence. They may still have the same number of direct subordinates, but their influence has expanded to employees at lower levels in the organisation and consequently knowledge that is often filtered vertically up an organisation passing through intermediary managers, is now directly accessible in its original form to the senior manager.

In an environment of ambiguity, complexity and uncertainty where decisions are non-programmed, strategic and imperative to the competitiveness of the organisation, no longer is the binary 'Yes' or 'No' compliance style audit question, with its implicit assumptions, sufficient to elicit knowledge. It is important to recognise, that often we do not know what we need to know until it is shared by someone. Once this shared knowledge is cognitively processed with our current knowledge base, the new knowledge allows for more informed decision-making. The use of binary questions may be appropriate when the recipient already has the contextual knowledge of the source individual's environment, however, the findings from the three studies reported here suggest that regardless of the knowledge context, strategic or operational, or knowledge flow, vertical or horizontal, open-ended and directed questions result in the recipient having a more favourable attitude towards the shared knowledge. Further, the more favourable the recipient is towards the knowledge the more likely they are to use that knowledge in the future; knowledge transfer. Therefore, possibly business should re-evaluate the use of binary questions in their assurance, compliance and audit processes.

9.8 Future Research Suggestions

There have already been a number of suggested future research directions presented throughout this thesis, however there are a number of others that merit mention. They include the influence of the knowledge context, the perplexing relationship between recipient attitude and recipient satisfaction, the applicability of the Theory of Reasoned Action (TRA), the influence, if any, of recipient cognitive style and furthermore, source cognitive style, and the inevitable introduction of further variables to the research model.

Although varying knowledge contexts were employed in the three studies the implications of the findings would be richer if the strategic knowledge context was examined within a real organisation and involved vertical knowledge flows. As indicated in the discussion above, today's business environment is more discontinuous and ambiguous than ever before and shared knowledge for strategic decision-making is essential. It would be worthy therefore, to test the relationship

between question response structure and recipient attitude using a strategic knowledge context that is company specific. In such a circumstance the recipient may not have the same level of prior knowledge as reported by the recipients in Study Three (operational knowledge context) and subsequently results may differ – with either a more or less favourable attitude, dependent upon question response structure. Such a study would enrich the findings reported here and assist with broadening external validity.

One of the perplexing findings reported in this thesis was the confusing relationship, if any, between recipient attitude and recipient satisfaction towards the shared knowledge. It is fair to comment that the measure used for recipient satisfaction was not very strong (or verified in the literature) and whether it requires future research is up for debate. The measure for recipient attitude was robust over all three studies and therefore it could be maintained that recipient satisfaction does not require any further investigation, especially since some contend that attitude and satisfaction are very similar measures (Melone, 1990). However, it could equally be argued that the attitude measure used (TRA operationalised attitude construct) is possibly dated in terms of measuring a recipient's perception towards shared knowledge – be that attitude towards or satisfaction with. The TRA was developed in the 70's and research has moved on 30 years plus. Subsequently, future research could examine the development of a more applicable, complex measure – one that may include elements of satisfaction towards the shared knowledge, together with measures for attitude.

While the literature suggests that an individual's cognitive style influences the manner in which they seek out knowledge (Barkhi, 2002; Ford et al., 2002; Taylor, 2004) and process information (Allinson & Hayes, 1996), the findings reported in this thesis were inconclusive with contrasting results between two of the studies. However, a plausible explanation for the lack of variation between intuitive and analytical recipients attitude towards binary question responses in the last study could be attributed to the operational knowledge context used. If, in a future research situation, a strategic knowledge context is used (similar to that of the second study), it is conceivable that with limited contextual knowledge analytical recipients will not

be as favourably disposed towards binary question responses when compared to their intuitive counterparts. A strategic knowledge context involves non-programmed decision-making and by definition analytical recipients would require more knowledge than that contained in a 'Yes' or 'No' response.

There is also the potential that the cognitive style of the source may interact in the knowledge sharing process. Future research could investigate how question response structure affects the source individual's perceived ability to share their knowledge and further, whether or not their cognitive style interacts with this. For instance, an analytical source individual may be extremely frustrated with binary questions as they may not be able to share knowledge to their desired level. Such extreme frustration may, or may not, be asserted by an intuitive source individual.

With the experiment method and functionalist approach employed in this thesis there were limits to the number of variables that were examined and consequently qualitative researchers may argue that the overall findings lacked a degree of meaning. In response to this, the author agrees that other variables require future consideration when examining question structure and recipient attitude in the context of organisational knowledge sharing; two of the major variables are organisational culture and trust. Although perceived organisational climate was lightly examined in the last study, having an appropriate culture is key to successful knowledge sharing (Huemer et al., 1998) and therefore organisational culture/climate should be a vital element in any future research. The literature also contends that trust is a key component in knowledge sharing, in that it affects both the sender and the receiver of the knowledge (see McEvily *et al.*, 2003). Again this variable should be considered in any future work into questioning and knowledge sharing.

Finally, functionalist research focuses on testing relationships and findings facts, and as a result does not always provide sufficient meaning in terms of the implications of the reported results. This author has attempted to provide some form of meaning by discussing the implications of the findings to business however, whether this has been successful is yet to be discovered. Making use of a qualitative approach, future research could offer more insight into the relationship between question response

structure and recipient attitude, by means of interviews, where richer data could be collected on why, or why not, a recipient is more, or less, favourably disposed towards question responses of a certain structure. Such an approach would also provide an avenue for investigating in greater detail variables such as the cognitive style of the individual and their preferred response length to questions.

9.9 Chapter Summary

This chapter has described the implications of the findings reported earlier (see Chapters 5, 6, 7 and 8) and offered some practical application for business individuals who strive for better ways to improve knowledge sharing in their respective organisations. The first part of the chapter tackled the question of why binary questions were consistently least favoured suggesting that earlier survey-polling based research may not be applicable to business, since such research assumes the recipient has access to the context surrounding the source individual's knowledge. This was followed by reasoning for why there was no statistical difference between open-ended and directed questions.

Next, the influence of the knowledge context, strategic and operational, was discussed and rationale presented for why the operational knowledge context of Study Three resulted in a more favourable attitude for all three question response structures, when compared to the strategic knowledge context used in Studies One and Two. Although the results from cognitive style were inconclusive, the implications for business were briefly outlined and this was followed by a discussion into how attitude can be used to predict intention to use knowledge in the future.

The practical application of the findings was described in the section: 'What is the Best Question Structure?' This section described a number of situations where certain question structures would be most appropriate, taking into account both small-to-medium enterprises and the large corporate. Further, using an example of regulations imposed on financial institutions in the United Kingdom, the use of and possible repercussions of using binary structured questions and complex structured questions was described. The chapter finished with a discussion of future research

directions. The next chapter brings together this whole thesis and describes the main conclusions and academic contributions that this study has fulfilled.

— CHAPTER TEN —

SUMMARY & CONCLUSION

10.1 Introduction

The purpose of this study was to examine the influence of the structure of a question on knowledge sharing efficacy. The study investigated how the structure of a question influences a recipient's attitude towards the knowledge received from the response. A progression of three studies was used to test the posed hypotheses using laboratory and field experiments, the key findings of which are summarised below. The conclusions and principal contributions that this study makes to both theory and practice are described in the final section of this chapter.

10.2 Summary of Results

To test the relationship between question response structure and recipient attitude, and examine aspects of the research model presented in Chapter 3, a progression of three experiments was undertaken (see Chapter 4). Chapters 5, 6 and 7 presented the objective, method, results and discussion for each experiment. A combined analysis of the three studies was presented in Chapter 8. The following subsections summarise these results.

Question Response Structure and Recipient Attitude

In all three experiments binary question responses were the least favoured by recipients, compared to responses of an open-ended or directed structure. There was no significant difference in recipient attitude between open-ended and directed question responses. The results revealed a decrease in effect size as the experimental environment moved from the laboratory to the field. This was not unexpected and is consistent with a trade-off between internal and external validity.

Across all question structures (binary, open-ended and directed) recipient attitude was highest (most favourably disposed) in Study Three and lowest (least favourably disposed) in Study One. However, the laboratory and first field experiments (Studies One and Two) used a contrived scenario case that employed a strategic knowledge context, whereas in the last field experiment (Study Three), real organisational knowledge in an operational context was used. These results were not unexpected because the recipients in the last experiment had some prior operational knowledge and were in a better position to process the shared knowledge and understand the implications of this knowledge for the future decisions they had to make. It is probably not unreasonable to suggest that they had a more favourable attitude towards the shared knowledge; there was less risk in using the shared knowledge in their future decision-making as the knowledge was relevant and actionable. In contrast, the strategic knowledge shared in Studies One and Two was new to the recipients (they had no prior knowledge) and the decisions they were asked to make, whilst fictitious, had risk implications.

Recipient Attitude and Intention

In Study Three a recipient's attitude towards shared knowledge was positively correlated with their intention to use the knowledge in the future. The research model (Chapter 3) posited attitude to be an antecedent of intention to perform the behaviour of using the knowledge in the future and intention mediates the relationship between attitude and the behavioural act. If indeed, intention can be used to predict behaviour (as per the Theory of Reasoned Action), then a favourable intention towards the use of shared knowledge suggests that the knowledge will be used in decision-making at sometime, and therefore will be transferred.

Recipient Cognitive Style

Support for the moderating influence of a recipient's cognitive style on the relationship between question response structure and recipient attitude was inconsistent. Whereas analytical recipients had a significantly less favourable attitude towards binary question responses than their intuitive counterparts in Study Two, in Study Three there was no significant difference between the attitude of analytical and

intuitive recipients towards binary question responses. Neither was there consistent support for the idea that a recipient's cognitive style was a useful predictor of their preferred response length to written questions.

Organisational Culture/Climate and Prior Knowledge

Although no hypotheses were posed, the research model (Chapter 3) posited that both perceived organisational culture/climate and prior knowledge of the recipient would influence their attitude towards the knowledge received. The results did not support this. No direct relationship between either a recipient's prior knowledge or their perception of the organisational culture/climate and their attitude towards the shared knowledge was found. There was also no relationship found between a recipient's perception of the organisational culture/climate and their intention to use the knowledge in the future as suggested in the Theory of Reasoned Action.

Recipient Satisfaction

Recipient satisfaction with the knowledge shared was an exploratory construct that was investigated in each of the three studies. The findings were very inconsistent and therefore no major conclusions can be drawn. There was no support for recipient satisfaction with detail mediating the relationship between question response structure and recipient attitude.

10.3 Conclusion

The results from this study contribute to our understanding of both the theory and practice of knowledge management and questioning. Empirical research on factors that influence knowledge sharing is still in its infancy within modern knowledge management research and has generally focused on the factors that impede or enhance the source individual's sharing of their knowledge, rather than the factors that influence the recipient's receiving of the shared knowledge. This study was focused solely on the recipient of the shared knowledge and examined how one factor, question response structure, could influence the recipient's receiving of documented knowledge. Specifically it examined how the structure of a question

influences the recipient's attitude towards the knowledge shared through the responses that source individuals provided to questions of a particular structure. It also met the calls of others for more research into the roles of the recipients of shared knowledge (Dixon, 2002) and questioning in the knowledge sharing process (Cooper, 2003).

The findings reinforce the views of Okhuysen and Eisenhardt (2002) who found active questioning to be a superior intervention method and provides a basis upon which the research community can advance understanding of the role of questioning in the generation of new knowledge. Further, the findings emphasise the importance of appreciating and understanding the assumptions that underpin question structure, particularly from the perspective of the recipient. For instance, binary or closed questions assume that the recipient is in possession of enough of the source individual's knowledge context to be able to process the implications of a 'Yes' or 'No' response (Vinten, 1995). The less favourable disposition of the recipients of shared knowledge towards binary responses found in this study supports the contention that they had insufficient knowledge context to be able to interpret the responses in a manner that was consistent with personal criteria for decision-making. An assumption of open-ended questions is that the recipient is mining for new knowledge (Foddy, 1993) and that any new information gained from the question responses can be added to the recipient's personal knowledge bank and be subsequently used in the future for relevant decision-making (Spink et al., 2002). The more favourable disposition of recipients towards the future use of shared knowledge derived from the responses to questions of an open-ended or directed structure suggests that they found the shared knowledge valuable.

The findings of this study add to the open versus closed questions debate. They support the findings of Schuman and Presser (1979) who found that open-ended and closed structure formats of the same question elicited two quite different responses, but challenge those of Dohrenwend (1965) who found no additional depth of question response in closed compared to open questions. However, in Dohrenwend's (1965) study, as in most of the studies conducted in the open versus

closed debate, the recipient of the responses was also the question designer and already had sufficient awareness of the context surrounding the question to be able understand and interpret a closed or binary response. In the study reported here the additional depth implicit in open-ended question responses appeared to be not only wanted by the recipients, but also required by them for future decision-making.

The findings of this study reinforce the views of those who contend that the recipient is the key to knowledge transfer, that they alone judge whether information sharing has been successful (Davy, 2006; Wilson, 2002). Furthermore, they support an important part of Ipe's (2003) theoretical framework; that questioning is a factor that influences the opportunity to share and more importantly the recipient's attitude towards what is shared. Although the influence of question structure on the source of knowledge was not examined in this study, it cannot be discounted. If the source of knowledge cannot articulate what they know because their response is constrained or channelled (closed or binary questions), then the findings of this study suggest that the disposition of the recipient towards shared knowledge is likely to be less favourable than their disposition towards the knowledge shared by sources who have been able to articulate in an unrestrained (open questions) or directed manner what they know. It is the author's view that more research is required into how question structure influences the ability and motivation of a source to share their knowledge; the research model posed in Chapter 3 could be examined from the perspective of the source. Such research would enhance the work of others who have examined knowledge sharing behaviours and factors that influence them (see Bock & Kim, 2002; Lin & Lee, 2004; Ryu et al., 2003).

Although this study did not set out to test the Theory of Reasoned Action (TRA), the results suggest that the theory is just as applicable to a recipient's attitude and intention towards future use of shared knowledge, as it is to a source individual's attitude and intention to share their knowledge (see Bock & Kim, 2002; Lin & Lee, 2004; Ryu et al., 2003). However, in this study the subjective norm of perceived organisational culture/climate did not influence intention (as per the TRA) or attitude (as posed in the research model). Organisational culture is considered by

many to be one of the major factors influencing knowledge sharing (de Long & Fahey, 2000; McDermott & O'Dell, 2001); why then did it not influence the recipients of shared knowledge? It could be that recipients have nothing to lose by accepting shared knowledge, irrespective of their perception of the prevailing organisational culture/climate – they have everything to gain, whereas the source of shared knowledge has more to lose when they relinquish unique ownership of their knowledge. Perhaps the perceived influence of organisational culture is greater on the individual who is the source of knowledge than the recipient of it.

As already discussed in detail in Chapter 9, the findings reported in this study have relevance to knowledge management in the real world, primarily because it provides the leaders and managers of organisations with insight into how the structure of a question influences the knowledge sharing process. In particular it illustrates how the documented responses to questions of different structure may influence a recipient's attitude towards the shared knowledge; responses to questions of an open-ended or directed structure are viewed more favourably by the recipients of knowledge than responses to questions of a binary structure. The findings also suggest that if a recipient has a favourable attitude towards shared knowledge they are more than likely to be favourably inclined towards using this knowledge in their future decision-making.

The findings reported in this study may assist organisations to create an environment that ensures that those 'who need to know – do know' because the originators of the knowledge have articulated 'what they know' into a form that the recipient can easily process. Providing a better structured mechanism by which knowledge can be shared has the potential to revolutionise organisations, as collective knowledge underpins and bolsters the confidence of decision makers and strategy formulators to face risk and to exploit opportunity – the essence of competitive advantage. Competitive advantage built upon cost structures and distinctiveness rarely lasts for long, but in Johnson et al's. (2005) view, competitive advantage built upon tacit interactions could provide formidable competitive capacity. Knowledge underpins tacit interactions and structured questioning techniques similar to that used in this

study are one way of ensuring the sharing and transfer of organisational knowledge to its tacit workers.

As described in the introduction to this thesis (Chapter 1), organisations are conducting business in an environment that is dynamically evolving, where ambiguity and complexity are prevalent. In order to survive in such an environment providing processes by which tacit interactions and knowledge can be nurtured is of utmost importance. Structured articulation of questioning for knowledge sharing is but one mechanism that may assist organisations to create an environment where hierarchical boundaries and silos are minimised, power associated with owning knowledge is reduced and accountability and responsibility is transparent. In such an environment the culture of the organisation supports and encourages knowledge creation and innovation.

This study demonstrates how formal structured questioning can be used as a knowledge sharing intervention method and that the structure of a question influences a recipient's attitude towards the knowledge received. The strength and size of the relationship between question response structure and recipient attitude derived across the three experiments strongly supports the general applicability of the results of the study, with the relationship between question response structure and recipient attitude consistent across differing shared knowledge contexts, i.e. strategic and operational. An individual's attitude towards shared knowledge can be used to predict their intention to use the knowledge in the future and understanding the factors that influence their attitude is likely to be of considerable importance in the emerging age of the 'tacit' worker.

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APPENDIX A – STUDY 1

The following appendices relate to Chapter 5, Study One.

Appendix A: Item 1 – Instruction Sheet

This survey contributes to the initial pilot study of a PhD dissertation being undertaken at the University of Waikato. The purpose of the research is to develop a greater understanding of the role of question structure in communication media such as surveys and questionnaires. To shed light on how question structure may impact on a response you are asked to participate in a short survey which should take no more than 10-15 minutes of your time.

The study is divided into two parts and your participation would contribute to the first part. You would be required to read a short case and follow this by answering three questions associated with this case. All participants will be kept anonymous and there is no requirement to provide any personal details. Your responses to the provided questions will then form part of the second phase of the research. In the second phase of the research the participants will be asked to respond to a survey based upon the responses provided by you. They will not however be provided with your details.

Please note you are not obliged to complete the survey, however, your voluntary participation would really be appreciated. If you decide to participate in this survey you should find 7 pages attached including the cover page. The Outline of Research Project informs you of the project and outlines how your responses will be used, including confidentiality. You will be required to sign the Consent Form for Participants which confirms that you have read and agreed to participate in the study. The Case Study provides the background information you will require prior to completing the survey which is found in the Questions and Responses section. The survey is very short and comprises three questions related to the case.

All information and data collected from participants at all stages will remain anonymous and will not be used for any research outside the boundaries of the dissertation. If you would like a copy of the results please fill in your email address below, detach this page from the questionnaire and hand it in with the completed survey. Your email details will be placed in a file and results will be sent to you when available.

Please email me a copy of the results to:

_____

If you have any further concerns please feel free to contact the researcher Heather Bircham at hjb@waikato.ac.nz. My supervisor, Dr Stephen Bowden can be contacted at sbowden@waikato.ac.nz.

Appendix A: Item 2 – Scenario Case

DevelopNu is a company that specialises in the development and commercialisation of new non-drug pharmaceutical products. It not only undertakes direct contract work on behalf of major pharmaceutical distributors, but also develops and takes to market new products on its own account. The company has a strong management team and a reputation for delivering projects on time, but slightly over budget. It has a strong balance sheet backed by sound assets, considerable cash reserves and a good credit rating which gives it substantial debt financing capacity. It also has a number of strong contracts providing good revenue streams in the short to medium term.

Due to recent world events, strong anti-money laundering and financing of terrorist organisations legislation has been enacted in the USA and the European Union. Whilst DevelopNu is a sound and well established Californian company, Federal Agencies have indicated their requirement that all companies and associated agencies undertake appropriate due diligence with any form of financing.

Recently, DevelopNu has been approached by an unknown entrepreneur (Mr Smith) born in Argentina but a national of Germany. Mr Smith would like DevelopNu to develop and market products based upon an apparently revolutionary manufacturing process which has been successfully patented in the USA, Canada and the European Union. Preliminary research undertaken by the company indicates that:

- Mr Smith is the owner of the patent;
- The new process could substantially reduce manufacturing costs and enhance the quality of a wide range of existing products;
- The new process would allow the manufacture of a number of marketable products that until now have been too expensive to manufacture.

A panel of experts comprising employees of DevelopNu and external consultants are of the opinion that the patented process could be implemented quickly and for relatively low cost in most of DevelopNu's manufacturing plants. Quick implementation is anticipated because the process requires very little equipment additional to that already used by DevelopNu. Existing equipment however would be utilised in significantly different ways. Preliminary analysis and planning to develop and bring the process to market reveals that the project is beyond the immediate financial resources of DevelopNu and therefore the company will require additional funding to undertake the project.

To date Mr Smith has been unwilling, even when offered confidentiality, non-use and non-circumvention agreements, to divulge the identity of the organisation or person(s) responsible for the actual development of the processes that have been patented. He has also refused to explain how he acquired ownership of the patents. He is known to have a history of failed projects and near bankruptcy, but there are no court judgments recorded against him and no outstanding debts registered in any of the major debt collection agencies in the USA or the European Union.

You work for the investment company NuVest and are responsible for researching and making recommendations to senior management on investment opportunities such as those available to DevelopNu. You have been asked to respond to the following questions presented on the Questions and Responses form.

Appendix A: Item 3 – Questions & Response Structure

Binary Response Structure

Participants had to respond to the following five questions by circling either Yes or No.

1. Are there significant risks embedded in or associated with this project? Please circle your answer.

   Yes No

2. Should this project be researched further? Please circle your answer.

   Yes No

3. Should NuVest invest in this venture? Please circle your answer.

   Yes No

Open-ended Response Structure

Participants were provided with a blank space after each questions from which they could provide their response.

1. Are there significant risks embedded in or associated with this project?

2. Should this project be researched further?

3. Should NuVest invest in this venture?

Directed Response Structure

Participants were provided with a blank space after each questions from which they could provide their response.

1. Are there significant risks embedded in or associated with this project?
   - If "Yes", what are they and could they be reduced?
   - If "No", why are there none?

2. Should this project be researched further?
   - If "Yes", what aspects do you believe should be researched further?
   - If "No", why not?

3. Should NuVest invest in this venture?
   - If "Yes", are there any conditions for investment that you believe are necessary?
   - If "No", why not?

Appendix A: Item 4 – Question Responses

The participants that responded to the questions were labelled Employee 1, Employee 2, Employee 3 and Employee 4.

Binary Responses

1. Are there significant risks embedded in or associated with this project?

Employee 1	Yes
Employee 2	Yes
Employee 3	Yes
Employee 4	Yes

2. Should this project be researched further?

Employee 1	Yes
Employee 2	Yes
Employee 3	Yes
Employee 4	Yes

3. Should NuVest invest in this venture?

Employee 1	No
Employee 2	No
Employee 3	No
Employee 4	No

Open-ended Responses

1. Are there significant risks embedded in or associated with this project?

Employee 1
Yes

Employee 2
Yes. Credibility of Mr Smith. Need for external funding. Always risk for 'first movers". DevelopNu has a strong reputation – don't want to lose this. Don't know who actually developed the process

Employee 3
Yes, Mr Smith is a risk. Does he really own the patent (legally)? How much influence/control will he have over the project?

Employee 4
Yes. Risk that DevelopNu may be breaching patenting regulations if Mr Smith hasn't been credited with the patent of the process. Thus, the result could be fines as a result and a negative effect on the firm's reputation. Also possible losses if the decision must be reversed after the process has been implemented.

2. Should this project be researched further?

Employee 1
Yes if the company is interest in pursuing it.

Employee 2
Yes. "Apparently revolutionary manufacturing process' need to ensure that it is what they are being told. Is there any similar alternatives? What are the competition doing? How with this directly benefit the organisation? What are the risks involved?

Employee 3
Yes, more research needs to be done into the background of Mr Smith.

Employee 4
Yes. Research the background of Mr Smith. The person(s) responsible for the development of the process. The possible benefits to losses ratio.

3. Should NuVest invest in this venture?

Employee 1
Unknown at this time

Employee 2
Not without further investigation into the background of Mr Smith or the revolutionary process.

Employee 3
Yes, but only after doing further research into Mr Smith

Employee 4
The venture has potential; however with the stricter legislation of financing due to recent events it would be wise to hold off on the decision until further research has been undertaken.

Directed Responses

1. Are there significant risks embedded in or associated with this project? If "Yes", what are they and could they be reduced? If "No", why are there none?

Employee 1
Yes, the main risk is that the entire offer is a set-up (pretty much like the money laundry offers I get from Africa several times a week). If Mr Smith is unwilling to reveal any background info on the patents, and if the company needs additional financing to launch the project, these two aspects do not match. Other risks include: the new process may be less efficient then anticipated (there is not experience with it yet); it could turn out that original costs estimates for implementing the process are too low.

Employee 2
No, risks can be mitigated by intensive investigation of Mr Smith.

Employee 3
Yes there are risks, but the degree to which they are significant would depend on NuVest's other ventures (comparably) and the venture capital market in general. There is a possibility that NuVest could be implicated in funding a "terrorist" activity – though to reduce this threat and implications for the company as a whole the arm that funds DevelopNu could be spun off into a separate company under a different name (slightly lower credit rating). The risk associated with a negative or poor return, or loss of investment as suggested by Mr Smith's past could be balanced by the use of underwriter/debtor insurance.

Employee 4
Yes. Very expensive – hence "all eggs in one basket". Integrity of the German Mr Smith. Lack of prototyping, hence not fully proved. Seems to be too good to be true.

2. Should this project be researched further? If "Yes", what aspects do you believe should be researched further? If "No", why not?

Employee 1
Since DevelopNu is currently doing okay financially there is no reason to launch this project without clear insight into every aspect of the ground. It is also bad business practice to hold back the information about the patent. The fact that Mr Smith is a German living in South America makes him even less trustworthy; that reminds me of what Nazis did after WWII.

Employee 2
Yes. Mr Smith. The exact technical details of the process.

Employee 3
Yes. Past funding of Mr Smiths activities. MR Smith won't talk but past venture capital companies etc probably will. NuVest or the underwriters could contact them directly. For fun could contact Interpol. Talk to experts within the area of process to see if they know where it may have come from. Seek legal advice to determine if the information gathered and the process followed to gather this information meets the requirement of due diligence in both USA and EU.

Employee 4
Yes. Prototyping. Conversion of singe line not all plants. Integrity of German Mr Smith. Alternative new advances in technology. Overall supply chain costs not just manufacturing. Other interested parties for new technology.

3. Should NuVest invest in this venture? If "Yes", are there any conditions for investment that you believe are necessary? If "No", why not?

Employee 1
No, definitely not. The risk of losing money in this project is way too high. For an investment company it is common to obtain insight into all details of what to invest in, that seems impossible in this case. Investors want to see a time span after which their money starts coming back; this span is impossible to determine here.

Employee 2
Yes, subject to satisfactory outcome of investigations. Too exact for a yes/no answer, but yes to more investigation.

Employee 3
Yes, if information gathered, or able to be subsequently gathered, meets the requirements of due diligence.

Employee 4
No. Too good to be true. Needs further investigation for such a large investment.

Appendix A: Item 5 – Questionnaire – Recipient

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Questions and Responses

BACKGROUND INFORMATION

Please imagine that you are the Investment Manager in the company NuVest. NuVest is a finance company that is considering a new investment opportunity (DevelopNu). Your colleagues in the senior management team have voiced some concerns about the project and before making a final recommendation you have decided to research it further. To obtain a better understanding of the views and perspectives of your employees you questioned a number of them to obtain their considered thoughts and views on the project, requesting written responses. You have asked more than one employee the same question and therefore you have multiple responses to the same question. The questions you asked and your employee's responses are provided below.

After reading the responses provided by your employees you are required to make a recommendation on how the senior management team should proceed. Your recommendation will be the basis upon which the senior management team will make its decisions. It should include consideration of the following:

- Is further research into this project necessary or indeed required?
- Are there significant risks associated with the project and can they be managed?
- Should the company be: investing; considering investment subject to the outcome of further research; or rejecting the investment opportunity?

Please read the questions you (the Investment Manager) provided your employees and their responses in the context of the above background information. Then complete the survey attached from the perspective that you are the Investment Manager and that you have to make decisions based upon the knowledge you have received from your employees.

Note: You will not be required in the survey to document your recommendation.

QUESTIONS AND RESPONSES

[insert questions and responses]

[the binary questionnaire contained the questions and only binary response]

[the open-ended questionnaire contained the questions and only open-ended responses]

[the directed questionnaire contained the questions and only directed responses]

Now that you have read the questions and responses please respond to the survey on the following page.

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Knowledge Sharing and Knowledge Satisfaction

A. KNOWLEDGE SATISFACTION

The questions in this survey are about your perception of the knowledge you have gained from the responses provided to the questions supplied. Remember you are a senior manager in NuVest and you are required to make an investment recommendation based on the responses provided. You are not required to provide your recommendation in this survey; rather the survey seeks to elicit your reaction to the knowledge you obtained from the responses to the questions that were asked.

Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
1.	The knowledge provided in the responses assisted me to make the decisions I had to make.	1	2	3	4	5	6	7
2.	The knowledge provided in the responses was sufficient for me to make the decisions I had to make.	1	2	3	4	5	6	7
3.	The knowledge contained in the responses enhanced my understanding of the issues involved with the decisions I had to make.	1	2	3	4	5	6	7
4.	The knowledge contained in the responses improved the effectiveness of my decision-making.	1	2	3	4	5	6	7
5.	Relevant knowledge is important to me when I have to make a decision.	1	2	3	4	5	6	7
6.	Availability of knowledge is important to me when I have to make a decision.	1	2	3	4	5	6	7
7.	Using available knowledge is important to me when I have to make a decision.	1	2	3	4	5	6	7
8.	I am satisfied with the relevance of the knowledge contained in the responses.	1	2	3	4	5	6	7
9.	I am satisfied with the depth of the knowledge contained in the responses.	1	2	3	4	5	6	7
10.	I am satisfied with the accuracy of the knowledge contained in the responses.	1	2	3	4	5	6	7
11.	I consider the knowledge I have obtained from the responses to be accurate.	1	2	3	4	5	6	7
12.	I consider the knowledge I have obtained from the responses to be complete.	1	2	3	4	5	6	7
13.	I consider that the knowledge I obtained from the responses reduced uncertainty in my decision-making.	1	2	3	4	5	6	7
14.	The knowledge I have received from the responses is useful for future decision-making in similar situations.	1	2	3	4	5	6	7
15.	The knowledge I have received from the responses is good for future decision-making in similar situations.	1	2	3	4	5	6	7
16.	The knowledge I have received from the responses is valuable for future decision-making in similar situations.	1	2	3	4	5	6	7
17.	The knowledge I have received from the responses is irrelevant for future decision-making in similar situations.	1	2	3	4	5	6	7
18.	The knowledge I have received from the responses is worthless for future decision-making in similar situations.	1	2	3	4	5	6	7

Thank you for the time you have taken to complete this survey. Please remember if you would like a copy of the results please fill in your email address and detach the Outline of Research Project Sheet. Again your results will be kept confidential and only used for the means of statistical analysis for this study.

APPENDIX B – STUDY 2

The following appendices relate to Chapter 6, Study Two.

Note: Study Two used the same questions and responses as Study One. The questions are responses are itemised in Appendix A: Item 4 – Question Responses.

Appendix B: Item 1 – Questionnaire - Recipient

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Questions and Responses

BACKGROUND INFORMATION

Please imagine that you are the Investment Manager in the company NuVest. NuVest is a finance company that is considering a new investment opportunity (DevelopNu). Your colleagues in the senior management team have voiced some concerns about the project and before making a final recommendation you have decided to research it further. To obtain a better understanding of the views and perspectives of your employees you questioned a number of them to obtain their considered thoughts and views on the project, requesting written responses. You have asked more than one employee the same question and therefore you have multiple responses to the same question. The questions you asked and your employee's responses are provided below.

After reading the responses provided by your employees you are required to make a recommendation on how the senior management team should proceed. Your recommendation will be the basis upon which the senior management team will make its decisions. It should include consideration of the following:

- Is further research into this project necessary or indeed required?
- Are there significant risks associated with the project and can they be managed?
- Should the company be: investing; considering investment subject to the outcome of further research; or rejecting the investment opportunity?

Please read the questions you (the Investment Manager) provided your employees and their responses in the context of the above background information. Then complete the survey attached from the perspective that you are the Investment Manager and that you have to make decisions based upon the knowledge you have received from your employees.

Note: You will not be required in the survey to document your recommendation.

QUESTIONS AND RESPONSES

[insert questions and responses]

[the binary questionnaire contained the questions and only binary response]

[the open-ended questionnaire contained the questions and only open-ended responses]

[the directed questionnaire contained the questions and only directed responses]

Now that you have read the questions and responses please respond to the survey on the following page.

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Knowledge Sharing and Knowledge Satisfaction

A. KNOWLEDGE SATISFACTION

The questions in this survey are about your perception of the knowledge you have gained from the responses provided to the questions supplied. Remember you are a senior manager in NuVest and you are required to make an investment recommendation based on the responses provided. You are not required to provide your recommendation in this survey; rather the survey seeks to elicit your reaction to the knowledge you obtained from the responses to the questions that were asked.

Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
1.	I am satisfied with the depth of the knowledge I gained from the responses.	1	2	3	4	5	6	7
2.	I am satisfied with the completeness of the knowledge I gained from the responses.	1	2	3	4	5	6	7
3.	I am satisfied with the relevance of the knowledge I gained from the responses.	1	2	3	4	5	6	7
4.	I am satisfied with the accuracy of the knowledge I gained from the responses.	1	2	3	4	5	6	7
5.	I am satisfied with the quality of the knowledge I gained from the responses.	1	2	3	4	5	6	7
6.	I am satisfied that the knowledge I gained from the responses is precise	1	2	3	4	5	6	7
7.	I am satisfied with the structure of the responses.	1	2	3	4	5	6	7
8.	I am satisfied with the format of the responses	1	2	3	4	5	6	7
9.	I am satisfied that the knowledge I gained from the responses is reliable.	1	2	3	4	5	6	7
10.	I am satisfied that the knowledge I gained from the responses has sufficient detail.	1	2	3	4	5	6	7
11.	I am satisfied that the knowledge contained in the responses assisted me.	1	2	3	4	5	6	7
12.	The knowledge I have received from the responses is useful for future decision-making in similar situations.	1	2	3	4	5	6	7
13.	The knowledge I have received from the responses is good for future decision-making in similar situations.	1	2	3	4	5	6	7
14.	The knowledge I have received from the responses is valuable for future decision-making in similar situations.	1	2	3	4	5	6	7
15.	The knowledge I have received from the responses is irrelevant for future decision-making in similar situations.	1	2	3	4	5	6	7
16.	The knowledge I have received from the responses is worthless for future decision-making in similar situations.	1	2	3	4	5	6	7

Please continue on next page ……

17. If I am receiving knowledge from others in a written format, I am more satisfied with responses that are (please circle one response):

    Long Short

18. If I am receiving knowledge from others in a written format, I am more satisfied with responses that are (please circle one response):

    Detailed in format Summary in format

19. If I am receiving knowledge from others in a written format, I am more satisfied with responses that are (please circle one response):

    Structured and Reasoned Unstructured information dumps

B. INFORMATION PROCESSING

People differ in the way they think about problems and information. Below are 38 statements (questions 20-57) designed to identify your own approach. If you believe that a statement is *true* about you, answer **T**. If you believe that it is *false* about you, answer **F**. If you are *uncertain* whether it is true or false, answer **?**. This is not a test of your ability and there are no right or wrong answers. Simply choose the one response which comes closest to your own opinion. Work quickly, giving your first reaction in each case, and make sure that you respond to every statement.

Indicate your answer by completely filling in the appropriate oval opposite the statement:

T True **?** Uncertain **F** False

		T	?	F
20.	In my experience, rational thought is the only realistic basis for making decisions.	0	0	0
21.	To solve a problem, I have to study each part of it in detail.	0	0	0
22.	I am most effective when my work involves a clear sequence of tasks to be performed.	0	0	0
23.	I have difficulty working with people who 'dive in at the deep end' without considering the finer aspects of the problem.	0	0	0
24.	I am careful to follow rules and regulations at work.	0	0	0
25.	I avoid taking a course of action if the odds are against its success.	0	0	0
26.	I am inclined to scan through reports rather than read them in detail.	0	0	0
27.	My understanding of a problem tends to come more from thorough analysis than flashes of insight.	0	0	0
28.	I try to keep to a regular routine in my work.	0	0	0
29.	The kind of work I like best is that which requires a logical, step-by-step approach.	0	0	0
30.	I rarely make 'off the top of the head' decisions.	0	0	0
31.	I prefer chaotic action to orderly inaction.	0	0	0
32.	Given enough time, I would consider every situation from all angles.	0	0	0
33.	To be successful in my work, I find that it is important to avoid hurting other people's feelings.	0	0	0
34.	The best way for me to understand a problem is to break it down into its constituent parts.	0	0	0
35.	I find that to adopt a careful, analytical approach to making decisions takes too long.	0	0	0
36.	I make most progress when I take calculated risks.	0	0	0
37.	I find that it is possible to be too organised when performing certain kinds of task.	0	0	0

Please continue on next page ……

		T	?	F
38.	I always pay attention to detail before I reach a conclusion.	0	0	0
39.	I make many of my decisions on the basis of intuition.	0	0	0
40.	My philosophy is that it is better to be safe than risk being sorry.	0	0	0
41.	When making a decision, I take my time and thoroughly consider all relevant factors.	0	0	0
42.	I get on best with quiet, thoughtful people.	0	0	0
43.	I would rather that my life was unpredictable than that it followed a regular pattern.	0	0	0
44.	Most people regard me as a logical thinker.	0	0	0
45.	To fully understand the facts I need a good theory.	0	0	0
46.	I work best with people who are spontaneous.	0	0	0
47.	I find detailed, methodical work satisfying.	0	0	0
48.	My approach to solving a problem is to focus on one part at a time.	0	0	0
49.	I am constantly on the lookout for new experiences.	0	0	0
50.	In meetings, I have more to say than most.	0	0	0
51.	My 'gut feeling' is just as good a basis for decision making as careful analysis.	0	0	0
52.	I am the kind of person who casts caution to the wind.	0	0	0
53.	I make decisions and get on with things rather than analyse every last detail.	0	0	0
54.	I am always prepared to take a gamble.	0	0	0
55.	Formal plans are more of a hindrance than a help in my work.	0	0	0
56.	I am more at home with ideas rather than facts and figures.	0	0	0
57.	I find that 'too much analysis results in paralysis'.	0	0	0

C. DEMOGRAPHICS

Please circle the appropriate response to the following questions.

58. Sex: Male Female

59. Age: <20 20-29 30-39 40-49 50+

60. Number of year with the Company: <2 2-5 6-10 11-15 16+

61. Position: Senior Management Middle Management Line Management

Thank you for the time you have taken to complete this survey. All of your responses will be confidential; only aggregate statistics will be reported.

APPENDIX C – STUDY 3

The following items relate to Chapter 7, Study Three.

Appendix C: Item 1 – Letter (Stage One)

1 August 2005

«AddressBlock»

«GreetingLine»

In conjunction with a PhD thesis being conducted at The University of Waikato, Resene is looking into different techniques that can assist and improve knowledge sharing within the company. As the researcher for this project I am writing to inform you of the study and to ask for your support and assistance. The project which Nick Nightingale has approved involves the investigation of staff knowledge surrounding paint tinting procedures at Resene. The study comprises two stages and has been developed in consultation with Resene staff.

The first stage of this process involves collecting knowledge from key Resene staff on paint tinting procedures. This is where we ask for your assistance, as we require the paint tinting knowledge of nine Resene staff. This knowledge will then be used in an anonymous manner in a detailed questionnaire that will be sent to approximately 100 branch staff.

Enclosed with this letter is a questionnaire that contains 5 questions that specifically relate to paint tinting at Resene. The questionnaire also has a number of other generic questions relating to knowledge sharing, and the length of time you have been with the company. The questionnaire should take no more than 5-15 minutes of your time to complete.

Since we require eight other employees to also be involved with this study, we ask that you complete the questionnaire individually and do not consult with other staff members. Once you have completed the questionnaire please place it in the envelope enclosed and mail back to Marianne Rowley at Resene Head Office. We would like to have this stage of the study finished by Monday 15th of August.

You can be assured of complete confidentiality. This questionnaire has an identification number for mailing purposes only. The results from this study will be made available to Head Office. You may receive a summary of the results by writing "copy of the results requested" on the back of the return envelope and print your name below it. To keep your details confidential please do not put this information on the questionnaire itself.

If you have any questions please feel free to either contact me directly on hjb@waikato.ac.nz or 021 1638920, or Marianne Rowley at Resene Head Office on 04 5778118.

Thank you for your assistance.

Sincerely,

Heather Bircham-Connolly
Management Systems Department.

Appendix C: Item 2 – Questions & Response Structure

Binary Response Structure

Participants had to respond to the following five questions by circling either Yes or No.

1. Should all paint products sold by Resene be tinted?

   Yes No

2. Are you aware of any paint products sold by Resene that do not fit exactly into the standard tinting system?

   Yes No

3. Is it possible to exceed tint limits on any paint products sold by Resene?

   Yes No

4. Does the Resene Colorshop Retail Manual provide adequate information for staff to accurately and confidently tint the paint products?

   Yes No

5. Are there general guidelines (underpinning procedures) that staff can use when tinting non-standard products?

   Yes No

Open-ended Response Structure

Participants were provided with a blank space after each questions from which they could provide their response.

1. Should all paint products sold by Resene be tinted?

2. Are you aware of any paint products sold by Resene that do not fit exactly into the standard tinting system?

3. Is it possible to exceed tint limits on any paint products sold by Resene?

4. Does the Resene Colorshop Retail Manual provide adequate information for staff to accurately and confidently tint the paint products?

5. Are there general guidelines (underpinning procedures) that staff can use when tinting non-standard products?

Directed Response Structure

Participants were provided with a blank space after each questions from which they could provide their response.

1. Should all paint products sold by Resene be tinted?
   - If "Yes", please list any products that you are aware of that are not included in the Resene Colorshop Retail Manual.
   - If "No", please list any products that you are aware of that cannot be tinted.

2. Are you aware of any paint products sold by Resene that do not fit exactly into the standard tinting system?
   - If "Yes", please list those products that you are aware of that do not fit the standard tinting system exactly, including the name of the company expert on them or the location of the relevant products reference information.
   - If "No", please list any products that you are aware of that are not included in the Resene Colorshop Manual, including the name of the company expert or the location of the product's reference material.

3. Is it possible to exceed tint limits on any paint products sold by Resene?
   - If "Yes", please list what can happen if tint limits are exceeded.
   - If "No", are there any paint products sold by Resene that require particular care when tinting.

4. Does the Resene Colorshop Retail Manual provide adequate information for staff to accurately and confidently tint the paint products?
   - If "Yes", please list any ways you believe would make Resene Colorshop Retail Manual even more effective than it currently is.
   - If "No', please list the deficiencies as you see them and the improvements to the manual you believe are required.

5. Are there general guidelines (underpinning procedures) that staff can use when tinting non-standard products?
   - If "Yes", please briefly detail.
   - If "No", what could be done to remedy this.

Appendix C: Item 3 – Questionnaire - Source

BACKGROUND INFORMATION

Resene is reviewing the information it provides to branch staff on the tinting of paint. The first stage in this review process involves collecting knowledge from key Resene staff on paint tinting procedures. There are 5 questions we would like to ask you about your knowledge of paint tinting. Please respond to these questions using the format provided in the questionnaire.

The questionnaire also contains a further 14 questions. These questions relate to your perception of the knowledge sharing climate at Resene and your general satisfaction with the knowledge that you shared on paint tinting.

Please be reassured that the information you provide will be kept confidential.

A. PAINT TINTING QUESTIONS

[The questions about paint tinting were provided here with the appropriate response space – Yes No for binary and blank space for open-ended and directed]

B. ORGANISATIONAL CLIMATE

The following questions are about your perception of the knowledge sharing climate at Resene. Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
6.	People in this organisation are willing to share knowledge/ideas with others.	1	2	3	4	5	6	7
7.	People in this organisation keep their best ideas to themselves.	1	2	3	4	5	6	7
8.	People in this organisation share their ideas openly.	1	2	3	4	5	6	7
9.	People with expert knowledge are willing to help others in this organisation.	1	2	3	4	5	6	7
10.	This organisation is good at using the knowledge/ideas of its employees	1	2	3	4	5	6	7

C. SATISFACTION WITH ABILITY TO SHARE KNOWLEDGE

The following questions are about your general satisfaction with your ability to share your paint tinting knowledge given the question response structure provided in questions 1-5. Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Dis-agree	Some-what Dis-agree	Neutral	Some-what Agree	Agree	Strongly Agree
11.	I am satisfied that I could share relevant knowledge on paint tinting.	1	2	3	4	5	6	7
12.	I am satisfied that I could share accurate knowledge on paint tinting.	1	2	3	4	5	6	7
13.	I am satisfied that I could share precise knowledge on paint tinting.	1	2	3	4	5	6	7
14.	I am satisfied that I could share reliable knowledge on paint tinting.	1	2	3	4	5	6	7
15.	I am satisfied that I could share depth of knowledge on paint tinting.	1	2	3	4	5	6	7
16.	I am satisfied that I could share detailed knowledge on paint tinting.	1	2	3	4	5	6	7

D. DEMOGRAPHICS

Please **CIRLCE** the appropriate response to the following questions.

17. Sex: Male Female

18. Age: <20 20-29 30-39 40-49 50+

19. Number of years with the Company:

<1 1-2 2-5 6-10 11+

Thank you for the time you have taken to complete this survey. Please place the completed survey in the return envelope and post in the Resene internal mail to Marianne Rowley.

All of your responses will be confidential; only aggregate statistics will be reported.

Appendix C: Item 4 – Follow-up Email

18 August 2005

Hi,

Two weeks ago you received a questionnaire relating to paint tinting procedures at Resene. Your participation in this, the first stage of the study is very important, as your knowledge forms the basis for the information that will be shared with other Resene employees in stage two.

Since the second stage of this study is planned for later this month we would like to ensure that all questionnaires are completed and returned within the next 7 days. If you have not yet completed the questionnaire, we ask that you take 10 minutes to complete it and return it in the self-addressed envelope to Marianne Rowley at Head Office. For those that have completed and returned the questionnaire, I thank you very much for your time and effort.

If you have any questions please feel free to either contact me directly on hjb@waikato.ac.nz or 021 1638920, or Marianne Rowley at Resene Head Office on 04 5778118.

Again thank you for your assistance.

Sincerely,

Heather Bircham-Connolly
Management Systems Department.

Appendix C: Item 5 – Question Responses

Binary Responses

1. Should all paint products sold by Resene be tinted?

Employee 1	No
Employee 2	No

2. Are you aware of any paint products sold by Resene that do not fit exactly into the standard tinting system?

Employee 1	Yes
Employee 2	Yes

3. Is it possible to exceed tint limits on any paint products sold by Resene?

Employee 1	Yes
Employee 2	Yes

4. Does the Resene Colorshop Retail Manual provide adequate information for staff to accurately and confidently tint the paint products?

Employee 1	No response
Employee 2	Yes

5. Are there general guidelines (underpinning procedures) that staff can use when tinting non-standard products?

Employee 1	Yes
Employee 2	Yes

Open-ended Responses

1. Should all paint products sold by Resene be tinted?

Employee 1
No. Primers etc do not need tinting. Refinished products – whites, ceiling whites do not require tinting.

Employee 2
No. There are some products which are not designed to be tinted for different reasons. For example, the "Decorator" range has never been tested for tint strengths or designed to standard tint strengths. The Wintergrade products should not be tinted or tinted to a number, because addition of tinters compromise drying and film formation at low temperature/high humidity.

2. Are you aware of any paint products sold by Resene that do not fit exactly into the standard tinting system?

Employee 1
Yes. Industrial paint products – tinted ex H/O. Specialist paint products – tinted ex H/O. Special colours - one-off colours made up for specific clients.

Employee 2
Yes. "Decorator" Range. "Contractor".

3. Is it possible to exceed tint limits on any paint products sold by Resene?

Employee 1
Yes, by people not following rules and tinter limit guidelines. Also mis-tints.

Employee 2
It is possible and some of our tint formulas do exceed the tint limits. But it is very undesirable because it would compromise some application and performance properties.

4. Does the Resene Colorshop Retail Manual provide adequate information for staff to accurately and confidently tint the paint products?

Employee 1
Yes. But perhaps need more regular updates of special/corporate colours.

Employee 2
Sorry I am not familiar with Resene Colorshop Manual.

5. Are there general guidelines (underpinning procedures) that staff can use when tinting non-standard products?

Employee 1
Yes. Tinter limits e.g. maximums need to be followed. Can refer to ColorLab at H/O for guidance.

Employee 2
Avoid tinting non-standard products. Explain to customer that Resene would not carry out responsibility for tinting non-standard products.

Directed Responses

1. Should all paint products sold by Resene be tinted? If "Yes", please list any products that you are aware of that are not included in the Resene Colorshop Retail Manual. If "No", please list any products that you are aware of that cannot be tinted.

Employee 1
No, not all be tinted. Ceiling paint Shelf Line. Ceiling paint Trade Line. Quick Dry. Sealers i.e. Smooth Surface Sealer and Sure Seal. Clear Coatings Aqua Clear etc.

Employee 2
No. Primers – Galvo Prime, Galov-One. Clears – Aquaclear. Sealers – Particle Board Sealer, Smooth Surface Sealer. Aquapel. Magnetic Magic.

2. Are you aware of any paint products sold by Resene that do not fit exactly into the standard tinting system? If "Yes", please list those products that you are aware of that do not fit the standard tinting system exactly, including the name of the company expert on them or the location of the relevant products reference information. If "No", please list any products that you are aware of that are not included in the Resene Colorshop Manual, including the name of the company expert or the location of the product's reference material.

Employee 1
Yes. Sand Tex Super Fine, came out since 2001.

Employee 2
I am not aware of the Coloursho p Manual.

3. Is it possible to exceed tint limits on any paint products sold by Resene? If "Yes", please list what can happen if tint limits are exceeded. If "No", are there any paint products sold by Resene that require particular care when tinting.

Employee 1
It is not supposed to be possible so no. But it can happen if the min-max tinter page is not looked at. Plus you do get "a certain shop does that for me" or "I'll go to Dulux". Painters putting pressure on shop staff to do something that in the future could come back. Aquashield x200, Sandtex, Thixalon, Resitex Plastercote.

Employee 2
I would imagine the tinter limits per litre e.g. 1Y per litre of light tone, are not allowed to be exceeded, otherwise tinter acceptance problems can result in colour differences, foaminess, when brushed and poor water resistance. I believe solvent-based paint has more tinter acceptance problems than water-based. Some tinters e.g. J, have been difficult to incorporate (causing streakiness when paint applied). The paint must be shaken immediately the tinter is added.

4. Does the Resene Colorshop Retail Manual provide adequate information for staff to accurately and confidently tint the paint products? If "Yes", please list any ways you believe would make Resene Colorshop Retail Manual even more effective than it currently is. If "No', please list the deficiencies as you see them and the improvements to the manual you believe are required.

Employee 1
No, there are things missing. There has been no update on tinting since April/May 2001. We have had 5 new bases come out and have no tinting information on them i.e. min, max levels. The layout makes it difficult to find if a product is included or not for special tinting rules. A basic chart in alphabetical order would be fine. A lot of work has been done on tinters and this information has not been updated either. The special limited tinters - no mention of them or their limitations.

Employee 2
Yes. Don't know.

5. Are there general guidelines (underpinning procedures) that staff can use when tinting non-standard products? If "Yes", please briefly detail. If "No", what could be done to remedy this.

Employee 1
Yes. Using the exception to tinting rules pages and working out how much tint to put in. Some staff do have problems in doing this.

Employee 2
Yes. Based around ratio of TiO_2 levels

Appendix C: Item 6 – Results Stage One

Demographics

Measure	Items	Frequency	Percentage
Gender	Male	3	50.0
	Female	2	33.3
	Missing	1	16.7
Age	20-29	0	0.0
	30-39	0	0.0
	40-49	3	50.0
	50+	2	33.3
	Missing	1	16.7
Years with Company*	<1	0	0.0
	1-2	0	0.0
	3-4	0	0.0
	5-9	3	50.0
	10-14	1	16.7
	15+	1	16.7
	Missing	1	16.6

* Years with the company was recoded into the same categories used in the data analysis for Stage Two - <1, 1-2, 3-4, 5-9, 10-14 and 15+ years

Means, Std Deviation, Variance and Frequencies

				Frequency on the 7-point Likert Scale						
Question	**Mean**	**Std Deviation**	**Variance**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Q6	5.8333	.40825	.16667					1	5	
Q7	3.0333	1.50555	2.26667		3		1	2		
Q8	4.6667	1.36626	1.86667		1		4		1	
Q9	4.8333	1.94079	3.76667		1	1		1	2	1
Q10	4.3333	1.96638	3.86667	1			2	2		1
Q11	5.6667	1.03280	1.06667				1	1	3	1
Q12	5.6667	1.21106	1.46667				1	2	1	2
Q13	5.5000	1.04881	1.10000				1	2	2	1
Q14	5.5000	1.04881	1.10000				1	2	2	1
Q15	5.1667	1.72240	2.96667		1			2	2	1
Q16	4.8333	1.47196	2.16667			1	2	1	1	1

Appendix C: Item 7 – Questionnaire – Recipient

BACKGROUND INFORMATION

Resene is reviewing the information it provides to branch staff on the tinting of paint. The first stage in this review process involved technical staff in Wellington responding to a number of questions about paint tinting. The questions they were asked and their corresponding responses are documented below. We would like you to read the questions and responses and then answer the questionnaire.

We understand that some of the procedures and guidelines involved in the tinting of paint may be found in various manuals or have been passed on to you by other staff. But for reasons outlined below, we would ask that you DO NOT refer to any Resene material, or ask any other employees to assist you when completing the questionnaire.

The questionnaire is designed to help us provide you with the information you need to undertake your work. It is not a test of your knowledge. We need honest and truthful answers and what you may consider negative information, and therefore may not wish to share, could be exactly the information we required. So please be reassured that the information you provide will be kept confidential.

To test this new format please read the information shared by the technical staff and then answer the questionnaire.

QUESTIONS AND RESPONSES

[insert questions and responses]

[the binary questionnaire contained the questions and only binary response]

[the open-ended questionnaire contained the questions and only open-ended responses]

[the directed questionnaire contained the questions and only directed responses]

INSTRUCTIONS

With the knowledge you have gained from the questions and responses in mind, please respond to the questionnaire on the following page.

A. ATTITUDE TOWARDS THE KNOWLEDGE

The following questions are about your general attitude towards the knowledge you gained from the question responses. Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
1.	The knowledge I have received from the question responses is useful for future decision-making on tinting paint.	1	2	3	4	5	6	7
2.	The knowledge I have received from the responses is good for future decision-making on tinting paint.	1	2	3	4	5	6	7
3.	The knowledge I have received from the responses is valuable for future decision-making on tinting paint.	1	2	3	4	5	6	7
4.	The knowledge I have received from the responses is irrelevant for future decision-making on tinting paint.	1	2	3	4	5	6	7
5.	The knowledge I have received from the responses is worthless for future decision-making on tinting paint.	1	2	3	4	5	6	7

B. SATISFACTION WITH THE KNOWLEDGE

The following questions are about your general satisfaction towards the knowledge you gained from the question responses. Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
6.	I am satisfied with the relevance of the knowledge I gained from the responses.	1	2	3	4	5	6	7
7.	I am satisfied with the accuracy of the knowledge I gained from the responses.	1	2	3	4	5	6	7
8.	I am satisfied with the precision of the knowledge I gained from the responses.	1	2	3	4	5	6	7
9.	I am satisfied that the knowledge I gained from the responses is reliable.	1	2	3	4	5	6	7
10.	I am satisfied with the depth of the knowledge that I gained from the responses.	1	2	3	4	5	6	7
11.	I am satisfied with the detail of the knowledge that I gained from the responses.	1	2	3	4	5	6	7

C. PREFERRED RESPONSE FORMAT

The following questions are related to your preferred method of receiving information. **TICK** the most appropriate box on the ranking scale for each question.

12. If I am receiving knowledge from others in a written format, I am more satisfied with responses that are:

    Extremely Short: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Extremely Long

13. If I am receiving knowledge from others in a written format, I am more satisfied with responses that are:

    More summary in format: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :More detailed in format

14. If I am receiving knowledge from others in a written format, I prefer that the content will reassure my current knowledge base:

    Strongly disagree: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Strongly agree

15. If I am receiving knowledge from others in a written format, I prefer the content to be new:

    Strongly disagree: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Strongly agree

D. INTENTION TO USE KNOWLEDGE

The following questions are about your general intention to use the knowledge you acquired from the responses as part of your job at Resene. Please **TICK** the most appropriate box on the ranking scale for each question.

16. I intend to use the knowledge I gained from the question responses in the future as part of my job at Resene.
    Extremely unlikely: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Extremely likely

17. I will try to use this knowledge in the future when dealing with Resene customers.
    Strongly agree: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Strongly disagree

18. I plan to use this knowledge in the future when dealing with Resene customers.
    Strongly disagree: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Strongly agree

19. I will make an effort to use this knowledge in the future when dealing with Resene customers.
    Definitely true: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Definitely false

20. I am likely to use this knowledge in the future when dealing with Resene customers.
    Extremely unlikely: ☐ ☐ ☐ ☐ ☐ ☐ ☐ :Extremely likely

Please indicate the extent to which you agree with the following by placing a **TICK** in the most appropriate box on the ranking scale.

For me to use the knowledge I gained from the responses to assist me with the needs of future clients is:

21.	Harmful:								:Beneficial
22.	Pleasant:								:Unpleasant
23.	Good:								:Bad
24.	Irrelevant:								:Relevant
25.	Worthless:								:Valuable
26.	Enjoyable:								:Unenjoyable

E. PRIOR KNOWLEDGE

The following questions are about your prior knowledge surrounding paint tinting at Resene. Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
27.	In terms of paint tinting procedures, I consider myself to be an expert.	1	2	3	4	5	6	7
28.	I often ask other staff for advice about paint tinting procedures.	1	2	3	4	5	6	7
29.	I consider myself competent enough in paint tinting to assist customers without the help of other staff.	1	2	3	4	5	6	7
30.	There is still more I can learn in terms of paint tinting procedures.	1	2	3	4	5	6	7
31.	The information I gained from the responses has increased my knowledge on paint tinting procedures.	1	2	3	4	5	6	7
32.	I consider myself a novice in paint tinting procedures.	1	2	3	4	5	6	7

F. ORGANISATIONAL CLIMATE

The following questions are about your perception of the knowledge sharing climate at Resene. Please indicate the extent to which you disagree or agree with each of the following statements by **CIRCLING** the appropriate number from 1-7.

		Strongly Disagree	Disagree	Some-what Disagree	Neutral	Some-what Agree	Agree	Strongly Agree
33.	People in this organisation are willing to share knowledge/ideas with others.	1	2	3	4	5	6	7
34.	People in this organisation keep their best ideas to themselves.	1	2	3	4	5	6	7
35.	People in this organisation share their ideas openly.	1	2	3	4	5	6	7
36.	People with expert knowledge are willing to help others in this organisation.	1	2	3	4	5	6	7
37.	This organisation is good at using the knowledge/ideas of its employees	1	2	3	4	5	6	7

G. INFORMATION PROCESSING

People differ in the way they think about problems and information. Below are 38 statements (questions 38-75) designed to identify your own approach. If you believe that a statement is *true* about you, answer **T**. If you believe that it is *false* about you, answer **F**. If you are *uncertain* whether it is true or false, answer **?**. This is not a test of your ability and there are no right or wrong answers. Simply choose the one response which comes closest to your own opinion. Work quickly, giving your first reaction in each case, and make sure that you respond to every statement.
Indicate your answer by placing a **TICK** or completely filling in the appropriate oval opposite the statement:

T True **?** Uncertain **F** False

		T	?	F
38.	In my experience, rational thought is the only realistic basis for making decisions……	0	0	0
39.	To solve a problem, I have to study each part of it in detail…….….	0	0	0
40.	I am most effective when my work involves a clear sequence of tasks to be performed…….....	0	0	0
41.	I have difficulty working with people who 'dive in at the deep end' without considering the finer aspects of the problem…….……...	0	0	0
42.	I am careful to follow rules and regulations at work…….….....	0	0	0
43.	I avoid taking a course of action if the odds are against its success…….…..	0	0	0
44.	I am inclined to scan through reports rather than read them in detail…….……...	0	0	0
45.	My understanding of a problem tends to come more from thorough analysis than flashes of insight…….…...	0	0	0
46.	I try to keep to a regular routine in my work. …… ….	0	0	0
47.	The kind of work I like best is that which requires a logical, step-by-step approach…….....…	0	0	0
48.	I rarely make 'off the top of the head' decisions…….…...	0	0	0
49.	I prefer chaotic action to orderly inaction…….....	0	0	0
50.	Given enough time, I would consider every situation from all angles…….....	0	0	0
51.	To be successful in my work, I find that it is important to avoid hurting other people's feelings…….....	0	0	0
52.	The best way for me to understand a problem is to break it down into its constituent parts…….	0	0	0
53.	I find that to adopt a careful, analytical approach to making decisions takes too long……...	0	0	0
54.	I make most progress when I take calculated risks…….....	0	0	0
55.	I find that it is possible to be too organised when performing certain kinds of task……..	0	0	0
56.	I always pay attention to detail before I reach a conclusion……...	0	0	0
57.	I make many of my decisions on the basis of intuition…….	0	0	0
58.	My philosophy is that it is better to be safe than risk being sorry…….	0	0	0
59.	When making a decision, I take my time and thoroughly consider all relevant factors……	0	0	0
62.	I get on best with quiet, thoughtful people……...	0	0	0
63.	I would rather that my life was unpredictable than that it followed a regular pattern……	0	0	0
64.	Most people regard me as a logical thinker……...	0	0	0
65.	To fully understand the facts I need a good theory……...	0	0	0
66.	I work best with people who are spontaneous…….	0	0	0
67.	I find detailed, methodical work satisfying……...	0	0	0
68.	My approach to solving a problem is to focus on one part at a time……	0	0	0
69.	I am constantly on the lookout for new experiences…….....	0	0	0
70.	In meetings, I have more to say than most……..	0	0	0
71.	My 'gut feeling' is just as good a basis for decision making as careful analysis. ……	0	0	0
72.	I am the kind of person who casts caution to the wind…….....	0	0	0
73.	I make decisions and get on with things rather than analyse every last detail…….....	0	0	0
74.	I am always prepared to take a gamble…….	0	0	0
75.	Formal plans are more of a hindrance than a help in my work…….	0	0	0
76.	I am more at home with ideas rather than facts and figures……..	0	0	0
77.	I find that 'too much analysis results in paralysis'…….	0	0	0

H. DEMOGRAPHICS

Please **CIRLCE** the appropriate response to the following questions.

78. Sex: Male Female

79. Age: <20 20-29 30-39 40-49 50+

80. Number of years with the Company: _____ (Please print)

81. Position: Branch Manager, Shop Manager, Area Manager, Sales Rep, Architectural Rep, Region Rep, Other

82. Store Location: _____ (Please print general region not specific store)

Thank you for the time you have taken to complete this survey. All of your responses will be confidential; only aggregate statistics will be reported.

Appendix C: Item 8 – Letter (Stage Two)

5 October 2005

«AddressBlock»

«GreetingLine»

In conjunction with a PhD thesis being conducted at The University of Waikato, Resene is looking into different techniques that can assist and improve knowledge sharing within the company. As the researcher for this project I am writing to inform you of the study and to ask for your support and assistance. The project which Nick Nightingale has approved involves the investigation of staff knowledge surrounding paint tinting procedures at Resene. The study comprises two stages and has been developed in consultation with Resene staff.

In the first stage of the study we gathered knowledge from a number of Resene technical staff on paint tinting procedures. This knowledge is contained in the attached questionnaire and this is where we require your assistance. Since it is necessary for you to have up-to-date knowledge on paint tinting for your job, we would like your opinion on how well the knowledge was shared.

The attached questionnaire should take no more than 5-15 minutes of your time to complete. Although we understand that it is a busy time for you with the October sale, we ask that recognise the importance of this study to Resene Head Office. Since there may have been others in your store that also received the questionnaire we ask that you complete it separately. Further, we want you to answer as honestly and truthfully as possible and often what you may consider as 'negative opinion' and therefore you may not want to share, is in fact the exact information we require. So please be honest. Also we ask that you DO NOT refer to any Resene material, e.g. Coloursho p manuals etc, to assist you when completing the survey. Rather we want your own acquired knowledge and experience.

We ask that you complete and return the questionnaire in the enclosed envelope to Marianne Rowley at Resene Head Office by Friday 21st of October. You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only. The results from this study will be made available to Head Office. You may receive a summary of the results by writing "copy of results requested" on the back of the return envelope and printing your name and address below it. To keep your details confidential please do not put this information on the questionnaire itself.

If you have any questions please feel free to either contact me directly on hjb@waikato.ac.nz or 021 1638920 or Marianne Rowley at Resene Head Office on 04 5778188.

Thank you for your assistance.

Sincerely,

Heather Connolly
Management Systems Department
The University of Waikato.

Appendix C: Item 9 – Follow-up Postcard

21 October 2005

Hi,

In the last couple of weeks a questionnaire seeking your opinion about how well paint tinting knowledge is shared at Resene was mailed to you. This questionnaire is part of a study being conducted by Resene together with The University of Waikato.

If you have already completed and returned the questionnaire to Marianne Rowley at Resene please accept out sincere thanks. If not, please do so today. Because this questionnaire has been sent to only a small, but representative sample, of Resene staff, it is extremely important that yours also be included in the study, if the results are to accurately represent the opinions of Resene employees.

If by some chance you did not receive the questionnaire, or it got misplace, please either email Marianne on marianne.rowley@resene.co.nz or phone her on (04) 5778188 and we will get another one in the mail to you today.

Sincerely,

Heather Bircham-Connolly
Management Systems Department
The University of Waikato

APPENDIX D – RESPONSE WORD COUNT

Experiments 1 & 2 – Total Word Count for Question Responses

	Question Number			
Response Structure	**1**	**2**	**3**	**Total**
Binary	4	4	4	12
Open-ended	197	82	59	248
Directed	234	185	108	527

Experiment 3 – Total Word Count for Question Responses

	Question Number					
Response Structure	**1**	**2**	**3**	**4**	**5**	**Total**
Binary	2	2	2	3*	2	11
Open-ended	74	27	40	19	35	195
Directed	45	17	132	93	32	319

* One source individual did not respond to this question with either a 'Yes' or 'No' and therefore the word 'No Response' was added to the questionnaire for the recipient.