AN EXPLORATION OF THE DETERMINANTS OF INNOVATION: THE TOP MANAGEMENT TEAM, ORGANISATIONAL CLIMATE AND ORGANISATIONAL LEARNING

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Some researchers argue that the top team, rather than the CEO, is a better predictor of an organisation's fate (Finkelstein & Hambrick, 1996; Knight et al., 1999). However, others suggest that the importance of the top management team (TMT) composition literature is exaggerated (West & Schwenk, 1996). This has stimulated a need for further research on TMTs. While the importance of TMT is well documented in the innovation literature, the organisational environment also plays a key role in determining organisational outcomes. Therefore, the inclusion of both TMT characteristics and organisational variables (climate and organisational learning) in this study provides a more holistic picture of innovation.

The research methodologies employed includes (i) interviews with TMT members in 35 Irish software companies (ii) a survey completed by managerial respondents and core workers in these companies (iii) in-depth interviews with TMT members from five companies (iv) longitudinal innovation data from the CEOs of participating companies. Data were gathered in two phases, time 1 (1998-2000) and time 2 (2003).

The TMT played an important part in fostering innovation. However, it was a group process, rather than team demography, that was most strongly associated with innovation. Task reflexivity was an important predictor of innovation (time 1, time 2). Only one measure of TMT diversity was associated with innovation– tenure diversity –in time 2 only.

Organisational context played an important role in determining innovation. This was positively associated with innovation – but with one dimension of organisational learning only. The *ability* to share information (access to information) was not associated with innovation but the *motivation* to share information was (perceiving the sharing of information to be valuable). Innovative climate was also associated with innovation. This study suggests that this will lead to innovative outcomes if employees perceive the organisation to support risk, experimentation and other innovative behaviours.

Key words: INNOVATION, TOP MANAGEMENT TEAMS, ORGANISATIONAL CLIMATE

T o mum and Daragh with love and to dad, who even in his lowest moments was the driving force behind this and remains so even when he is no longer with us

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CHAPTER ONE
INTRODUCTION

1.0 Introduction

The core objective of this research is to establish the factors determining innovation in indigenous Irish companies and from this, to build a picture of the innovative process. In so doing, the role of the top management team (TMT) and the organisational environment in fostering innovation is investigated. Much research has supported linkages between the top management team and organisational outcomes (Jackson, 1992; Norburn and Birley, 1988). However, a variety of evidence continues to give rise to contradictory results. There are problems inherent in the methods adopted in studying the TMT (for example the cross sectional nature of the majority of the research) and it is still not entirely clear how the TMT impacts upon organisational outcomes. It may be the case that, due to the complex nature of organisations and the outcomes to which they give rise, establishing the nature, level and intensity of the TMT's impact will continue to be a difficult and sometimes impossible task. Notwithstanding this complexity there continues to be a need for more research on the nature of innovation in top management teams and the methods by which innovation is diffused throughout the organisation. The empirical evidence presented in the literature review points to a number of TMT and organisational variables associated with innovation. The intention of this study is to draw together these TMT and organisational characteristics in order to provide a model of organisational innovation. The TMT variables under investigation are TMT diversity, TMT intragroup trust and TMT reflexivity. The organisational variables examined are organisational climate and leaning. The inclusion of both the TMT characteristics and the organisational variables provides a more holistic picture of organisational innovation.

Because the top management team is the group of decision makers generally charged with organisational strategy and performance, it is intuitively appealing to assume that its impact on organisational outcomes would be a given. This intuition is manifest in many of the theoretical arguments and stances that can be observed in the literature (e.g. Hambrick and Mason, 1984; Michel and Hambrick, 1992).

Since the publication of Hambrick and Mason's (1984) upper echelons theory, the top management team (TMT) has emerged as an important area of study in organisational research. It is important to study such groups for many reasons. TMTs operate at the boundary between the external and internal environment and therefore play a crucial role in environmental sense-making. They formulate strategic decisions, which have organisation-wide impact. Their actions carry considerable symbolic weight and their influence on the organisational culture is pervasive. Research relating to TMT structure, group processes and team performance indicates that the TMT is a better predictor of an organisation's fate than the CEO in isolation (Finkelstein and Hambrick, 1996; Hambrick, 1994; Hambrick and Mason, 1984). Therefore, the importance of studying the TMT and its relationship with organisational outcomes is clear.

One important influence on TMT functioning resides in the demography of the group. Demographics have been considered to be proxies for the underlying social psychological processes of the group that were difficult to measure (Pfeffer, 1983). Much of the literature available to date on the relationship between team composition, diversity and organisational outcomes yields contradictory results and ambiguities due to the fact that team demographic diversity has both negative and positive effects on group processes and outcomes. In 1994, Smith et al. demonstrated the limitation of the demography literature. They suggest that TMT demographic heterogeneity affects the team processes, which in turn affect organisational outcomes such as innovation. Therefore, studying TMT diversity and organisational outcomes in isolation will never yield a conclusive understanding of the role of the TMT, let alone predict cause and effect relationships. However, studying TMT diversity in conjunction with other team and organisational variables can give rise to a more robust understanding of the TMT as a totality. This study also examines TMT intragroup trust, TMT task reflexivity and the organisational context (climate and organisational learning) in an attempt to get a more complete picture of the relationship between the top management team and innovation.

1.1 Research Aims

The two overall aims of this research are:

- The exploration of the effects of top team composition and processes on organisational innovation (innovation data were gathered in two periods, time one and two)
- To explore the relationship between the organisational context (specifically, innovative climate and organisational learning) and innovation. The resultant research questions are as follows:

1. **The first set of research questions concern the effect of the top management team on market innovation:**
   (a) What relationship exists between top team diversity and innovation time one and time two?
   (b) What relationship exists between the group dynamics of trust and reflexivity and market innovation time one and time two?
   (c) What relationship exists between top team diversity and the group dynamics of trust and reflexivity time one and time two?

2. **The second set of research questions concern the effect of the organisational context on market innovation:**
   (a) What relationship exists between organisational climate and market innovation time one and time two?
   (b) What relationship exists between organisational learning behaviour and market innovation time one and time two?

The research questions will later be used to guide the formulation of hypotheses in Chapter 2, 3 and 4.

1.2 Overview of the Thesis

Chapter 2 reviews the literature on TMT demography and group processes and presents some of the hypotheses for the research. Two theoretical perspectives in particular are examined;

1. The upper echelons theory (Hambrick & Mason, 1984), which focuses solely on top team demography and organisational outcomes.

2. The group process theory (Shaw, 1981; Smith et al., 1994), which maintains that demographic variables alone are insufficient in predicting organisational outcomes and stresses the importance of including group processes in the TMT demography-organisational outcome equation

It is concluded that the research on TMT composition and organisational outcomes is full of contradictions. It is argued that, in order to enhance an understanding of the role of the TMT in influencing organisational outcomes, certain group processes and psychological undercurrents need to be considered. In doing so, this study focuses on intragroup trust and task reflexivity.

Chapter 3 focuses on the psychological and social processes of the TMT, namely intragroup trust and task reflexivity. The purpose of the chapter is to review the main trends in research on trust and reflexivity and to evaluate their role in explaining how the TMT impacts innovation. While there is a wealth of literature documenting relationships between intragroup trust and outcomes such as learning, commitment and satisfaction, there is little empirical evidence of direct relationships between trust and performance. Also, despite the growing interest in the area of trust in the organisational literature, few studies focus on levels of trust within the senior team. The section on trust concludes with several hypotheses generated from the literature focusing on intragroup trust in TMTs.

This chapter also reviews the literature on task reflexivity. While interest in this area has grown considerably in the last few years (De Dreu, 2002, Hirst & Mann, 2004; West, 2000), this area is still relatively neglected despite growing evidence that it plays an important role in team functioning. This chapter introduces the concept of reflexivity, charting its origins in the psychotherapy and discourse analysis literature and its subsequent application to understanding group functioning and performance. The main trends in the reflexivity research are explored and from this research, hypotheses are formulated.

Chapter 4 reviews the literature on organisational climate, learning and innovation. Firstly, organisational climate and the different approaches adopted within the literature are discussed. This section highlights some of the problems inherent in the

research, including lack of agreement regarding definition, uncertainty surrounding the level of analysis and a lack of theoretical studies on climate. This study focuses on a specific facet of climate – climate for innovation – and hypotheses are generated from the literature.

As part of this research a focus on the area of organisational learning is also adopted. The debate on how organisations learn has been rather fractured. Researchers who adopt an individualistic perspective to this topic tend to view organisational learning as individual learning within the organisational context. Others argue that this perspective fails to take into consideration the social context within which learning takes place. However, recent writers in this area manage to bridge the gap between individual and social perspectives by viewing learning as a process that is both individually and socially shaped. Models of organisational learning are presented, paying particular attention to Nahapiet and Ghoshal's (1998) model, which focuses on the information exchange/knowledge creation aspect of organisational learning. Using this model, several hypotheses are generated and it is suggested that there will be positive associations between organisational learning and innovation.

Lastly, the literature on innovation (which is treated as a dependent variable throughout the study) is reviewed. Several definitions of innovation are presented and the different streams in the innovation literature identified. This study adopts the organisational innovativeness research approach, which focuses on investigating the determinants of innovation (this study focuses on the TMT, organisational learning and climate as potential determinants of innovation).

Chapter 5 provides an overview of the research rationale and a summary of the hypotheses formulated from the literature review. The aim of this chapter is to provide a conceptual framework for the rest of the thesis. The aims, research questions, hypotheses and rationale are presented. This chapter also outlines the research strategy adopted to address the research questions and related hypotheses. Details are given of the research sample (35 indigenous Irish software companies) and the process of negotiating access. It sets out the research design of this particular study and the plan of investigation used to obtain the information. The research questions warranted the use of both quantitative and qualitative methods and the methods used

in this study (the survey and the interview) are discussed. This chapter also provides an exposition of the framework of analysis developed for the purpose of this research.

Chapter 6 provides an overview of the measures used in the quantitative survey. Details of scale development and the reliability of these scales are provided. Results of the exploratory factor analysis of the variables under investigation can be found in this chapter.

Chapter 7 addresses the hypotheses formulated in the literature review, presenting the empirical data collected during the course of this thesis. It first describes the top management team profile and presents correlations across all the study variables. The results of the regression analyses (variance in innovation measures accounted for by inputs and group processes) are then provided. Finally, the longitudinal data is presented. The chapter ends with a summary of the findings with reference to the existing theory.

Chapter 8 begins with a summary of the main findings. This is followed by a more in-depth discussion of the key findings as they relate to the research questions and the hypotheses formulated in Chapter 2, 3 and 4. It also draws on the findings from the in-depth interviews carried out with the top managers from five of the companies surveyed. These interviews contribute to understanding the innovative process by providing data on the accounts and interpretations of those who tend to be closest to the innovative process, namely top managers.

Chapter 9 presents the over all conclusions of the thesis. It begins with an overview of the research. This is followed by the theoretical contribution of the research. Limitations of the research, suggestions for future research and the practical implications of the study are also addressed.

CHAPTER TWO
THE TOP MANAGEMENT TEAM COMPOSITION LITERATURE

2.0 Top Management Team -Theoretical Background

Since the publication of Hambrick and Mason's (1984) upper echelons theory, the top management team (TMT) has emerged as an important area of organisational research. It is important to study such groups for many reasons. TMTs operate at the boundary between the external and internal environment and therefore play a crucial role in environmental sense making. They formulate strategic decisions that have organisation-wide impact. Their actions carry considerable symbolic weight and their influence on the organisational culture is pervasive. Research relating to TMT structure, conflict and team performance indicates that the TMT as a whole, rather than the CEO in isolation, may be a better predictor of an organisation's fate (Finkelstein & Hambrick, 1996, Hambrick, 1994; Hambrick & Mason, 1984).

However, there is a growing body of literature questioning the impact of the top management team on organisational outcomes. West and Schwenk's (1996) study of top management teams found that there was no relationship between top team composition and performance and they urge the reconsideration of assumptions regarding these relationships in view of the questionable empirical results to date. Walsh (1988) suggests that the impact of the top management team may be more complex than much of the demography research suggests and some theorists argue that top managers have limited impact on organisational outcomes because of environmental factors (Lieberson & O'Connor, 1972; Salancik & Pfeffer, 1977). Wiersema and Bantel (1992) reported that "very little support for the heterogeneity argument emerged....heterogeneity on age, organisational tenure, and team tenure were not significantly associated with strategic change" (p. 14).

However, despite these concerns, the effective functioning of the TMT is clearly important. One important influence on TMT functioning resides in the composition of the group. Due to the typically heterogeneous nature of these teams, they are by nature inherently prone to conflict. The debate on balancing the costs and benefits of

heterogeneity has led to a multitude of research studies (Hambrick & Mason, 1984; Knight et al., 1999; Smith et al., 1994) but the evidence has been rather inconclusive. Much of the literature available on the relationship between team composition, diversity and organisational outcomes yields contradicting results and ambiguities due to the fact that team diversity has both negative and positive effects on both group processes and outcomes. There are a number of possible explanations for such mixed findings.

An explanation put forward by Finkelstein and Hambrick (1990) refers to the concept of managerial discretion. Discretion is a "means of accounting for differing levels of constraint facing different top-management groups"(p. 485). Where the top team have low discretionary power, the role of the TMT is limited. Where discretion is high, top managers will have a significant impact on organisational outcomes and the upper echelons theory will have strong explanatory power.

Argote and McGrath (1993) argue that the effects of diversity on outcomes could depend on four factors. First, they suggest that the effect of diversity is likely to depend on the type of task facing the team. Jackson (1996) and West et al. (1998) argue that diversity is most valuable when the team face a complex and creative task. This would suggest that certain types of teams are likely to benefit more from diversity than others (e.g TMTs). Second, the effects of diversity may differ depending on the outcome studied. Milliken and Martins' (1996) extensive review of the diversity literature concludes that diversity may have a positive relationship with cognitive based outcomes such as decision making and performance, but a more negative effect on behavioural outcomes, such as team member turnover. Third, the impact of diversity may vary over time. One of the main criticisms of the diversity research is the prominence of cross sectional studies. The few longitudinal studies conducted suggest that the effects of diversity do vary with time. For example, Watson, Kumar and Michaelson (1993) have found that homogeneous teams may perform better in the initial stages of group formation, but these effects dissipated over time and diverse teams later outperformed the homogeneous groups. Fourth, the impact of diversity on outcomes may depend on what measures of diversity are being studied. Jackson (1996) suggests that task oriented measures of diversity (e.g.

function, experience) are more likely to have positive effects than relations oriented diversity (e.g. age or gender).

Another explanation for mixed results in the demography literature is that TMT heterogeneity affects the team processes, and through these processes, organisational outcomes such as innovation. Therefore, research findings may differ depending on whether team processes were also examined – the effects of team demography on organisational outcomes may be due to the effects of the team's demography on process, hence direct demography – organisational outcome relationships may not emerge.

2.1 Top Management Team Composition and Organisational Outcomes

The top team composition-outcomes equation can be divided into two schools of thought. The first school of thought follows the attraction-selection attrition model (Schneider, 1987) and the similarity attraction theory (Byrne, 1971), which maintain that we are attracted to those who are similar to us because they validate our sense of self worth and reinforce the attitudes we hold. Therefore, homogeneous teams are found to be more cohesive (Wagner, Pfeffer, & O'Reilly, 1984) experiencing higher levels of social integration.

The second school of thought assumes that diversity is valuable but that in order to work effectively, groups need the right combinations and group processes in place. At issue here are questions about the combination of roles, norms, styles or skills that fit together effectively and which types of people are needed within different groups (Chatman & Flynn, 2001; West & Allen, 1977). This perspective links heterogeneity with creativity and problem solving, with diversity theorists positing that once diversity is managed effectively, it can yield many rewards. This is echoed in Fiol's (1995) study on innovation in a Fortune 100 company in the US where diversity and different knowledge bases were linked to creativity. However, she notes that the beneficial aspects of diversity only emerged after the team successfully navigated a phase of conflict and turbulence. She also notes that attempting to understand and manage the effects of diversity and what she terms "contradiction" (different realities or stories) in a rational way would be to ignore a history of research indicating "that the creative mind is creative precisely because of

inherent contradictions of character and personality"(p.88). She is therefore suggesting that it is inevitable that the research on diversity is inherent with contradictions. Kanter (1988) also identifies the tensions in the diversity-organisational outcome equation and calls for organisational cultures that emphasise diversity but at the same time have 'connectedness' (p.172).

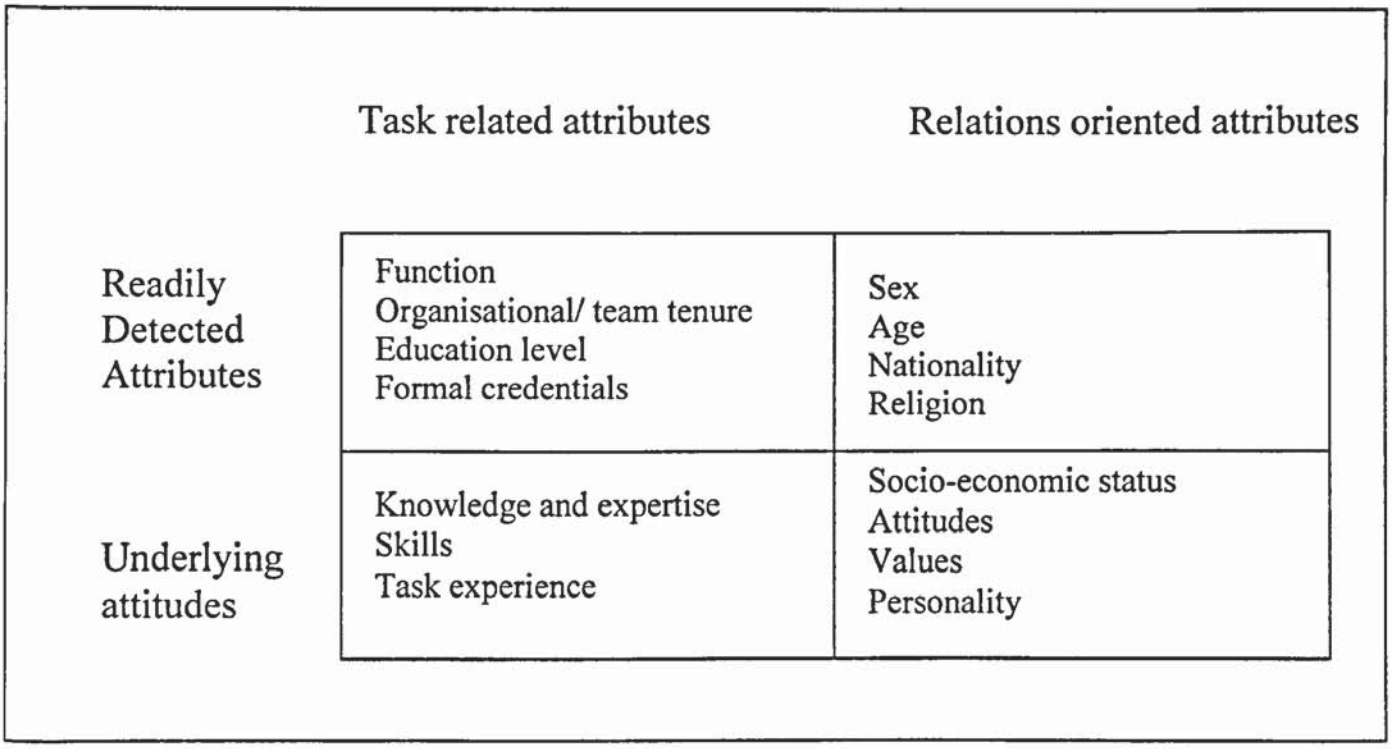
It would be impossible to fully capture the area of diversity and its consequences in one theory and studies on diversity have been influenced by work in many other disciplines including business, psychology and sociology. Two related theoretical perspectives have inspired recent research on top team diversity and organisational outcomes in particular. The first, the upper echelons theory (Hambrick & Mason, 1984), focuses solely on the demographic composition of the team where demographic composition is linked directly to organisational performance. The second, the group process theory (Shaw, 1981), illustrates the importance of group processes in the team composition-organisational outcome equation. Smith et al. (1994) maintain that demographic variables alone are insufficient in predicting organisational outcomes as they found that TMT demography was indirectly related to performance through group process. They also found direct relationships between TMT demography and performance and between group processes and performance suggesting that the relationship between top team heterogeneity and organizational outcomes is much more complex than the demography literature would suggest. This is an example of how misleading it can be to measure the effect of demographic heterogeneity on performance in isolation. Failing to examine the effects of team diversity on group processes can lead to misinterpretations that may have critical implications for organisational outcomes (Knight et al., 1999). While the literature on team diversity and its effect on organisational outcomes is often contradictory, there is consensus that certain group processes might play a crucial role in determining whether the outcome is a positive or negative one (Dess, 1987; Fredrickson, 1986; Smith et al., 1994). However, there has not been consistency regarding what that role is and it is imperative to incorporate TMT processes into demographic models of team functioning.

2.2 Team Diversity

Because team diversity can refer to many different aspects of team composition, it is useful at this point to differentiate between the different types of diversity that exist in teams. Lawrence (1997) suggested that diversity could be studied across at least four dimensions: visible demographic variables (e.g. gender, age, race), relational attributes (e.g. organisational tenure), status attributes (e.g. marital status) and personal attributes (e.g. beliefs, attitudes and values). Much of the research on diversity neglects this last dimension although Kilduff, Angelmar and Mehra (2000) do go some way towards rectifying this. Using data from 35 simulated firms run by a total of 159 managers attending executive education programmes, they investigated if any relationships existed between top management team composition and cognitive style and found no evidence of a relationship between demographic diversity and cognitive diversity. While this research is limited in looking at a relatively small sample of simulated teams, the finding suggests that using demographic measures as proxies for cognitive measures can provide misleading results. They suggest that demographic diversity may complement rather than determine cognitive heterogeneity.

Jackson (1996) has developed a simple two dimensional taxonomy where the individual attributes that create diversity are categorised as (a) either readily detected or underlying and (b) as either task related or relations related (see diagram 2.1). Task related characteristics include job tenure, team tenure, skills and job experience. Relations related attributes include gender, age, values and attitudes. According to this typology, readily detected attributes can be determined easily, quickly and consensually (for example, job tenure or gender). Underlying related characteristics are more difficult to detect and are subject to different interpretations (socio-economic status, personality).

Figure 2.1: Jackson's Taxonomy for describing the content of Team Diversity



Jackson, 1996: The Consequences of Diversity in Multidisciplinary work teams

Jackson (1996) emphasises the importance of considering the possible effects of relations oriented diversity that might be present in the team. Relations oriented diversity can influence behaviour because it triggers stereotypes and attitudes about different individual attributes. Such stereotypes and attitudes can exist for both task and relations oriented diversity. For example, diversity in functional area and status can influence attitudes about and behaviour towards people in those positions. Research also indicates that relations oriented attributes such as age, gender or ethnicity can influence perceptions of competence and ability (Lawrence, 1988; Wallston & O'Leary, 1981). Milliken and Martins (1996) suggest that diversity creates difficulty for groups because of the "complex, and often implicit, differences in perspectives, assumptions and causal beliefs with which the more superficial or observable differences are correlated" (p. 404).

Hambrick, Cho and Chen (1996) also question the neat dissection of diversity into task and relations oriented characteristics, stating that the major dimensions for

describing team members reflect a combination of task related and personal attributes. They suggest that task related diversity in functional background or education not only reflects the individual's professional expertise but may also affect an individual's attitudes, values and cognitive style. Because of this assumption that demographic variables may explain intervening cognitive variables, demographic variables are used as surrogate measures for less visible variables such as cognitive style (Kilduff et al., 2000; Wiersema & Bantel, 1992). Team demographic diversity using visible and measurable variables such as gender and age have been used therefore to reflect how much a team differs in terms of attitudes, values and cognitive style.

However, while it is important not to treat diversity measures as mutually exclusive, it is also necessary to differentiate between the different diversity measures. Kilduff et al. (2000) suggest that this has not been the case and argue that the tendency to make general assertions regarding demographically diverse teams and the collective cognitive capability of the team rather than using specific measures of diversity can be problematic. Team diversity has been found to have different effects on organisational outcomes depending on the measure under investigation, for example diversity in experience was found to be negatively associated with performance whereas diversity in education was found to be positively associated with performance (Smith et al., 1994).

In the present study, three kinds of task-oriented attributes are examined: diversity in functional background, education, and tenure. These measures were chosen because they are consistent with the measures used in the majority of the literature. One relations oriented attribute is explored: diversity in age. The following is a review of the literature on the varied relationships between diversity, group processes and organisational outcomes. Market innovation is the main outcome variable under investigation, however the effects of diversity on affective and task group processes (trust and reflexivity) and organisational context (organisational learning) are also explored. The literature review is organised by the type of diversity studied. Within each type of diversity, both theoretical and empirical work is reviewed.

2.2.1 Diversity in Functional Background:

It has been argued that managers who come from different functional backgrounds differ in terms of work related attitudes, knowledge and cognitive perspectives (Hambrick & Mason, 1984). Hayes and Abernathy (1980) suggest that certain functional backgrounds are more likely to lead to commitment to innovation than others. They provide anecdotal evidence that suggests that executives with functional backgrounds in finance and law are less likely to innovate than those with technical, R&D or engineering backgrounds. Dearborn and Simon (1958) found that functional background played an important role in determining how executives approached problem solving. They asked 23 managers to identify problems in a 10,000 word case analysis and concluded that managers were more likely to identify problems associated with their own functional background. However, the sample size is small and the results only provided weak support for their conclusions (Walsh, 1988). Daellenbach, McCarthy and Schoenecker (1999) provide empirical evidence of this argument in their study of 57 primary metals and semiconductor industries in the US. Their findings indicate that there is a positive relationship between the technical orientation of the TMT and above average R&D intensity.

This finding also emerged in Salaman and Storey's (2002) exploration of managers' views about the process of innovation. They conducted semi-structured interviews with 20 top managers and key middle managers in a large manufacturing company. Their findings suggest that functional background is associated with a manager's approach to innovation. Interestingly, however, there was a divergence, with approximately half the managers interviewed agreeing with previous research and proposing that finance backgrounds were less likely to innovate, saying that they were "unwilling to make the big change to a new way of thinking about business risk and investment" (p.158). However, the rest of the managers interviewed felt the problem lay more with engineering functions in the top team, contradicting the findings of Daellenbach et al. (1999). They identified the dominance of engineering values as the problem and believed that engineering functions concentrated excessively on product innovation to the detriment of other types of innovation. They also felt that engineers were inherently risk adverse.

Regardless of the type of functional backgrounds, many writers argue that diversity of expertise and perspectives enhance creativity and increase levels of innovation (Chaganti & Sambharya, 1987). West, Borrill and Unsworth (1998) suggest that functional diversity will lead to innovation where the group's task is complex and the environment is threatening, but only when this diversity does not threaten the integration of the group. Empirical work is consistent with this. Bantel (1993) found that functional diversity within teams leads to clearer corporate strategies and Hambrick, Cho and Chen (1996) have also found functional diversity to have positive effects for the firm, leading to market share and profit growth. The latter study explores the influence of TMT diversity on firms' competitive moves in the airline industry. Data on competitive moves were gathered from a sample of 32 airlines over eight years using a unique methodology where the competitive actions of the firms were directly identified from an extensive review of public information (e.g. major industry publications). They found functionally diverse teams exhibited a greater propensity for action and overall, concluded that, "although team diversity is a double edged sword, its overall net effect on airline performance, in terms of changes in market share and profits, was positive" (p. 659).

Bantel and Jackson's (1989) study of the banking sector found a positive association between functional diversity and administrative innovations in the banking sector (interestingly, they found no association between functional diversity and technical innovations). Using TMT surveys, they examined the relationship between team demography and innovation adoptions in a sample of 199 banks. Their results indicate that the more innovative banks were managed by functionally diverse teams. These relationships remained significant when organisational size, team size and location were controlled for.

The type of industry may moderate the effects of diversity on organisational outcomes. Korn, Milliken and Lant (1992) found a positive relationship between TMT functional diversity and performance (as measured by increases in returns on assets) in the furniture industry but not in the software industry. Milliken and Martins (1996) argue that this finding suggests "functional diversity in management teams may add value in terms of dealing with environmental complexity but that it may not facilitate coping with environmental volatility" (p. 411). Smith et al. (1994) similarly

predicted that functional heterogeneity in top teams would hinder performance in volatile industries but their empirical work did not support their hypothesis. Their study of TMT demography and group processes in 53 high-technology firms found no association between functional heterogeneity and performance (ROI, sales growth).

Simons (1995) suggests that functional diversity is more likely to be associated with positive performance outcomes when the team has appropriate processes in place (e.g. processes that facilitate debate). Overall, the research suggests that functionally diverse teams (most of the research focused on TMTs) may have better external links and greater access to information (Milliken & Martins, 1996). The majority of the empirical evidence suggests that the more diverse the team is in terms of function, the more ideas, knowledge, information and innovation there will be (although it is important to consider the conditions under which functional diversity may lead to positive performance outcomes).

In reviewing the literature on team diversity, Milliken and Martins (1996) comment that much of the research on functional heterogeneity focuses on relationships between functional diversity and cognitive advantages to the group (more information, more debate etc.) and pays little attention to more affective outcomes. While the majority of the evidence suggests functional diversity may be positively related to cognitive outcomes, it is also argued that functional diversity can lead to 'process losses' (Milliken & Martins, 1996, p.410). It has been suggested that functional heterogeneity can lead to conflict regarding group identity (Finkelstein & Hambrick, 1996) - do members see themselves as heads of their own functions (which may have goals that conflict with other functions) or members of the top team? Functional diversity may lead to increased politicking and hidden agendas hindering the implementation of innovative initiatives. Empirical evidence is consistent with this assumption. Knight et al.'s (1999) study investigating how demographic diversity and group processes influence strategic consensus within TMTs found functional diversity hindered strategic consensus. They collected data from 76 high-technology firms in the US and Ireland and for the most part, they found TMT diversity in general had negative effects on strategic consensus. Daellenbach et al. (1999) also found functional diversity did not emerge as a predictor of innovation. In fact they found functional diversity often led to information overload. However, the vast

majority of empirical evidence suggests that functional diversity is positively related to cognitive outcomes and innovation.

2.2.2 Diversity in Tenure

Research investigating the relationship between tenure and innovation has yielded mixed results. While Katz (1982) proposed that heterogeneity in team tenure led to increased creativity, he simultaneously claimed that diversity in tenure could result in lower levels of consensus, thus hindering the innovative process. Diversity in team tenure was found to decrease levels of cohesion and trust and lead to lower levels of group specific knowledge (Lawrence, 1997). Diversity in tenure has also been linked to a reduction in the safety levels within the group – this could in turn hinder innovation as Edmondson (1996) found psychological safety conducive to risk taking and innovation under certain conditions. While Bantel and Jackson (1989) surmised that tenure diversity could benefit the team by adding cognitive diversity, they also suggest that tenure diversity may lead to dysfunctional conflict and hinder communication within the team. However, they found no empirical support for either hypothesis in their study of the banking sector (no significant relationship was found between tenure diversity and innovation).

There is also empirical support for the above arguments. O'Reilly and colleagues (1989) found tenure diversity was negatively related to group-level social integration as well as to individual integration in their survey based study of 20 work units. Wagner, Pfeffer and O'Reilly (1984) examined turnover from 1976-1980 for top management group members in a sample of 31 Fortune 500 companies. They found a negative relationship between organisational tenure and turnover.

However, there are also arguments suggesting tenure diversity may lead to positive cognitive outcomes. O'Reilly and Flatt (1989), and Katz (1982) argue that diversity in tenure leads to increased creativity and innovation. Diversity in tenure can benefit the team by adding fresh perspectives and objectivity as well as lessening the likelihood of "groupthink", a phenomenon that occurs when groups become overly cohesive and can result in defective decision making. Wiersema and Bantel (1992) argue that a team's heterogeneity in organizational and team tenure is likely to lead to diverse opinions and a willingness to change, however their research findings did not support

this hypothesis (no significant relationship was found between tenure heterogeneity and strategic change). Boeker's (1997) research did however find positive associations between TMT tenure diversity and strategic change. He studied 67 semiconductor producers over a 14 year period and gathered data on these firms from interviews with the top team members. Hambrick et al. (1996) found tenure diversity to be associated with 'relatively significant, bold competitive responses' (p.676). Their research on the aviation industry was carried out over eight years and is one of the few longitudinal studies in this area. They gathered data from major aviation publications on competitive moves by 32 major airlines in order to investigate the influence of top team heterogeneity on firms competitive moves. They also found tenure diversity was positively associated with increased market share and profit growth. Knight et al.'s (1999) study of US and Irish TMTs found that, contrary to their expectation, tenure diversity was positively related to strategic consensus.

There is a considerable amount of research on this area that reports no significant relationships between diversity tenure and organizational outcomes. Smith et al. (1994) reported no relationship between performance measures (ROA, sales growth) and TMT tenure diversity. This is consistent with other studies (e.g. Bantel & Jackson, 1989; Wiersema & Bantel, 1992). Another possible explanation is that the relationship between tenure heterogeneity and outcomes is curvilinear. This suggestion supports Hambrick and D'Aveni's (1992) findings. In their study of team deterioration as part of a downward spiral of large corporate bankruptcies, they found that the teams of bankrupt firms were "extreme in their amounts of tenure heterogeneity – some very homogeneous and some very heterogeneous – possibly revealing some instances of recent wholesale team replacement (homogeneous), some very long-standing teams (homogeneous), and some teams that were schismatic combinations of very long tenured and very short tenured members (heterogeneous)" (p. 1460).

Overall, the research in this area suggests that diversity tenure may have negative consequences for affective outcomes (e.g. reducing social integration and increasing turnover). The effects of tenure diversity on cognitive outcomes are mixed, but the majority of the literature suggests that tenure diversity increases the chance of the

TMT engaging in debate, breaking with past practices and being more open to change (Wiersema & Bantel, 1992).

2.2.3 Diversity in Education

2.2.3.1 Educational Level

There is general agreement in the literature that the higher the level of education attained, the more receptive to creative solutions and innovation the person will be (Bantel & Jackson, 1989; Hambrick & Mason, 1984; Kimberly & Evanisko, 1981; Thomas, Litschert, & Ramaswamy, 1991). West et al. (1999) suggest that education level and performance are associated for two reasons. One is that managers who have acquired high level educational qualifications 'have the cognitive capability and flexibility to appraise and react appropriately to their complex environments" (p. 2). Alternatively, they suggest that the specific training gained in completing PhDs, Masters etc equips managers more effectively than those who have not gained these qualifications.

Research on top management team education is consistent with the above theory. Bantel's (1993) study using data from a sample of retail banks found educated managers are more likely to make effective decisions. Other studies corroborate this finding. Managers with high-level qualifications have been found to be more receptive to ambiguity and change (Dollinger, 1984; Kimberly & Evanisko, 1981) and are more likely to take action (Hambrick et al., 1996). The latter study, which explored the influence of top management team heterogeneity on organisational outcomes in the aviation industry, found positive associations between education level and market share and profitability. The results of Kimberly and Evanisko's notable study on organisational innovation in hospitals suggest that technological innovation is positively affected when the hospital administrator is highly educated. West et al. (1999) found educational level to be the strongest predictor of profitability and, to a lesser extent, productivity of 160 UK manufacturing companies studied over 10 years. Educational level explained 19.4% of the variance in profitability in different firms and 11.4% of the variation in productivity. Sambharya (1989) found no association between educational level and performance and suggests that this could in part be attributed to the timing of the research. The research took place in the eighties and

'since the MBA degree really became popular in the early seventies, the managers with those degrees will start reaching upper echelons in the 1990s' (p. 113).

2.2.3.2 Diversity in Education

Educational diversity can be measured in two ways. It can be explored in terms of diversity in education curricula (major area of study) or in terms of diversity in educational level (years of post-secondary education). The former measure tends to be the most pervasive and has been found to have a positive association with organisational outcomes. There is some evidence to suggest that being different from one's team members in terms of education level can increase the probability of turnover in both top and lower level teams (Jackson et al., 1991). However, they noted that this finding only applied to what they called non-elite top management team members (those without the title of VP, CEO or chairperson).

While the research on educational diversity and affective outcomes is mixed (e.g. Wiersema and Bantel, 1993, failed to find a relationship between curriculum heterogeneity and team turnover in a sample of US firms), the research on educational heterogeneity and cognitive outcomes is more conclusive. The vast majority of this research suggests that educational diversity has a positive association with cognitive outcomes. Hambrick et al. (1996) found diversity in educational background was positively associated with top managers' propensity for action, market share and profitability in 32 US airlines. Chaganti and Sambharya (1987) found that educational diversity increased levels of innovation in organisational strategy and Bantel (1993) found that educational diversity within teams in banks resulted in improved corporate strategies.

Wiersema and Bantel (1992) found that TMT diversity in educational curriculum was positively related to firms' change in diversification strategies. Using a random sample of 100 firms from the 500 largest manufacturing firms, they found educational diversity was still significantly associated with strategic change after controlling for prior firm performance, organisational size, TMT size and industry structure.

Using heterogeneity in the years of education as a measure, Smith et al. (1994) also found educational diversity to have a positive direct relationship with organizational

performance (ROI and growth in sales) suggesting that in high velocity environments, the benefits of a heterogeneous knowledge base in the top team may offset the difficulty of managing diverse qualifications. Their study involved CEO interviews and top team surveys in 53 single-business technology intensive firms and is noteworthy for its three-way approach to understanding the effects of the top management team. They test three alternative models of the effects of top management team's demography and process on organisational performance: 1. a direct demography – outcomes model; 2. a process model, in which process contributes incrementally and directly to outcomes, over and above demography; 3. an intervening model, in which the effects of the top management team on outcomes are due entirely to the effects of its demography on process. Their findings illustrate how complex the effects of the top team are and include both direct and indirect relationships between team demography and outcomes.

2.2.4 Diversity in Age

While diversity in age has been associated with different perspectives and experiences in the workplace, this is considered to be a small percentage of the total set of experiences and perspectives captured by age diversity (Zenger & Lawrence, 1989). Employees of different ages, regardless of their position within the workplace, tend to have diverse social, political and economic experiences, which reflect their own unique origins and history. Employees of different ages also tend to be at different points in their family lives. These different experiences outside the workplace appear to produce different attitudes and interests within the workplace (Rhodes, 1983). Therefore, while age diversity is generally characterised as non-job related (Simons et al., 1999) or as relations oriented (Jackson, 1996), it can influence values and attitudes within the workplace.

In theory, it has been argued that age diversity can have both positive and negative effects. For example, Bantel and Jackson (1989) suggest that age diversity can facilitate group creativity, debate and innovation through the sharing of different viewpoints and experiences (although it is interesting to note that no significant relationship emerged between age diversity and innovation in their study of the banking sector). However, it can also result in dysfunctional conflict, lack of consensus and ineffective communication as age diversity can deter the development

of a shared language between individuals that results from similar background and experiences (Pfeffer, 1983; Zenger & Lawrence, 1989).

The majority of empirical work suggests the latter. In Zenger and Lawrence's (1989) study of a medium sized US electronics firms, similarity in age was positively associated with technical communication both in project teams and in the wider organisation (although the association was stronger within the project teams). While the single site setting calls for caution when generalising to other organisations and industries, these results do suggest that age diversity hinders technical communication and thus may hamper organisational performance. West et al.'s (1999) research on 160 UK manufacturing companies found that the more teams differed in age, the worse the profitability for their company. In explaining this finding, they speculate that difference in age is associated with difference in worldviews. The less a team share a similar worldview or mental model of the task, the harder it is to communicate, collaborate and co-ordinate their strategies as a team.

Other studies have shown a positive association between age similarity and job satisfaction (Hunt & Saul, 1975; Kalleberg & Loscocco, 1983). Very few studies reported a positive association between age diversity and organisational performance. An exception, however, is a study conducted by Sambharya (1989) on 280 US based multinationals. He found a positive association between age diversity and ROS and ROA. These findings were contrary to what was predicted and he explained the finding by suggesting that age deviation in top teams suggests a diversity of viewpoints, which can lead to better decision making. Although there have been conflicting predictions about the relationship between age diversity and innovation, the majority of the empirical evidence suggests that age diversity will be negatively associated with innovation.

It is clear that the research concerned with TMT demography yields mixed results. Although some debate has surrounded the question of whether team heterogeneity benefits or hinders team and organisational outcomes, the majority of the literature suggests the following:

Hypothesis 1 Task- related diversity (function, education and experience) will be positively associated with market innovation and relations-related diversity (age) will be negatively associated with market innovation.

2.3 Top Team Diversity and Group Processes

It is evident from the literature that the effects of diversity on team functioning and organisational outcomes are often contradictory. Ancona and Caldwell (1992) suggest that heterogeneity may yield conflicting results because "while it does produce internal processes and external communication that facilitate performance, it also directly impedes performance....It may be that for these teams diversity brings more creativity to problem solving and product development, but it impedes implementation because there is less capability for teamwork than there is for homogeneous teams" (p.321). A possible reason for this dissent is that much of the earlier research on top teams focused solely on the demographic composition of the team (Hambrick & Mason, 1984) where demographic composition was linked directly to organisational performance. However, when group processes are brought into the equation, these contradictory results can be explained somewhat.

While it may be possible for top teams to capitalise on their diversity if there are group processes in place that facilitate debate and open discussion (Smith et al., 1994), the reverse is also true. If effective group processes are not place, or if there are group processes in place that hinder debate (e.g. affective conflict), the potential benefits of diversity may not be realized (or diversity may become counterproductive). Research investigating the importance of group processes in understanding the consequences of diversity has explored the roles played by conflict (Amason, 1996; Jehn, 1995; Knight et al., 1999; Simons & Peterson, 2000), agreement seeking (Knight et al., 1999), debate (Simons, Pelled & Smith, 1999) and communication (Smith et al., 1994).

Several researchers have suggested that team processes could moderate links between team diversity and organisational outcomes and suggest encouraging greater negotiation and functional conflict (e.g. Anacona & Caldwell's, 1992, study of 45 new product teams in high technology firms). Similarly, Amason (1996) and Jehn's (1995) studies demonstrate how the impact of diversity can vary depending on the

type of conflict experienced within the group. Diverse teams that engage in cognitive (or task) conflict are more like to achieve positive outcomes than diverse teams experiencing high levels of affective (or relationship oriented) conflict. In their study of 76 TMTs in high technology firms, Knight et al.'s (1999) findings suggest diverse teams with low levels of interpersonal conflict and high levels of agreement seeking achieve higher levels of strategic consensus. They suggest that the encouragement of certain processes (cooperation, agreement seeking) might mitigate any potential negative effects of diversity.

Other research is consistent with this. Simons et al. (1999) collected multi-informant data using TMT questionnaire and a financial information survey from 57 electronic components manufacturing firms. They found positive interactive effects of diversity and debate on performance and concluded that "for diversity to benefit a company's bottom line, there must be a process by which the positive aspects of diversity are brought to bear" (p. 670). Interestingly, they found the interactive effects were stronger for task related diversity than for relations related diversity (age diversity). They suggest that "debate is more likely to be fruitful when it draws on different experiences and perspectives that are relevant to a task rather than on less relevant viewpoint differences. This finding provides some preliminary support for the notion that more job related forms of diversity have greater potential impact on organizational performance, as Pelled (1996), Milliken and Martins (1996), and Williams and O'Reilly (1998) have suggested" (p. 670).

Similarly, Keck (1991) and Hambrick and D'Aveni (1992) have attributed links between team diversity and organisational outcomes to unmeasured social and psychological processes. Their reasoning is that diversity influences team processes and these processes in turn influence organisational outcomes. It is therefore important to take into consideration the psychological and task processes of the team. West et al. (1998) differentiate between task group processes and affective group processes and suggest that group affective tone is an important, if somewhat controversial, approach to understanding teams. This study therefore explores both affective and task processes in order to better understand the impact of the top team. Thus, intragroup trust and task reflexivity are now examined.

2.3.1 TMT Diversity and Intragroup Trust

The social attraction and homophily theories posit that the more similar individuals are the more positive they will feel towards each other. Social homophily preferences need not be based on demographic characteristics but Nielsen (1985) hypothesised that shared demographic characteristics can lead to collective solidarity. This theory has also been applied to individuals' propensity to trust. Individuals are more likely to perceive those different from them as dishonest, uncooperative and untrustworthy (Brewer, 1979; Williams, 2001). Hambrick et al. (1996) suggest that "in some instances, heterogeneity may engender outright distrust and acrimony, as widely dissimilar group members may have different vocabularies, paradigms, and even objectives" (p. 663) causing innovation and performance to suffer. Similarly, McAllister (1995) hypothesised that social similarity between individuals can influence trust and that homogeneous groups may have an advantage over diverse groups in their ability to create trusting work relationships.

But is there empirical evidence to support the similarity-trust theory? Interestingly, findings from McAllister's study do not support his hypothesis that similarity engenders trust. He investigated the nature of interpersonal trust among managers and professionals and, through the use of questionnaire, collected data from 175 manager-peer dyads. He found no significant relationship between social similarity and trust (however, he only measured one demographic category – ethnicity). Johnson, Cullen, Sakano and Takenouchi (1996) investigated the formation and outcomes of trust between partners in the non-equity-based international cooperative alliance (ICA). Dyadic data were gathered from Japanese and US partners in 101 ICAs based in Japan. Results showed that similarity between ICA partner firms (expertise, organisational culture etc) contributed to trust for the Japanese but not the US.

Flynn, Chatman and Spataro's (2001) results support the social attraction and homophily theories. Using a sample of 119 MBA candidates and 245 financial services officers, they found that people who were more demographically different than their co-workers engendered more negative impressions than did more similar workers. However, they found that personality (in particular extraversion and self monitoring) moderated this relationship. The impressions were more positive when demographically different people were either extraverted or high self-monitors.

While the trust literature would indicate that the generation of trust is influenced by a variety of different factors (e.g. frequency of interaction, effective communication, procedural justice, see Eisenhardt, 1989; Kramer, Brewer & Hanna, 1996), it suggests that beliefs about trustworthiness are often associated with social group membership and similarity attraction theories (Cox, 1993; Williams, 2001). However, the empirical evidence supporting this theory is not as significant. This study tries to rectify this and from the literature suggests:

Hypothesis 1a: Top management team diversity will be negatively associated with intra group trust.

2.3.2 TMT Diversity and Task Reflexivity

The task group process under investigation in this study is task reflexivity. While this process is discussed in detail in chapter three a definition of reflexivity is useful at this point. Swift and West (1998) define reflexivity as the "uniquely human ability to reflect upon processes, events, sensations, past experience and the physical being" (p. 4). This definition can be applied to team level where team reflexivity is "the extent to which team members overtly reflect upon the group's objectives, strategies, and processes and adapt them to current or anticipated endogenous or environmental circumstances" (West, 1996, p. 559).

Jackson, in her review of the diversity literature, suggests that team diversity may stimulate many opportunities for reflexivity, while this would be less likely in homogeneous groups (Jackson, 1996). However, this would depend on the type of diversity experienced within the team. Jackson has suggested that task related diversity would be more likely to have beneficial effects on team outcomes than relations related diversity. Her analysis suggests that diversity in status and power distribution would decrease reflexivity. The effects of team diversity on team reflexivity may be further complicated by other factors.

Schippers, Den Hartog, Koopman and Wienk's (2003) study on diversity, reflexivity and team outcomes is one of the few empirical studies on diversity and reflexivity. They surveyed 54 teams from 13 different organisations and found that the effects of team diversity were moderated by group longevity and outcome interdependence.

They hypothesised that heterogeneous groups higher on group longevity would be more reflexive than homogenous groups, because in those groups members will spend more time debating and discussing differences in opinion. They also hypothesised that homogenous groups would be more reflexive in the initial stages of group formation, because they are familiar with each other but at a later stage they would routinise their behaviour. However, their results suggest the opposite. They found group longevity moderated the relationship between diversity and reflexivity, in that "older" homogeneous groups and "younger" diverse groups were more reflexive than both "younger" homogeneous teams and "older" diverse teams. Diverse teams high on group longevity were found to be less reflexive and they suggest this might be "because homogeneous teams need some time to get acquainted and will be more reflexive after a while, whereas heterogeneous teams will start exploring different viewpoints and score higher on reflexivity in the first phase of their existence. Later on, those teams might be less reflexive, because of incompatible viewpoints".

They also found diverse teams to be more reflexive when outcome interdependence was high rather than low and suggest that more diverse teams may profit more in terms of reflexivity, as long as those teams are high on outcome interdependence (common goals and being evaluated as a team). These findings reflect the complexity surrounding the effects of diversity on outcomes such as reflexivity and suggest that diversity will have different effects on team processes under different circumstances and at different times. However, a limitation of this research is it's cross sectional nature. The researchers did not test longitudinally whether teams that were together longer differed from younger teams with respect to reflexivity, but asked team members how long the team had been together, and compared young and old.

Another consideration is the type of diversity under investigation. As Jackson pointed out, there are two different although not mutually exclusive categories of diversity – task oriented diversity and relations oriented diversity and each dimension of diversity may have different relationships with reflexivity. Jackson and others suggest that in general, task diversity is more likely to lead to debate and open questioning whereas relational diversity is more likely to lead to dysfunctional conflict. Therefore, while there is a lack of literature on diversity and reflexivity, the literature that does exist would suggest the following:

Hypothesis 1b – TMT task oriented diversity will be positively associated with reflexivity and TMT relations oriented diversity will be negatively associated with reflexivity.

2.4 TMT Diversity and the Organisational Context

In the last 15 years there has been a change in emphasis in research on teams from group processes to the links between the organisational context and the team. However, there is little empirical research in this area (West et al., 1996). They suggest that this deficiency reflects "the difficulty of contradicting team research where context is an important variable. Comparing the organisational context of 50 teams requires 50 organisations which have teams carrying out similar tasks – nevertheless, the size of the challenge should not deter researcher from undertaking this task" (p.14). This study considers two aspects of organisational context – organisational learning and organisational climate and explores any relationships between organisational learning and TMT diversity. Because the sample comprises of top managers in high technology organisations, it is likely that these teams will carry out similar tasks, thus somewhat addressing the problem identified by West et al. above.

2.4.1. TMT Diversity and Organisational Learning

There is some evidence to suggest that diversity within the top team can impact upon organisational learning. But before exploring this literature, it is necessary to first provide the definition for organisational learning adopted in this study (this is discussed in more detail in chapter four). The lack of common agreed definitions of organisational learning (OL) has led to OL being described as an "organisational learning jungle, which is becoming progressively dense and impenetrable" (Prange, 1999, p. 24). However, most recent definitions of organisational learning are consistent in that they incorporate some reference to knowledge creation and exchange as well as exploitation of extant knowledge (see Nahapiet & Ghoshal, 1998; Nonaka, 1996; Qureshi, 2000). It is this aspect of organisational learning (the creation and sharing of information and knowledge) that is adopted in this study.

While there have been some studies suggesting that knowledge diversity plays an

important role in the learning process, there is relatively little research focusing on the effects of group diversity on the learning experience. However, the importance of diverse knowledge bases and perspectives in the learning process has been recognised in the learning literature. The problem solving and innovation that characterise knowledge creating companies are due to the combination of diverse perspectives and expertise rather than the knowledge of any one person or group (Herriot & Pemberton, 1995). Cohen and Levinthal (1990) propose that in a setting in which there is uncertainty about the knowledge areas from which potentially valuable information may emerge, a diverse background will improve the potential for learning because it increases the prospect that incoming information will relate to what is already known. While Cohen and Levinthal were referring to the individual learning experience, they also note the importance of a diversity of expertise and knowledge across individuals. They maintain that while some overlap of knowledge is needed in order to communicate, there are benefits to diversity of knowledge across individuals that parallel the benefits to diversity of knowledge within individuals. In other words, the more diverse the group membership, the more diverse the knowledge base, thus increasing the likelihood that incoming information will be known to a member of that group enhancing what they refer to as the "absorptive capacity" of the firm. Simon (1985) notes that diverse knowledge structures in individuals elicit the sort of learning and problem solving that leads to innovation. Cohen and Levinthal apply this to groups of individuals, suggesting that "interactions across individuals who each possess diverse and different knowledge structures will augment the organisation's capacity for making novel linkages and associations – innovating – beyond what any one individual can achieve" (p.135).

But is there empirical evidence supporting the positive association between team diversity and learning? Cummings (2004) argues that the value of external knowledge sharing increases when work groups are diverse in terms of organisational affiliations, roles or positions. He conducted a field study of 182 work groups in a Fortune 500 telecommunications firm. External knowledge sharing was measured using group member surveys and performance was assessed using senior executive ratings. He found that external knowledge sharing was more strongly related to performance when work groups were diverse. Bunderson and Sutcliff (2002) suggest that diversity (they measured functional diversity) can have both positive and negative effects on

information sharing depending what measure of diversity you use. They found that functional diversity was positively associated with information sharing – but only when team members had broad experience in a range of functional areas. They found that functionally diverse teams composed of team members who lacked this broad range of experience, or what they call "narrow functional specialists" (p. 875), were negatively associated with information sharing. This finding echoes the call in the literature for differentiation between the diversity measures (Kilduff et al., 2000).

While different types of diversity may impact learning or knowledge sharing in different ways, there is also a plethora of research indicating that the negative or positive effects of diversity depend on what group processes are in place. Research indicates that while diversity in age, function, tenure etc. may lead to a diversity of knowledge and different information sources, lack of consensus may hinder the benefits of that diverse knowledge base being utilised (Chatman & Flynn, 2001; Smith et al., 1994). Osland, Kolb and Rubin (2001) suggest that managers with diverse learning styles found it more difficult to communicate than more homogeneous groups. Cohen and Levinthal (1990) suggest that a trade-off between commonality and diversity of knowledge is necessary to minimise the conflicting effects of diversity. While commonality should improve communication, they suggest avoiding levels of commonality where diversity is substantially diminished. Fiol (1994) questions the necessity of this trade-off and suggests it is possible to have simultaneous agreement and disagreement. She suggests that meaning is not unidimensional and that by unpacking the many different meanings shared by individuals, it is possible to develop consensus around one dimension without necessary agreeing upon the other. She argues that meaning resides in both the content of the message and in how the message is framed. Fiol suggests that while people may disagree on the content of the communication (the labels people use to convey their interpretations of reality), this is not such a problem if they develop unified ways of framing the communication (the form people use to construct that interpretation regardless of its content e.g. rigid or flexible perceptions of an issue (p. 403). In other words Fiol (1994) is saying that "people may disagree about their interpretive pictures, while converging around a frame that is broad enough to encompass those differences" (p. 406).

While diversity of knowledge and expertise is an integral part of organisational learning, other dimensions of diversity may affect the learning process differently. Therefore, it is put forward that:

Hypothesis 1c: Task related TMT diversity (function, education and tenure) will be positively associated with organisational learning and relations related TMT diversity will be negatively associated with organisational learning.

2.5 Conclusion

There is a considerable body of work exploring the relationship between TMT diversity and organisational outcomes. However, much of the research is beset by contradictions. Two main theories dominate the TMT demography literature. The first, the upper echelons theory, focuses in the main on direct relationships between TMT demography and organisational outcomes. The second theory, group process theory, argues that it is essential to include the social and psychological processes of the top team in the equation in order to gain a fuller understanding of this relationship. In the next chapter, it is argued that TMT intragroup trust and TMT task reflexivity are important psychological and social processes and are key to understanding the complex nature of TMTs.

CHAPTER 3
TMT INTRAGROUP TRUST AND TASK REFLEXIVITY

3.0 Introduction

As discussed in the previous chapter, one possible explanation for the contradictory and inconclusive findings in the team demography literature is the omission of affective and task group processes in the team diversity-outcome equation. This chapter aims to review the literature on group processes, focusing specifically on intragroup trust and task reflexivity.

Firstly, the extensive literature on trust will be reviewed, dealing specifically with the area of intragroup trust within top management teams. The different definitions of trust, factors affecting trust and also some of the problems associated with studying trust will be examined. The influence of trust on organisational variables will also be explored, focusing particularly on the variables under investigation in this study – task reflexivity, organisational climate, organisational learning and innovation.

Secondly, the area of task reflexivity will be explored. While this is a relatively new area of research in organisational theory, there is sufficient evidence to indicate that task reflexivity plays a significant role in important organisational outcomes such as innovation. This section will explore the literature on reflexivity, paying particular attention to relationships between TMT reflexivity and the variables under investigation in this study (see above).

3.1 Exploring the Concept of Trust within the Workplace

> "Trust tends to be somewhat like a combination of the weather and motherhood. It is often talked about and it is widely assumed to be good for organisations but when it comes to specifying what it means in an organisational context, vagueness creeps in." (Porter, Lawlor, & Hackman, 1975: 497)

The changing nature of work with the related increase in the ambiguity and uncertainty experienced in the workplace and the greater need for accommodation in relationships at work means that trust is now gaining importance in organisational research (Osborn & Hagedoorn, 1997; Tjosvold, 1990). Williamson's (1993) lament that trust remains a "diffuse and disappointing concept" (p. 485) is no longer true. The concept of trust has generated interest in many diverse disciplines including psychology, sociology, politics, economics and organisational theory and each discipline approaches trust in a different way, often with little integration between disciplines. The vast applicability of the term trust to different environments and levels of analysis presents difficulties in reaching a universal definition. While psychologists define trust in terms of personality traits (Bowlby, 1973) and associate trust with childhood experiences, sociologists maintain that trust is culturally determined where certain cultures (collectivist) are more likely to be high trust than others (Fukuyama, 1995) and the rationalist perspective focuses on the calculus of self interest (Jarvenpaa & Leidner, 1999). While one discipline in isolation may only give a limited view of trust, an integration of the different disciplines can be useful and researchers are beginning to explore common elements across disciplines (Costa, 2003). Despite the lack of consensus regarding the definition of trust, two principle concepts emerge consistently in the multidisciplinary literature: 1.Co-operation (Gambetta, 1988) and 2. Risk (Currall & Judge, 1995; Griffin, 1967; Gambetta, 1988; Lewis & Weigert, 1985; Rotter, 1980).

Co-operation and trust are closely linked throughout the literature and Gambetta argues that when we say we trust someone "we implicitly mean that the probability that he will perform an action that is beneficial or at least not detrimental is high enough for us to consider engaging in some form of co-operation with him" (pps. 217-18). While Mayer, Davis and Schoorman (1995) are concerned with the lack of clarity in the literature between trust and risk, the literature agrees that risk is a prerequisite of trust - if there is complete certainty, trust becomes redundant. Deutsch (1960) suggests the following situational factors as involving risk:

(a) Uncertain or ambiguous course of action in the future

(b) Outcome occurrence depends on the behaviour of others

(c) The strength of the harmful event is greater than the beneficial event

These conditions are particularly relevant when discussing trust within top management teams as these teams are working under uncertain and ambiguous conditions, often encountering high risk where the strength of negative repercussions may be greater than positive repercussions and where, because interdependence is inherent to the meaning of teams, there is mutual dependency between team members. It would follow that in situations where such conditions are present, the importance of and need for trust increases.

The theme of risk and uncertainty is also evident in Schlenker, Helm and Tedeschi's (1973) definition of trust, which they posit as being "the reliance upon information received from another person about uncertain environmental states and their accompanying outcomes in a risky situation" (p. 419). Boon and Holmes (1991) continue this theme where trust is seen as "a state involving confident positive expectations about another's motives with respect to oneself in a situation entailing risk" (p. 194), which is based on 3 elements that contribute to the levels of trust between people

1. Individual's predisposition to trust (personality theory)
2. Situational factors
3. History of their relationship

Drawing from this research, Currall and Judge (1995) define trust as an individual's "behavioural reliance on another person under a condition of risk" (p. 153). Therefore, trust is based on the expectation of an individual that others will behave positively towards them under conditions of risk. This allows the term to be used for trust based on previous experience or rational calculation, and trust based on instinct (Coulson, 1998) and this is the definition adopted in this study.

3.2. Different Dimensions of Trust

McAllister (1995) identified two different dimensions of trust at an individual level; cognition based trust and affect based trust. Cognition based trust is based on the trustee's reliability, dependability and competence whereas affect based trust is based on emotional bonds between individuals or the "genuine care and concern for the welfare of partners" (p. 26). The nature of the relationship will play a crucial role in determining what dimension of trust is most important (Chan, 1997), for example a

mother-child relationship would be more likely to be characterised by affect based trust whereas a professional-client relationship is more likely to be characterised by cognition based trust. The length of the relationship can also play an important role in defining what dimension of trust is most important. McAllister (1995) suggests that cognitive trust is more important at the beginning of a relationship while affective trust becomes more important as the relationship progresses.

It is worth noting that there are also different types of trust at an organisational level. Shapiro, Sheppard and Cheraskin (1992), in an effort to describe relationship development in a business context, suggested the potential of three different types of trust to develop. They defined these as deterrence based trust, knowledge based trust and identification based trust.

3.2.1. Deterrence Based Trust

Deterrence based trust is based on consistency of behaviour – that people will do what they say they will do. This type of trust is developed and sustained through fear of punishment (e.g. loss of relationship, reputation). Lewicki and Bunker (1996) refer to this type of trust as calculus based trust because they believe that "deterrence-based trust is grounded not only in the fear of punishment for violating that trust but also in the rewards to be derived from preserving it" (p. 120). Compliance with this type of trust is ensured both by the rewards of trusting and by the threat that if trust is violated there will be negative repercussions – for example loss of reputation. Both Lewicki and Bunker (1996) and Shapiro et al. (1992) maintain that the deterrence component is much stronger in motivating behaviour than the beneficial aspect. This type of trust would appear to be rooted in the rational instrumental model where people choose to trust because the gains outweigh the potential losses. It echoes Sheppard and Tuchinsky's (1996) proposition that trust has become the new control mechanism in a changing work environment, where top down, management led control systems are giving away to bottom up, employee led systems. While March (1994) argues that rational models overstate decision makers' cognitive capabilities and engagement in conscious calculation, in high tech knowledge organisations, where most exchanges are occurring between equals, untrustworthy behaviour can prove costly. In such organisations, reputation is an important asset. Fear of losing their reputation should go some way to ensuring that individuals would act in a trustworthy manner.

3.2.2 Knowledge Based Trust

The second form of trust identified by Shapiro et al. (1992) is knowledge based trust. This form of trust is grounded in the other's predictability (Lewicki & Bunker, 1996) – knowing the other party enough to predict likely behaviour. Knowledge based trust relies on a shared history between the two actors and is information based rather than deterrence based. Shapiro et al. (1992) outline several different dimensions of knowledge based trust. However, the main emphasis is on predictability - the better another individual is known, the more accurately their behaviour can be predicted. Shapiro et al. maintain that predictability enhances trust – even when the prediction might be that the other party would act in an untrustworthy manner. Mayer et al. (1995) find the relationship between predictability and trust problematic, however. They argue that focusing on predictability in exploring trust is insufficient because it neglects the importance of vulnerability and risk in trust. They argue that one party might be able to predict another's behaviour – but if the prediction is that the behaviour will be untrustworthy, it will be unlikely a risk will be taken with that party. Since risk is an integral part of trust, it would suggest that predictability does not always lead to enhanced trust – indeed it might have the opposite effect. Therefore, while increased knowledge of a party, and therefore increased predictability, might lead to enhanced trust if the prediction is that they will behave in a positive manner, it would be incorrect to suppose this would always be the case.

In order to gain more knowledge about another, it is necessary to interact with that party and Shapiro et al. cite communication and courtship as the key processes here. Frequent communication is important to enable people learn about others' desires, preferences and approaches to problems. Regular communication between members of top teams has been found to increase social integration and trust (Eisenhardt, 1989) as people see each other in different contexts and witness reactions to different situations. At this level, trust is not necessarily broken by inconsistent behaviour if it is felt that behaviour can adequately be explained and understood. The more you know about an individual, the more accurate the attribution of their behaviour (Shapiro et al., 1992).

3.2.3. Identification Based Trust

This type of trust is based on identification with another's desires and intentions, therefore on mutual understanding. Kramer (1999) maintains that the emergence of trust within groups is related to group membership and identification with the group's goals.

Identification based trust needs no surveillance or monitoring. Shapiro et al. (1992) argue that many of the same activities that build the other two types of trust also develop identification based trust. They outline four additional activities: 1. Developing a collective identity (joint name, title, logo etc), 2. Co-location in the same building or neighbourhood, 3. Creating joint products or goals and 4. Committing to commonly shared values. When discussing trust in the context of top management teams, some of these conditions might prove problematic – top teams are often composed of independent and ambitious individuals, who are heads of their own functions as well as members of the top team. Functional goals and the overall team goals might sometimes conflict and there may be perceived differences in professional allegiances. There is also the added complication of the succession tournament where team members may be competing amongst themselves for the position of CEO. Therefore certain types of trust might be more prevalent in top management teams than others. Lewicki and Bunker (1996) position these types of trust into a developmental sequence. If after a series of deterrence based trust encounters it becomes evident that the individual has behaved in a trustworthy manner, a transition to knowledge based trust may occur. While knowledge based trust is developing, there is a move away from monitoring the individual towards identifying with him/her. When there is a perception that the goal of the individual includes identification with one's own goals, a transition to identification based trust may take place.

Kramer (1999) suggests that these diverse views of trust need to be reconciled. He proposes that research needs to move in the direction of developing a "contextualist account that acknowledges the role of both calculative considerations and social inputs in trust judgements and decisions" (p. 574). Hardin (1992) goes some way towards doing this by conceptualising trust as involving 3 elements:

1. Characteristics of the trustor
2. Attributes of the trustee
3. Specific context

3.3 Characteristics of the Trustor

One element that is integral to understanding trust is the characteristics of the trustor. This reflects the view of the personality theorists where the readiness to trust and trustworthiness is explored through individual personality differences. Trust is perceived as a belief, expectancy or feeling that is deeply rooted in the personality and has its origins in early childhood development (Erickson, 1953; Rotter, 1967). Rotter defines interpersonal trust as "an expectancy held by an individual or a group that the word, promise, verbal or written statement of another individual or group can be relied upon" (p. 651). Rotter's measure is widely used to focus on a generalised trust of others - it is considered a personality trait that would remain relatively stable from one situation to another. Mayer et al. (1995) describe this trait as the propensity to trust and they propose that this is "a stable within party factor that will affect the likelihood the party will trust" (p. 715). They define it as "the general willingness to trust others" (p. 712) and stress that individuals differ in their inherent propensity to trust. An individual's propensity to trust is affected by the experiences they have, their personality types, and their cultural backgrounds (Hofstede, 1980). Trusting someone is a result of past experiences of trust successes and failures and therefore can be seen as a partly rational process where those experiences are weighed up in order to make a decision to trust in the present (Weber, 1998).

However, as mentioned before trust is not simply a rational process, there is also an affective component to trust (McAllister, 1995; Lewis & Weigert, 1985). Weber's research indicates how the decision to trust can also be grounded in emotional reasons – perhaps the trustor admires the trustee and considers him/her a role model. This emotional component to trust is effectively articulated in a quote from Weber's study exploring trust violation. The respondent expressed vulnerability to this trust violation "Because I admire him. Ever since I was little I always wanted to be like him...you let your emotions get in the way of your thinking sometimes." (1998: 11)

Therefore, individual experiences and differences of the trustor will affect the type and level of trust invested. For example, Hartmann (1991) and Roy and Dugal (1998) found that individuals with flexible cognitive structures were more trusting than those with more rigid structures. Maznevski (1994) suggests that this might be because of their ability to categorise people and events more diversely, leading to them seeing all persons as similar to themselves and therefore are more trusting of those people. Researchers have suggested that managers with a more internal locus of control (Deci, Connell & Ryan, 1987) and greater self-efficacy (Whitener, Brodt, Korsgaard & Werner, 1998) are more likely to trust others. Rotter (1980) argues, however, that the inclination to trust or distrust depends more on experience than personal attributes. For example, the more experience one has with trustworthy significant others (parents, teachers etc), the more inclined one is to trust others.

While an individual's propensity to trust is an important component of trust, Costa (2003) found it to explain only a small percentage of the total variance of trust. Its influence can also vary depending on the context. Rotter (1980) suggests that the longer people work together the less impact this component of trust has. The impact of the trustor's propensity to trust can also be affected by the frequency of communication between individuals and groups. When the frequency of communication is high there is a transfer in the extent of influence from trustor related to trustee related variables (e.g individual attributes) (Becerra & Gupta, 2003).

3.4 Attributes of the Trustee

The attributes of the trustee (or at least the trustor's perception of the trustees attributes) has been found to be the strongest component of trust (Costa, 2003), a finding consistent with much of the literature and therefore a factor which needs to be taken into consideration when discussing trust. It is this component of trust that this research focuses on. There are a wide variety of factors proposed by different researchers as to the most important attributes when investigating trust.

Lieberman (1981) maintained that trust in fiduciary relationships is based on a belief in the professional's competence and integrity. Mishra (1996) identifies competence, openness, concern and reliability as the four main dimensions of trust where competence is the belief that managers will make the right decisions, openness and

honesty reflect that managers will give accurate and straightforward versions of events, concern indicates that managers act in the individual's best interest and reliability denotes consistency of behaviour. There is relatively little research exploring individual differences in determining the expectation of these characteristics in a trusting situation. For example, while integrity and benevolence might be crucial to one party in a working relationship, another party might be content to limit trust to that of ability or competence.

There are therefore many different domains where an individual might be trusted (e.g. trust in their competence) but equally, there may be domains where trusting him/her is inappropriate (e.g benevolence) or unnecessary. Lewicki et al. (1998) argue that because relationships are multifaceted and because trust and distrust are not polar opposites, it is possible to trust an individual in certain domains while simultaneously distrusting them in other domains. Both functions reduce complexity – trust functions reduce complexity by allowing desirable conduct to be seen as likely and distrust functions reduce complexity by allowing undesirable conduct to be viewed as likely, thus simplifying the social world (Lewicki et al., 1998). Gabarro (1978) as cited in Lewicki et al. (1998) echoes this opinion when he suggests that as teams stabilise there is a move from asking "how much do I trust?" to asking "In what areas do I trust?". It is therefore important to view trust and distrust as separate but linked dimensions. The absence of trust does not necessarily lead to distrust and therefore may not lead to distrustful behaviour. However, a lack of trust can lead to more controls, rules and a greater need for hierarchy (Fukuyama, 1995) and is therefore costly.

The importance of the situation in determining which trustee characteristics are most important under certain conditions is also worth investigating. For example, a person might be content to trust in another's ability to do the job where the task was relatively simple, and the relationship short term. However, where the situation is complicated by uncertainties and interdependencies, trust in the other's benevolence and integrity might also be needed. This is particularly relevant in top teams where interdependencies and ambiguities frequently exist. While these might require trust in another's benevolence as well as in their skill and ability, political underplays and competition might, however, hinder that level of trust being achieved. The types of

trust that are necessary in top teams and when each type of trust is necessary is worth investigating. While there are many factors proposed by different researchers as to the most relevant attributes when investigating trust, Mayer at al. (1995) highlight three that appear consistently in the literature and encapsulate many of the different typologies: ability, benevolence and integrity. They conceptually developed measures of trust in 1995 and Schoorman, Mayer and Davis operationalised them the following year. These are the measures utilised in this study and they will be discussed in more detail below.

3.4.1 Ability

To trust in an individual's ability is to trust in their skill and competencies to do the job. The domain of the ability is specific because the trustee might be very capable and skilled in a certain area, affording that particular person trust in that specific area (Mayer et al., 1995).

There appears to be much agreement as to the importance of trustee ability (Cook & Wall, 1980; Deutsch, 1960; Jones, James, & Bruni, 1975). Others refer to competence as being an essential element of trust (Lieberman, 1981; Mishra, 1996) or expertise (Griffin, 1967). It would appear that in order to engage in a trusting relationship with another at work, one must first trust in the other's ability to do the job that they are required to do. Jarvenpaa & Leidner (1999) used Schoorman et al.'s (1996) instrument to measure trust and found trust in an individual's ability to be important at the beginning of a relationship but this importance declined as time went on. This study also adopts Schoorman et al.'s measures of trust ability, which includes items such as " This team's members are known to be successful at what they do" and "I feel very confident about team members' skills".

3.4.2 Benevolence

Benevolence, or the expectancy that the trustee will behave in a positive way towards the trustor, is cited by many theorists as central to the definition of trust. Benevolence suggests goodwill and attachment on the part of the trustee towards the trustor. Theorists have used terms such as goodwill (Ring & Van de Van, 1992), altruism (Frost, Stimpson & Maughan, 1978), personal attraction (Griffin, 1967), trustworthy intentions (Cook & Wall, 1980) and loyalty (Butler, 1991) when identifying different

components of trust. Benevolence refers to the importance of the personal orientation that is integral to trusting relationships (Mayer et al. 1995). Again, the importance of benevolence to the trusting relationship depends on the situation, but it would appear evident that in long term relationships (mentor, protégé, top team members) where there are interdependencies and where one party might have to act on behalf of another, benevolence would be crucial.

As with trust in ability, Schoorman et al.'s measure of trust benevolence is used in this study and items include "Members of this team really look out for what is important to me" and "My needs and desires are very important to other team members".

3.4.3 Integrity

The relationship between integrity and trust "involves the trustor's perception that the trustee adheres to a set of principles that the trustor finds acceptable" (Mayer, p. 719). Again, this is a term that appears consistently throughout the literature. Mayer et al. (1995) maintain that trust in one's integrity is initially more important than trust in one's benevolence but with time benevolence should increase. Ring and Van de Ven (1992) refer to the importance of moral integrity, as does Butler (1991). The trustor needs to perceive the trustee as having principles, however, research indicates that congruence of principles between trustee and trustor is also important (McFall, 1987). While all three attributes are important, Kerkhof, Winder and Klandermans (2003) found trust in managers was more likely to be based on relational antecedents than instrumental which suggests that employee perceptions of managers' benevolence and integrity are more important than perceptions of competence when developing trust in one's manager. Items measuring trust in integrity include "Sound principles seem to guide the behaviour of members of this team".

Mayer et al.'s (1995) three factors - integrity, benevolence and trust - provide a robust model for exploring the antecedents of trust and have been utilised in a number of studies (Brockner & Siegel, 1997; Jarvenpaa & Leidner, 1999; Mayer & Davis, 1999; Robinson, 1996; Schoorman et al., 1996).

3.4.4. Trustee Behaviour

While the majority of the trust research has studied the subjective evaluations of another's trustworthiness (perceived attributes of the trustee) a number of writers have moved from investigating perceptions of trustee's attributes to actual behaviour (Whitener et al., 1998). The following behaviours have been found to be important in developing trust:

- Behavioural consistency – this reflects the predictability of actions based on past actions (Whitener et al., 1998).
- Behavioural integrity – there is consistency between words and deeds. Dasgupta (1988) identified two dimensions of behavioural integrity 1. telling the truth 2. keeping promises.
- Sharing and delegation of control – the provision of accurate information, explanations for decisions and openness (Whitener et al., 1998; Jarvenpaa & Leidner, 1999).
- Demonstration of concerns – Whitener et al. (1998) emphasise three actions that demonstrate concern 1. Showing consideration and sensitivity for others' needs and interests, 2. Acting in a way that protects others' interests 3. Refraining from exploiting others for the benefit of one's own interest.
- Frequent interaction (Jarvenpaa & Leidner, 1999).

Bijlsma and Van de Bunt (2003) found three behaviours to predict 97% of trust in managers: monitoring performance, guidance to improve performance and support in case of trouble with others. It is interesting to note that monitoring performance was found here to predict trust as, in many other studies, monitoring behaviours are negatively associated with trust (e.g. Dirks & Ferrin, 2001; Costa, 2003). Bijlsma and Van de Bunt found that monitoring by the manager of a subordinate was perceived as benevolence, as a caring action that decreases the risk of unfair assessment. However, monitoring behaviour towards peers can have an adverse effect (Costa, 2003). It is therefore important to consider the relationship between the trustor and trustee when exploring trusting relationships. This study explores levels of trust between peers (senior managers) and while trustee behaviour is not explored in the survey, it is considered in the in depth interviews (see chapter five for a more detailed discussion).

3.5 The Organisational Context and Trust

The organisational environment in which managers exist can be expected to affect trust levels (Hardin, 1992). Organisational monitoring systems can impact on managers' behaviour towards peers (Ghoshal & Moran, 1996; Whitener et al., 1998). Other factors such as decision-making autonomy, bonus schemes and the history of the managers' connections to the organisational network were found to have important consequences for the perceptions of trustworthiness of managers within the organisation (Becerra & Gupta, 2003). The relationship between these factors and trust increased as the frequency of communication between the individuals increased, perhaps because the "effect of this context becomes more noticeable in the behaviour of managers and in the attitudes they may develop regarding their peers" (Becerra & Gupta, 2003, p.42).

Kramer (1996) found trust to be influenced by one's position in the hierarchy. Using an autobiographical narrative methodology, he found that individuals in low status positions tended to define more of their advisors' behaviour as trustworthy compared with those in higher positions. Kramer (1999) suggests that this occurs because of "their greater dependence and vulnerability, trust concerns are more salient to individuals in lower status positions. As a consequence they tend to be more vigilant and ruminative about trust related transactions" (p. 594). This suggests that issues of trust are more important to those in low status positions when the trusting relationship exists between people of different status. This is not a concern in this research, however, as the trust relationships under investigation are between senior managers and are therefore equal status relationships (with the exception of the CEO).

3.6 Why Study Trust?

The previous section has reviewed the literature on the different types of trust and trust development. As we move from the traditional control and command organisational structures towards more flexible and self directed work arrangements, trust is emerging as a critical concept in organisational theory (Jarvenpaa & Leidner, 1999). Intuitively, it makes sense to suggest that trust is "increasingly central to the study of organisations"(Tyler, 2003, p.556). Jones and George's (1998) theoretical paper on trust suggests that trust activates appropriate social processes such as intensive social relationships, high confidence in others, help seeking behaviour and

the free exchange of information. Tyler and Kramer (1996) answer their own question "whither trust?" by suggesting that trust is key to organisational effectiveness because it promotes voluntary co-operation which is increasingly important when command and control organisational arrangements are no longer effective. The importance of trust has been recognised in areas such as leadership (Atwater, 1988), teams (Lawler, 1992; Kirkman, Jones & Shapiro, 2000), organisational culture, cross cultural management (Easterby-Smith & Malina, 1999), the performance of interfirm exchange (Zaheer, McEvily & Perrone, 1998), performance (Brock-Swift & Barclay, 1997) and conflict management (Simons & Peterson, 2000).

But what empirical evidence is there to corroborate these claims? There is considerable evidence supporting predictions of a main effects relationship between trust and attitudinal outcomes (e.g. satisfaction and commitment). Costa, Roe and Tailleu (2001) developed and tested a model relating trust with perceived task performance, team satisfaction, relationship commitment, and stress. They collected data from 112 teams (including management teams, supervision teams and staff teams) in three social care institutions in the Netherlands. The results confirmed the importance of trust for the effective functioning of teams. High work team trust was related to high perception of performance, high team satisfaction, high attitudinal commitment and low continuance commitment. Other studies have found links between trust and team commitment (De Gilder, 2003), extra role behaviour (Tyler, 2003), and mutual learning (Nonaka & Takeuchi, 1995; Boisot, 1995; Bijlsma, Prins & Weber, 1999).

However, not all studies have found direct relationships between trust and performance (Dirks, 1999) and empirical evidence has generally but not consistently supported the trust-performance relationship. Empirical evidence of links between trust and organisational outcomes is particularly difficult to come by. Dirks and Ferrin's (2002) exhaustive review of the trust literature uncovers evidence of relationships between trust and behavioural outcomes (job performance and organisational citizenship behaviour) but they were considerably weaker than the relationships between trust and attitudinal outcomes (satisfaction and commitment). While their review of the effects of trust on affective outcomes broadly supported the direct relationship argument, their examination of the effects of trust on 'harder'

measures (e.g. performance) showed inconsistent findings – they report that "Two studies did find evidence for a significant, positive main effect of trust on group performance (Dirks, 2000; Klimoski and Karol, 1976), and one study reported a significant positive effect on business-unit performance (Davis et al., 2000). But other studies examining the main effect of trust on group performance (Dirks, 1999, Friedlander 1970)...and interorganisational performance (Zaheer et al., 1997) found only partial support or no support". (2001, p.452). However, it is interesting to note that in those studies that found only partial support for the trust-performance equation, trust was still found to play an important – if indirect - role. The findings from Dirk's (1999) experimental study of intragroup trust did not support predictions of main effects between trust and performance. However, the data did suggest that trust is a moderator, influencing how motivation was converted into work processes and performance.

Similarly, Zaheer et al. (1998) found some support for their hypothesis linking trust to performance – however, the precise link was somewhat different than initially proposed. They investigated the role of trust in interfirm exchange at two levels of analysis: interorganisational and interpersonal. Hypotheses were tested using both survey and interviews with a sample of 107 buyer-supplier interfirm relationships in the electrical equipment manufacturing industry. Interorganisational trust emerged as the overriding driver of exchange performance, negotiation, and conflict. However, interpersonal trust exerted little direct influence on these outcomes. Nevertheless, they suggest that "interpersonal trust may also matter through its institutionalising effects on interorganisational trust". (1998, p.153).

The majority of the trust literature suggests that trust is in some way associated with both attitudinal and behavioural outcomes. Whether the relationship between trust and organisational outcomes is direct or indirect, the benefits of trust are widely accepted in the literature and issues of trust have become increasingly central to the study of organisations (Tyler, 2003). However, there are few studies focusing on organisational outcomes such as financial performance or innovation. It is intuitively appealing to suggest that intragroup trust will be associated with team satisfaction and team performance – but does trust have effects outside of the team? This study goes some way towards answering this question by exploring possible associations

between TMT intragroup trust levels and market innovation.

A noticeable feature of the majority of the trust literature is its focus on dyadic relationships. The focus of this study is on intragroup trust, which is more complicated than dyadic relationships as the trustor has trusting relationships with a variety of different team members all with different attributes (Jarvenpaa & Leidner, 1999). Cummings and Bromiley (1996) define collective trust as "common belief among a group of individuals that another individual or group (a) makes good-faith efforts to behave in accordance with any commitments (b) is honest in whatever negotiations preceded such commitments and (c) does not take excessive advantage of another even when the opportunity is available" (p. 303). There are notable exceptions. Costa et al. (2001) focus on trust within teams and explore the association with performance. They gathered data from 112 teams in three social care institutions where teams members were asked to answer a structured questionnaire concerning their teams at work. Their findings suggest trust is positively associated with team satisfaction and perceived task performance. Jarvenpaa and Leidner's (1999) research also focuses on intragroup trust – however, the teams being studied are global virtual teams, thereby making generalisabilty questionable.

While these studies have made the transition from dyadic trust to collective groups, there is one group that is neglected in the trust research. There is little research that focuses on the nature and consequences of trust within the top management team. All of the research quoted in this study and the majority of the trust research overall focuses on trust between manager and subordinate or trust within lower level groups. There are a number of studies exploring the antecedents and influence of employee trust in senior management (e.g. Albrecht & Travaglione, 2003), however, there is a lack of research focusing on trust levels between members of senior management (a notable exception is Simons and Peterson's, 2000, study of intragroup trust and conflict within 70 top management teams. They found intragroup trust moderated the relationship between task conflict and relationship conflict). This study aims to redress this lack by investigating the impact of top management team intragroup trust on team (reflexivity levels) and organisational outcomes (organisational learning and market innovation).

3.7 Trust, Innovation, Reflexivity and Organisational learning

3.7.1 Trust and Innovation

> "Trust is often criticised by managers as a "soft" and seemingly intractable concept, yet it may be a necessary condition for attaining the competitive advantage associated with strategic and structural innovations"
> Whitener et al. (1998, p. 525)

The outcome measure in this study is organisational innovation. The lack of empirical evidence linking trust directly to innovation has already been mentioned in the previous section. However, there is a strong theoretical argument supporting this hypothesis (Hosmer, 1994; Ruppel and Harrington, 2000) and considerable evidence to suggest that trust does influence the innovative process. Several researchers in the area of innovation have emphasised the pivotal role of trust in fostering innovation within organisations (Hattori & Lapidus, 2004; Kohtamaki, Kekale & Vitala, 2004). At a societal level, Fukuyama (1995) discusses "high trust" societies as having the ability to be more innovative stating that "such societies will be better able to innovate organisationally since the high degree of trust will permit a wide variety of social relations to emerge" (p 26). O'Reilly, Chatman and Anderson (1987) maintain that trust leads to increased dialogue and shared communication which in turn opens up the opportunity to exchange information and knowledge.

However, direct links between trust and innovation remain rare. The empirical evidence suggests that trust may be associated with organisational innovation but in an indirect way. Research indicates that in diverse teams where there are high levels of trust and safety, group processes such as conflict tend to be functional leading to debate, creativity and innovation (Amason, 1996; Jehn, 1997; Edmondson, 1996; Simons & Peterson, 2000). Edmondson's (1996) study of the NHS found that teams reporting high levels of psychological safety (which she defines as "a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up. This confidence stems from mutual respect and trust among team members" (p.354, 1999) were more open about reporting errors, leading to innovative ways of rectifying them. Her 1999 study of 51 work teams in a manufacturing company found results consistent with this. Psychological safety was found to be positively associated with learning behaviour (seeking or giving feedback, making changes or

improvements, experimenting, constructive conflict). Simons and Peterson's (2000) study of top management teams found that intragroup trust moderated the relationship between task conflict and relationship conflict in 70 top management teams. They concluded that trust is key to gaining the benefits of task conflict without suffering the losses associated with relationship conflict.

Other studies provide evidence that trust is associated with innovative behaviour, if not innovation itself. For example, trust has been found to lead to exchange of information, (O'Reilly et al., 1987) openness and risk taking (Edmondson, 1999). This suggests that trust is important through its effect on processes directly linked to innovation. This study focuses on possible direct links between trust and market innovation and taking the theoretical arguments and the, albeit limited, empirical evidence into consideration, it is suggested that:

Hypothesis 2: There will be a positive association between TMT intragroup trust and market innovation

While market innovation is the main outcome variable under investigation, there are other potential relationships that are worth investigating. For example, there may be links between trust levels within the top team and the group process reflexivity. TMT intragroup trust might also be related to variables outside the team, e.g. organisational learning and innovative climate. The following section addresses these issues.

3.7.2 Trust and TMT Reflexivity

When discussing the effects of affective group processes on organisational outcomes such as innovation, it is also important to examine the relationships between the trust levels within the group and task group processes. The second group process under investigation is a task group process - TMT reflexivity. While intragroup trust and team reflexivity are separate (although sometimes similar) concepts, the process literature indicates that they may impact on each other. While reflexivity is a relatively new concept to the organisational theory literature, the work that has been done on this construct suggests an association between reflexivity and trust.

Theoretically, this association makes sense. If individuals trust each other they are more likely to admit mistakes, question assumptions and engage in debate (Edmondson, 1999). The very act of reflection within a group can be an uncomfortable process as it is likely there will be a discrepancy between real and desired circumstances leading to anxiety within the group (West, 2000). Trust may play a role in assuaging these worries. Burningham and West (1995) and Argell and Gustafson (1996) suggest that positive affective processes foster team reflexivity and creativity. Argyris and Schon (1978) argue that mistrust leads to defensive norms within organisations, which in turn hinders reflection and learning. Theoretically, there is a consistent argument supporting the trust-reflexivity relationship.

Empirically, the evidence is not as plentiful but what does exist supports the theory. For example, research conducted by Edmondson (1999) found an association between psychological safety (a concept entailing trust) and team learning. Edmondson's conceptualisation of team learning is closely related to the definition of reflexivity used in this research (discussing past mistakes, open debate and experimentation). Schippers et al. (2004) found a positive association between intragroup trust and team reflexivity. They measured reflexivity in two ways; 1. discussing processes and 2. evaluation/learning and they surveyed 59 moderately to highly complex decision making teams from fourteen different organisations. They found trust to be positively associated with both measures of reflexivity but in different ways. Trust was more strongly correlated with evaluation/learning than with discussing processes. The authors suggest a possible explanation for this finding is that less trust is needed for reflection at a more meta level (discussing processes) than for the more daily actions of team members (evaluation/learning). The little research conducted in this area suggests that where there are high levels of trust, there is more likely to be honest group discussion and reflection. Therefore, it is suggested that:

Hypothesis 2a: There will be a positive association between TMT trust and task reflexivity.

3.7.3 Trust and Organisational Learning

There are considerable theoretical and empirical arguments in the literature indicating that trust facilitates organisational learning. While the term organisational learning is

a broad one and can mean many different things, this research focuses on an important facet of organisational learning – the sharing of information and knowledge. The idea that trust may be associated with learning is not ground breaking, or surprising. It makes sense to suggest that where there is trust, there is likely to be more learning – individuals will be more likely to share information and knowledge, be less defensive and territorial and the learning literature supports this theory. Nahapiet and Ghoshal (1998) argue that intragroup trust is an important factor in the exchange and combination of information. Several other researchers share the belief that when trust levels are high people are generally more likely to engage in social exchange and co-operative interaction (Gambetta, 1988; Fukuyama, 1995; Tyler & Kramer, 1996). Edmondson and Moingeon (2001) argue that trust is vital if organisational learning is to take place. They maintain that "organisational learning, by its nature, is called for in situations in which much is unknown and uncertain (Senge, 1990), creating a need for trust to enable experimentation, reflection, or action...trust in both intentions and competence comes into play in producing significant organizational learning and change". (p.159)

While there is not a huge amount of empirical evidence of relationships between trust and organisational outcomes, what is there is consistent with this assumption. Klimoski and Karol (1976) in a study of problem solving groups, linked trust to the combination and exchange of information arguing that high levels of trust increase the willingness to share information. Their study describes how each member of 29 four-person groups of female undergraduates was led via manipulated feedback from the three other group members to perceive a high trust, low trust or no trust (control) situation. They measured performance by the number of ideas generated by each group. They found that the high trust groups outperformed those in the low trust groups.

In a study of 53 teams, Edmondson (1999) similarly found that psychological safety was a consistent predictor of team learning (seeking or giving feedback, making changes or improvements, experimenting, constructive conflict). Edmondson's findings suggest that team members are more likely to engage in learning and risk taking behaviour when they trust each other.

Andrews and Delahaye (2000) found perceived trustworthiness influenced knowledge sharing between scientists in their study of a Bio-Medical Consortium. In this competitive environment knowledge was a valuable commodity that was not shared casually. It was found that trust played a pivotal role in the decision to share information and the formal knowledge sharing requirements that were in place became redundant if trust was not present. They also found the credibility of the knowledge source influenced the sharing of knowledge – it was important that the knowledge source was perceived to be able to import correct, relevant high quality information. This is very similar to Mayer et al.'s (1995) concept of trust competence where trust in an individual depends on trust in their skill and competency to do the job. However, a limitation of this study is the small sample size – the data was gathered in 15 individual semi structured interviews and therefore its generalisability must be questioned.

Lee and Choi's (2003) findings support the relationship between trust and knowledge creation. They collected surveys from middle managers in 58 firms, the majority of which were in the service industry. Groups that experienced mutual trust were more likely to share and create knowledge (questionnaire items for the knowledge creation process used in this study had been validated and used by Nonaka et al., 1994). However, the results are limited to large Korean firms and generalisability from a Korean setting to other countries is problematic.

In summary, there is considerable theoretical and empirical support for the trust – learning relationship. Therefore it is hypothesised that:

Hypothesis 2b: Intragroup TMT trust levels will be positively associated with organisational learning.

3.7.4 Trust and Climate for Innovation

The view that organisational outcomes are a reflection of the values and demography of the top team has been discussed at length in chapter two. Hambrick and Mason's Upper Echelon's theory states that organisational outcomes are partially predicted by the senior team. While their approach focuses on demographic characteristics and bypasses some important and complex psychological issues, their underlying theory is

that demographic characteristics provide a more measurable surrogate for cognitive and psychological measures. While much of the upper echelons literature focuses on performance outcomes, the prediction that the top team will impact organisational climate is also supported. The majority of the culture/climate literature focuses on the organisational leader as the prime influencer of organisational culture and climate (Schein, 1997), however this is broadening to include the senior team as a whole (Seeger & Ulmer, 2003). There is considerable evidence suggesting that the top management team influences organisational climate. Top team support for innovation is an important dimension of a climate for innovation (Anderson & West 1998; Ragazzoni, Baiardi, Zotti, Anderson, & West, 2002). If employees perceive management as supporting and rewarding innovative behaviour, there will be higher levels of openness and risk taking (O'Reilly et al., 1987), both of which are essential elements of a climate for innovation.

Albrecht and Travaglione (2003) position trust in senior management as a central factor to the way that employees experience aspects of organisational climate. However, the variable under investigation in this study is trust *between* senior managers. While there has been little empirical evidence of a relationship between trust in general and innovative climate, there is no research focusing on the impact of trust between senior managers on climate. However, upper echelons theory and much of the climate/culture literature would suggest that the top team influence organisational climate. It is suggested here (although there is no previous empirical evidence) that trust within senior teams will increase innovative behaviour within those teams (openness, risk taking etc), which in turn will influence innovative climate. Therefore, it is proposed:

Hypothesis 2c Intragroup TMT trust levels will be positively associated with climate for innovation.

3.8 TMT Task Reflexivity

3.8. 1 Introduction

The previous section has discussed the role played by affective group processes (in particular, intragroup trust) in determining both team and organisational outcomes. The task group process under investigation in this study is task reflexivity, an area

emerging as important in determining organisational outcomes such as innovation. While there are relatively few empirical studies investigating the effects of reflexivity on organisational outcomes, the empirical work that has been done confirms this assumption. Reflexivity has generated a lot of interest recently in the organisational learning and innovation literature (Carter & West, 1998; West, 2000; DeDreu, 2002; Schippers, Den Hartogg, Koopman & Wienk, 2003). Like the concept of trust, reflexivity is grounded in debates within different disciplines, which often run in parallel (Holland, 1999). It is a term that is growing in significance in organisational theory and is recognised as leading to increased effectiveness and innovation (West, 2000) and contributing significantly to sense-making in cross cultural teams (Easterby-Smith & Malina, 1999). But, like trust, this term is used in so many different senses that it can often lead to confusion rather than clarification. This section aims to explore the different definitions of reflexivity and review the existing literature on the importance of reflexivity in organisational theory.

3.9. Defining Reflexivity

Reflexivity is a concept that is growing in significance in organisational theory but has been found to be quite rare in practice (West, 2000; Mulder, Swaak & Kessels, 2004). Discussions on reflexivity in organisational theory appear to be focused on the research process and the different approaches to how research is carried out. The term is also popular in psychotherapy and discourse analysis (Kelly, 1955; Swift & West, 1998). However, there are a number of researchers who are beginning to look at reflexivity as a group process that may impact on organisational outcomes such as innovation (West, 2000; Schippers, et al., 2003; De Dreu, 2002).

One of the first proponents of reflexivity in action was Schon (1983) when he described a process where "both ordinary people and professional practitioners often think about what they are doing, sometimes even while they are doing it. Stimulated by surprise, they turn thought back on action and on the knowing which is implicit in action" (Schon, 1983, p. 50).

Swift and West (1998) define reflexivity as the "uniquely human ability to reflect upon processes, events, sensations, past experience and the physical being" (p. 4). Reflexivity in an organisational setting involves individuals or teams reflecting upon

their preferred work methods and modifying them where necessary according to the needs of the task or environment. Team reflection may encompass conflict management, decision-making, communication and trust within the team. Its impact upon team effectiveness depends upon team composition, the organisational level of the team and team maturity (West, 2000). Three domains of reflexivity have been identified in past studies: (i) individual reflexivity - the degree to which individuals reflect upon and adapt their approach to work related tasks and decision making (ii) team reflexivity - the extent to which a team reflects upon and modifies its objectives, strategies and processes (ii) organisational climate for reflexivity - the support mechanism which facilitates reflexive processes within the organisation (Swift & West, 1998). This study focuses on team reflexivity.

Reflexivity is more than merely reflecting on what has already taken place, according to Easterby-Smith and Malina (1999), it "involves actively considering the implications of what has already been observed for the observer's own practice" (p. 77). Therefore, it is not enough to simply look back but also take into consideration the implications for the future. The 'looking forward' component of reflexivity is echoed by Swift and West (1998) who describe reflexivity as an iterative process comprising of three components: reflection – 'looking back', planning – 'looking forward' and action.

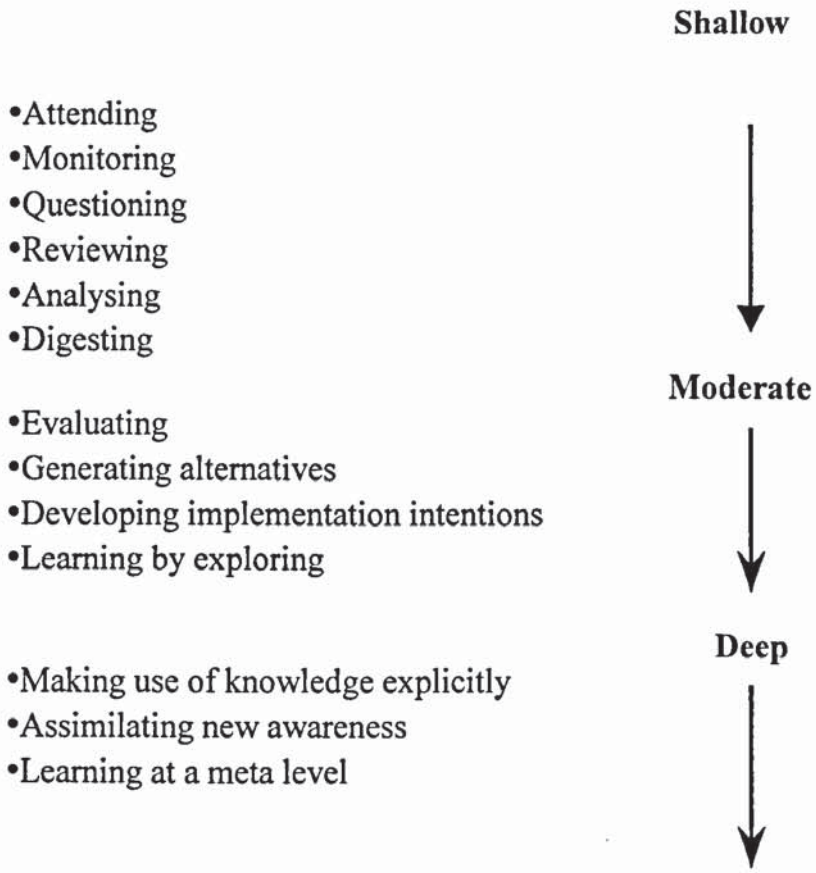
3.10. The Process of Reflection

Reflection consists of attention, awareness, monitoring and evaluating the task at hand (Swift & West, 1998). Swift and West have also proposed that there are three different levels of reflection: shallow, moderate and deep. Shallow reflection involves reviewing, questioning and monitoring and can be compared to Argyris's single loop learning (Argyris, 1992). Moderate reflection involves evaluating, generating alternatives and developing implementation intentions. This level is similar to Argyris's double loop learning where reflection takes on a more critical approach. The third level is where deep reflection takes place involving the explicit use of knowledge, the assimilation of new awareness and learning at a meta level. This level of reflection is quite rare and involves the questioning of taken for granted norms and values (Schippers et al., 2003) and is similar to Argyris's triple loop learning. Schippers et al. suggest that deep reflection, while taking place less frequently than

shallow and moderate reflection, might be more important for some teams. They maintain that top management teams would benefit more from this level of reflection as it might be more important for them to explicitly discuss the organisational culture.

Figure 3.1 Different Levels of Reflexivity

Different levels of reflexivity



Swift and West, 1998

3.10.1. Planning

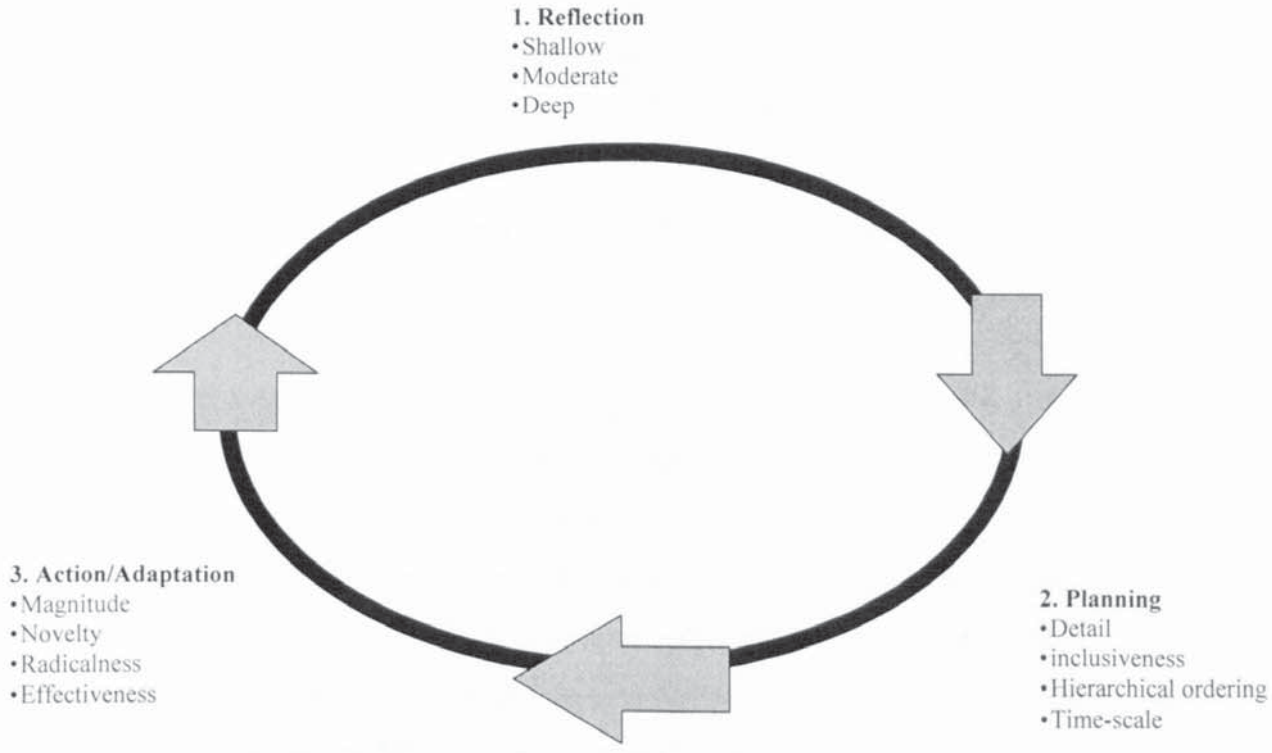
The planning dimension takes place after reflection and can be considered to be the bridge between reflection and action (Schippers et al., 2003; Swift & West, 1998; West, 2000). Planning involves working out how goals are going to be achieved before acting upon the goals. While Weingart (1992) proposes that planning can take place during action, Swift and West (1998) maintain that the more the plan is worked out prior to action, the more likely it will lead to action. Planning also includes

considering issues such as time scale, whether the plan is short term or long term, the consideration of potential problems and contingencies and a priori hierarchical ordering, or the extent to which plans are broken up into sub plans before actions are commenced. Teams who do not engage in the planning stage are less likely to reap benefits from the reflection stage and reflection is likely to decrease as a result (Swift & West, 1998).

3.10.2. Action

Action refers to the behaviours engaged in to achieve the team's goals. The action phase of team reflexivity can be measured across four dimensions: magnitude, novelty, radicalness and effectiveness. The first three dimensions measure how innovative the actions are and the fourth dimension measures team performance (Schippers et al., 2003). West (2000) maintains that the action stage is an iterative process and that the relationship between each stage is a circular one where action can lead to new information, which can lead to reflection and planning and so on see figure 3.2.

Figure 3.2 The three Phase



Therefore, reflexivity is a multifaceted concept involving three stages, reflection, planning and action and comprising a number of different levels. The level of reflection certain teams reach might depend on different factors including team leadership, the task at hand and the amount of trust within the team. West (2000) cautioned that reflection might be problematic for the team as a discrepancy between real and desired circumstances is likely within the team. The identification of such discrepancies can lead to uncertainty and anxiety and according to West hinders the natural development of reflexivity within groups.

However, certain factors have been found to induce reflexivity within groups. A team's approach to errors and failure can determine how reflexive a team is. Teams that view errors/failures as opportunities to learn can stimulate reflection on the processes and assumptions that led to them. Edmondson's (1996; 1999) findings suggest that reflecting on past mistakes can encourage new and innovative ways of rectifying them, thus enhancing performance. Dunbar (1996) studied four prominent science laboratories investigating the processes underlying scientific discoveries. His findings suggest that scientific discoveries were most likely when groups reflected on potential causes for negative or inconsistent findings.

Group member changes within the team can also lead to reflexivity as newcomers can bring new and fresh perspectives to the team (Katz, 1982; West, 2000). However, this would depend on the socialisation processes within the team and how 'insiders' integrate with the newcomers. Chatman and Flynn (2001) argue that the establishment of cooperative norms is vital if the team is to function effectively and benefit from group processes such as reflexivity. Group longevity has also been associated with reflexivity. Groups that have been together a long time are more likely to become isolated from critical feedback and information sources (Katz, 1982). There is empirical evidence of this also. Schippers et al.'s (2004) findings suggest that group longevity moderated the relationship between diversity and reflexivity, in that "older" homogeneous groups and "younger" diverse groups were more reflexive than both "younger" homogeneous teams and "older" diverse teams. Diverse teams high on group longevity were found to be less reflexive and they suggest this might be "because homogeneous teams need some time to get acquainted and will be more reflexive after a while, whereas heterogeneous teams will start exploring different

viewpoints and score higher on reflexivity in the first phase of their existence. Later on, those teams might be less reflexive, because of incompatible viewpoints".

Positive affective tone and trust within the team can foster group task reflexivity (Edmondson, 1996). Such groups are more likely to openly discuss and challenge assumptions taken for granted (Swift & West, 1998; West, 2000). The link between trust and reflexivity has been discussed in the previous chapter and the literature suggests that teams that trust each other are more likely to engage in open debate, questioning and adaptive behaviour (West, 1996; Edmondson, 1996). How a team manages conflict is also associated with task reflexivity. Tjosvold, Hui and Yu's (2003) findings indicate that competitive and avoiding approaches to conflict management had significant negative effects on task reflexivity and the cooperative approach had significant positive effects. Because the data are correlational, however, there is no direct evidence of causal links between conflict management and task reflexivity. Also, because the research setting is China (200 employees in 100 work teams in China were surveyed), generalisability to other settings is problematic.

3.11 Why Study Reflexivity?

While the study of reflexivity in organisational theory is still relatively rare, there are some important studies within this discipline indicating that reflexivity has a beneficial effect upon team performance, enhancing creativity and improving task outcomes (West, 1996). Conceptually similar factors such as task orientation and constructive controversy have been found to be associated with team innovation (West & Anderson, 1996; Anderson, Hardy & West, 1990) and team effectiveness (Tjosvold, 1990). Preskill and Torres (1999) argue that reflection is core to evaluative enquiry and learning and suggest that reflection can occur in various ways –

"Reflection while we are engaged in some tasks occurs when we watch ourselves as we act out certain thoughts and actions. It is often likened to an 'out-of-body experience' and happens most when we try to see things from a different perspective...Reflection that takes place after we have completed a task provides opportunities to revisit or recall what happened in practice. Reflection on underlying premises challenges individuals to consider their mental models and assumptions that influenced their practice. And finally, reflection for future action or practice focuses on predicting how we will use what we learned in the reflective process" (p.102).

Empirical evidence is supportive of the theory. Group problem solving was found to significantly improve when members examined how they were defining the problem and considered whether or not they were solving the 'right' problem. Bottger and Yetton (1987) used the "Moon Survival" game in their research on group problem solving, a task where participants imagine themselves to be stranded on the moon. Participants are required to rank fifteen pieces of equipment in order of declining contribution to their survival on the moon. They compared the scores of control teams and teams who were trained to use certain procedures very similar to the definition of reflexivity used in this research (e.g. participants were asked to re-examine the problem to ensure they are solving the "right" problem, barriers to effective problem solving were then identified and discussed openly). Those teams who had gone through the training made better decisions than those who did not. Further support for this is provided by Rogelberg, Barnes-Farrell and Lowe (1992). They found that groups that engaged in reflexive problem solving processes such as the step ladder technique produced higher quality decisions. The stepladder technique is a similar concept to reflexivity and aims to rectify some of the problems associated with group decision making by structuring the entry of group members into a core group and by ensuring that each member contributes to the decision making process. Open discussion is an important part of the process. Rogelberg et al. found that stepladder groups produced significantly higher quality decisions than non stepladder groups. Furthermore, stepladder groups' decisions surpassed the quality of their best individual members' decision 56% of the time (non stepladder groups' decision did so only 13% of the time).

Carter and West's (1998) study of 19 BBC-TV production teams found that reflexivity was positively associated with clarity of team objectives, participation in decision making, affective well being and team effectiveness. Team performance was measured using an audience appreciation index and executive producer ratings and the findings indicate that reflexivity accounted for considerably more of the variance (around 50%) in the team performance measures than either team size (around 25%) or climate (9%). Similarly, Schippers et al. (2003) found reflexivity to be positively related to two measures of performance, namely self rated performance and supervisor rated performance. 59 teams were surveyed and included management teams, self-regulating teams, production teams and teams in government service.

Team reflexivity may also be indirectly linked to important organisational outcomes. De Dreu (2002) suggests that reflexivity moderates the relationship between minority dissent and team innovation and effectiveness. This hypothesis was tested using a sample of 32 organisational teams performing complex and uncertain tasks. Team innovation was measured using an adaptation of Anderson and West's (1998) scale (items included "This is an innovative team" and " Team members often implement new ideas to improve the quality of our products and services"). Team effectiveness was measured using an adaptation of Hackman's (1983) scale (items included "This team is good at coming up with ways to complete their tasks" and "This team effectively deals with uncertainty and unexpected events"). Teams with high levels of minority dissent were found to be more effective and innovative but only in teams with high levels of reflexivity (De Dreu, 2002).

3.11.1. Reflexivity and Complex Decision Making Groups

West (1996) distinguished between simple decision making groups and complex decision making (CDM) groups when discussing the association between reflexivity and effectiveness. While reflexivity may not be necessary in routine decision making groups working in certain and predictable environments, West (1996) proposes it is an important process for CDM groups making complex decisions under uncertain and unpredictable circumstances if these teams are to achieve their goals. Changing circumstances often require a team to continually discuss what they are doing, how they are doing it and why they are doing it (Carter & West, 1998).

There is also empirical evidence that reflexivity is an important process in CDM teams. Carter and West (1998) found a positive relationship between reflexivity and team effectiveness in their study of CDM teams in the BBC. The performance of 19 BBC-TV production teams was examined over an 18-month period, using audience appreciation ratings and managers' assessments of performance. Schippers et al. (2003) found a positive association between reflexivity and performance in moderately and highly complex decision making teams (team performance was evaluated by both team members and supervisors). It is therefore especially important to study the effects of reflexivity within CDM groups (examples of which are TMTs, primary health care teams and project teams in commercial settings).

The teams under investigation in this study are TMTs in high technology industries and are classified as CDM teams as defined by West (1996) and are characterised by:

- Uncertain and unpredictable work environment (senior managers in high tech industries operate in an ever changing environment and they are required to play boundary spanning and information scanning roles. One of the central and most complex tasks the TMT has to deal with is understanding and managing this environment).
- Often work with complex and unpredictable technology (given that all of the firms under investigation are high technology firms, it is probable that senior managers are required to understand complex technology)
- Task performance requirements may be subject to change (senior managers have many different tasks and interact with both the internal and external environment. Senior managers are required to fulfil both boundary spanning and information scanning roles and interact with competitors, shareholders, markets, customers)
- High team member interdependence (although senior managers have different roles and responsibilities, they are dependent upon each other to achieve organisational goals)
- Autonomy over their daily work schedule (senior managers are heads of their own functions and while there should be agreement of goals, each member has autonomy over their area).
- Complex tasks (senior managers are engaged in making complex strategic decisions)
- The components of effectiveness are multiple and the team is responsible to multiple constituents (there are many different ways a senior team may be judged on its effectiveness e.g. how profitable, innovative, cost efficient etc the team is)

3.12 Reflexivity, Innovation and Organisational Learning

3.12.1. Reflexivity and Innovation

While research on reflexivity and innovation is quite rare, there are several recent studies that would indicate an association between reflexivity and organisational creativity and innovation (West, 1996; 2000). Hackman and Morris (1975) found

team creativity was enhanced in teams who engaged in reflective practices. They found that in 100 laboratory teams of three only 142 comments were made about the performance strategy of the team. However, discussion about process following these comments facilitated team performance. Similar concepts such as task orientation have been found to be associated with team innovation. West and Anderson's (1996) findings suggest that the overall level of team innovation may be more a consequence of the team's social processes than resources or team composition (although they do suggest that team composition is associated with the quality of the innovations). They conducted a longitudinal study on innovation in 27 top management health teams and their findings suggest that group processes such as task orientation (a concept that, like task reflexivity, involves divergent thinking and critical debate) play a key role in fostering innovation. Similarly, Anderson, Hardy & West's (1990) work in the NHS suggests that task orientation is key determinant of innovation and they have subsequently developed a model of team innovation in which task orientation plays an important role.

There is empirical evidence that task reflexivity can affect performance and innovation in an indirect manner as both a mediator and a moderator. Hirst and Mann's (2004) findings suggest that team reflexivity mediates the link between innovative leadership and team performance in their study of 56 R&D teams in four organisations over a one year period. Independent measures of performance were obtained from surveys of research managers as well as project managers. De Dreu (2002) suggests that reflexivity moderates the relationship between minority dissent and team innovation and effectiveness. Teams with high levels of minority dissent were found to be more effective and innovative but only in teams with high levels of reflexivity (De Dreu, 2002).

The role that reflexivity can play in problem solving is an important one and involves examining assumptions about the problem itself as well as targeting the right problem. Edmondson's (1996, 1999) work on psychological safety found that teams who felt safe spent time discussing failure and why it occurred, leading to higher quality problem solving. Non reflexive teams are more likely to avoid the identification of problems and regard problems and failure as threats to morale (West, 1996, 2000; Janis, 1982). On the other hand, reflexive teams are more likely to regard problems

and failure as learning opportunities and engage in more extensive scanning of the environment than their less reflexive counterparts. This is especially important in uncertain conditions as problem identification becomes more difficult under such conditions (West, 1996; 2000). Edmondson's findings suggest that this is the case. Her study of 51 work teams in manufacturing suggests that teams that feel comfortable speaking out and admitting errors are more likely to rectify the errors. While the majority of the research on reflexivity and innovation explores innovation at a team level (West et al., 1998; West, 2000), it is plausible to suggest that reflexivity within the top team may have wider implications. Upper echelons theory (discussed in chapter two) suggests that the top team is an important predictor of organisational outcomes. It is therefore suggested that:

Hypothesis 3: TMT task reflexivity will be positively associated with market innovation

3.12.2 Reflexivity and Organisational Learning

Much of the literature on learning highlights the importance of reflective practice. Reflective action is an extensively explored topic in the area of learning. As early as the 1930's, reflexivity and reflection were considered to play a pivotal role in the learning experience (Dewey, 1933). Kolb's learning theory (1984) develops the idea that learning is dependent on the integration of experience with reflection. Many of the behaviours associated with reflexivity (questioning, planning, exploration) are behaviours that enhance organisational learning (Preskill & Torres, 1999). Gherardi et al. (1998) suggest that reflexivity is a necessary part of learning and that most of the knowledge that distinguishes a novice from an expert lies in day to day reflection – "thinking about what we are doing and why, and talking about it with others" (p. 274).

It is also suggested that the processes of reflection and mutual enquiry are the most effective ways of combating the tendency towards developing defensive routines that hinder high level learning. Argyris defines defensive routines as behaviours that people adopt in order to protect themselves from negative feedback and it is suggested that they are one of the main ways in which information can become distorted (Argyris, 1986; Easterby Smith & Malina, 1998). Kayes (2002) suggests that "by encouraging managers to reflect critically on their assumptions and beliefs, reflective

approaches aid managers in achieving emancipation from perspective-limiting assumptions...whereas the cognitive approach leads towards simplification, the reflective approach leads toward complication. According to the reflective view, oversimplification leads to incomplete understanding" (p. 138)

Empirically, the evidence is also supportive of the reflexivity – learning relationship. Mulder et al. (2004) conducted research on collaborative learning in virtual ad hoc expert teams. Observing the learning behaviour of a design team over a period of four months, they concluded that shared understanding was suboptimal within the team. They deducted that this was due to a lack of questioning and reflective behaviour. They developed a tool that they hypothesised would lead to more reflective behaviour which in turn would lead to shared understanding and collaborative learning. Over time they found shared understanding and collaborative learning increased in the team (they also conducted an experiment that elicited similar results). Edmondson, Bohmer and Piscano (2001) conducted a qualitative field study of 16 hospitals implementing innovative technology. Analysis of the data suggests that successful implementers underwent a qualitatively different learning process than those who were unsuccessful. This learning process involved four process steps of which reflection was one (enrolment, preparation, trials and reflection). The importance of reflection was clearly acknowledged by managers at all levels in Vince and Saleem's (2004) single case study on organisational learning. While most manager focused on individual reflection, a need for collective or team reflexivity was recognised – one senior executive commented that reflection within groups can 'really make things happen' (p. 144). While the single case study is not designed to make generalisations, Vince and Saleem's study provides interesting insights into the reflexivity-learning relationship. Although there is considerable work done on individual and collective reflexivity and learning, little research explores links between the reflexivity of the top team and wider organisational learning. Based on the learning literature reviewed, it makes intuitive sense to suggest that TMTs who engage in reflexive practices are more likely to develop opportunities for organisational learning. Therefore, it is suggested that

Hypothesis 3a: There will be a positive association between TMT task reflexivity and organisational learning.

3.13. Summary

While there is considerable theoretical and some empirical support for the trust, reflexivity and organisational outcomes, there is a clear need for further research in these areas. The vast majority of the trust literature posits that trust is a valuable affective process in the workplace and is associated with important attitudinal and behavioural outcomes (although the relationship between trust and the attitudinal outcomes is considerably stronger). A prominent feature of the trust literature is its focus on dyadic relationships (although there are notable exceptions see Costa et al., 2001 and Jarvenpaa & Leidner, 1999). There is a need for more research on intragroup trust, the area of focus of this study. Another gap in the literature is the absence of research on trust within the TMT. All of the research quoted in this chapter focuses on manager-subordinate trust or trust within lower level teams. This study aims to redress this lack by focusing on intragroup trust levels within top management teams and exploring its relationship with organisational outcomes such as innovation and learning.

The second group process reviewed in this chapter is task reflexivity. A relatively new concept to the area of organisational studies, it has nonetheless, emerged as an area worthy of investigation. Recent empirical studies in this area are consistent in that they all suggest that reflexivity is an important group process and associated with outcomes such as team innovation, team satisfaction and learning. This study adds to the recent surge of interest in this area and investigates its association with wider organisational outcomes as well as team dynamics.

CHAPTER FOUR
ORGANISATIONAL CONTEXT: ORGANISATIONAL CLIMATE, ORGANISATIONAL LEARNING AND INNOVATION

4.0 Introduction

The previous two chapters have focused on the role played by the composition of the TMT and the group processes that characterise it in determining organisational innovation. However, in the last 15 years there has been a change in emphasis in research on teams from group processes to the links between the organisational context and the team (West et al., 1998). While the TMT plays an undeniably important role in determining organisational outcomes such as innovation, the organisational context within which the TMT functions is also important. By exploring the organisational context in conjunction with the TMT, I explore both team level and organisational level determinants of innovation, thus gaining a more holistic picture of organisational innovation. This chapter reviews the literature on the internal organisational context focusing on climate for innovation and organisational learning and the role they might play in determining innovation. The main goal of this chapter is to evaluate the utility of existing research and theory on these organisational variables and to explore the key trends in the literature with regard to their implications for this research study.

4.1. Organisational Climate

Organisational climate is a concept that has received considerable attention since the 1970's (Anderson & West, 1998). Empirical findings have found climate to exert a significant influence on organisational performance (Baer & Frese, 2003; Mudrack, 1989; Moss-Kanter, 1983) and individual motivation (DeCotiis & Summers, 1987). The term climate originates from organisational theorists such as McGregor and refers to the day-to-day practices in the organisation, its policies and reward procedures, the "encapsulation of the organisation's true priorities" (Ahmed, 1998, p.31). Before focusing explicitly on organisational climate, it is worth considering the differences between climate and culture. Janz and Prasarnphanich (2003) succinctly illustrate the difference between the two by suggesting that "in general, an organisation's climate is

thought to be a direct behavioural manifestation of organisational culture, which is deeper and less consciously held set of cognitions and affective attachments" (p. 353) Climate can be observed in the policies and procedures of the organisation and is more likely to rely on quantitative research methodologies, as is the case in this study (although climate is also explored in the qualitative interviews). Schneider (2000) argues that this reliance on quantitative research methods and a failure to adopt a more observational approach has led to climate taking a back seat to culture in the theory and research. However, Pettigrew (1990) contends that this is more a case of culture researchers being absorbed in trying to decide what organisational culture is, while climate researchers have gone out and measured it.

Litwin and Stringer (1968) define organisational climate as "a set of measurable properties of the work environment, perceived directly or indirectly by people who live and work in this environment and assumed to influence their motivation and behaviour" (p.1). Moran and Volkswein (1992) provide a more comprehensive definition when they describe climate as:

> "A relatively enduring characteristic of an organisation which distinguishes it from other organisations: and (a) embodies members' collective perceptions about their organisation with respect to such dimensions as autonomy, trust, cohesiveness, support, recognition, innovation and fairness; (b) is produced by member interaction (c) serves as a basis for interpreting the situation; (d) reflects the prevalent norms values and attitudes of the organizational culture; and (e) acts as a source of influence for shaping behaviour" (p. 20).

Therefore, climate is seen as something observable, that can be measured and that has an impact on how people behave within the organisation. Because culture and climate represent similar phenomena, some researchers purport that they are studying organisational culture when in fact they are studying climate. This has led to the term culture including both climate and culture (Fey & Beamish, 2001). However, because the measures used in this study are concrete and facet specific, it is considered more a study of climate than culture.

4.2. Different Approaches to Organisational Climate

Taguiri and Litwin's (1968) set of essays on organisational climate treated climate in ways ranging from the subjective, where climate was perceived as organisational members' interpretations of organisational characteristics, to a more objective view

where climate was seen as an objective set of organisational characteristics. Moran and Volkswein (1992) have identified four perspectives on organisational climate. (1) The structural perspective considers climate to be an objective manifestation of organisational structure. Because employees are exposed to common structural characteristics, they develop similar perceptions of the organisation's climate. (2) The perceptual perspective. Here, organisational climate resides within the individual – the employee responds to situational variables in a manner that makes sense to them. Therefore, climate is seen as a "psychologically processed description of organisational conditions" (Verbeke, Volgering & Hessels, 1998, p.308). (3) The third perspective is the interactive perspective where it is the interaction between players that brings forth the shared agreement on climate. (4) Finally, the cultural approach, which builds on the interactive approach, maintains that climate is created by a group of interacting individuals who share common values and beliefs, i.e. the organisation's culture.

Anderson and West (1998) identify two main approaches towards organisational climate as holding particular weight in the literature. The first of these is the cognitive schema approach which conceptualises climate as the individual's cognitive schema of their work environments, with the individual interpreting events according to what is salient to them and in terms of what makes sense to them.

The second conceptualisation of organisational climate is Schneider's (1990) definition of climate as "the shared perception of organisational policies, practices and procedures" (p.22) or, in a more general sense, a shared perception 'of how things are' (p.22). This approach is similar to Moran and Volkswein's perceptual perspective. The problem with this as identified by Anderson and West is establishing agreement between individuals' perception of 'how things are'. While the two approaches are not mutually exclusive, research in this area tends to favour the latter approach and this is the approach adopted in this study. Anderson and West outline three requisites (although they stress these criteria are not sufficient) for shared organisational climate to exist – (a) that individuals interact at work, at least on an infrequent basis, (b) that there is a common goal or at least an attainable objective that will encourage people to act collectively and (c) that there is sufficient task interdependence to propel individuals towards developing shared understandings.

Climate researchers have succeeded in resolving many of the problems associated with the measurement of 'shared' perceptions of how things are (James, Demaree, & Wolf, 1984; Shrout & Fleiss, 1979). Inter rater reliability, the extent to which participants' ratings agree with one another when evaluating the same criteria, is especially important when measuring subjective evaluations of climate (James et al.'s RWGJ measure is used in this study to calculate inter rater reliability and is discussed in chapter five).

Anderson and West have identified the lack of agreed meaning of organisational climate as creating problems in applied research. The concept remains ill defined (Field & Abelson, 1982). This may be partly due to uncertainty surrounding the level of analysis at which climate should be explored and understood - is the appropriate level individual, group or organisational? (Moran & Volkwein, 1992). It might also be due to the problem of what James (1982) terms "composition theory" which refers to the "specification of how a construct operationalised at one level of analysis e.g. psychological climate, is related to another form of that construct at a different level of analysis, e.g. organisational climate" (1982, p. 219). While Anderson and West recognise that agreeing upon a specific definition of climate as a general concept has proved elusive, they argue that attempts to deconstruct the concept of climate into subdomains has helped resolve this dilemma. Schneider and Reihers (1983) agree and go as far as to suggest that it is meaningless to talk about climate in general terms, suggesting that it is a far more useful concept when discussed in specific terms or what Rousseau (1988) refers to as "facet-specific climates" (e.g climate for innovation). Therefore it is not surprising that there has been growing interest in how specific climates impact on particular outcomes (Anderson & West, 1998). However, this too has its problems, the most obvious being the lack of clarity about climate specific measures, whether they are predictive of just one "facet-specific" outcome or many different outcomes (Anderson & West, 1998). They call for the establishment of consensual validity (is there agreement amongst the unit of analysis regarding the perceived climate?) in an attempt to overcome this problem, something that is difficult to establish if the unit of analysis is the organisation. Because of this some vagueness remains around the borders and differentiation of the climate construct (Fey & Beamish, 2001). This problem is exacerbated according to Moran and Volkswein (1992) by the lack of theoretical studies on climate.

4.3. Climate for Innovation

This study focuses on a climate for innovation. Climate for innovation is often operationalised as a set of organisational characteristics perceived by employees that could either facilitate or hinder innovation. In the present study, employees are asked to rate the organisation's climate in terms of risk, experimentation and innovation (using the Likert scale). These dimensions were chosen as each was found to be consistently associated with innovation and climate (Litwin & Stringer, 1968). (A more detailed discussion of how these items were derived is in chapter five). Janz and Prasarnphanich (2003) selected similar dimensions in their study (risk, reward and support) of organisational climate. West's (1990) model of group climate predicting innovation comprises of four climate factors, two of which are similar to the ones adopted in this study (support and participative safety – enables risk taking and experimentation). Janz and Prasarnphanich (2003) define risk as measuring "the orientation of the firm towards undertaking potentially innovative initiatives with uncertain outcomes" (p.360). It has been suggested that an organisation's attitude to risk can determine levels of innovation. Risk-averse firms hinder learning and innovation in that punishment for mistakes may prevent individuals from applying their knowledge to improving performance (Davenport & Prusak, 1998). Similarly, in an organisation that rewards and supports experimentation, organisational members are more likely to engage in innovative behaviour.

4.3.1 Organisational Climate and Innovation

It may seem tautologous but does a climate for innovation necessarily lead to innovation? Many studies suggest that the climate of an organisation might impact innovation. However, most of these studies are cross sectional, which makes establishing causality problematic. An often quoted exception is Litwin and Stringer's (1968) experimental study where three artificial companies were created for experimental purposes. The researchers then created three different climates through different management styles. The result was three different climates that had three different effects concerning job satisfaction, productivity and innovation.

Since then, climate has been found to predict factors related to individual innovative behaviour (Jain & Triandis, 1990; Kozlowski & Hults, 1987; Nystrom, 1990) and

Anderson, Hardy and West (1992) found climate to be a predictor of innovation in their case study of the National Health Service in the UK. Pillinger and West (1995) found that organisations characterised by high levels of innovation had climates emphasising good communication, teamwork and reflexivity. Burningham and West (1995) found team climate factors to be related to group innovation. Using Anderson and West's (1994) measure of climate for innovation (team vision, participative safety, task orientation and support for innovation), they surveyed 59 members of 13 teams in an oil company. They found a positive association between climate and externally rated group innovativeness. While the sample is small, this finding provides further support for the climate literature.

Ekvall (1991) found climate to be a moderating factor in the transformation of resources to innovative output. He and a colleague found a similar finding in their study of leadership style, social climate and organisational outcomes, except this time climate mediated leadership style and organisational outcomes. They collected data from 130 teachers in a state university in Sweden on climate (using the creative climate questionnaire, Ekvall, 1991; 1996) and leadership behaviour (using the CPE model, Ekvall and Arvonen, 1991). Outcome measures were subjective evaluations of how creative and innovative the organisation is using the work environmental inventory developed by Amabile and Gryskiewicz (1989). The results suggest that leadership style affects organisational outcomes only through the climate of the organisation. A limitation of this study is, however, the subjective nature of the outcome measures – innovation and productivity are measured by rating respondents' perceptions of how creative and innovative the organisation is rather than hard measures.

Baer and Frese (2003) found organisational climates for initiative and psychological safety played an important role in the adoption of process innovations (which they defined as "deliberate and new organisational attempts to change production and service processes" p.45). Their study of 47 mid-sized German companies examined the relationship between organisational climate, process innovations and organisational performance. They found that climates for psychological safety and initiative were positively associated with two measures of firm performance

(longitudinal change in ROI and firm goal achievement) - and moderated the relationship between process innovations and firm performance.

Amabile, Conti, Coon, Lazenby and Herron (1996) found that organisational support for risk and creativity and creative climate are two important factors that differentiate between high and low creativity projects (which they argue is "the seed of all innovation" p. 1155). They developed a new instrument KEYS that assesses climate for creativity and using this survey they conducted a single major construct-validity study in three phases. In the first phase, a set of high creativity projects and a set of low creativity projects were selected within a single large organisation (creativity was defined as "the production of novel and useful ideas by individuals or teams of individuals" p. 1169). Preliminary assessments of both environments were obtained using their instrument KEYS (items include organisational support of risk taking and information sharing). In the second phase, independent experts assessed each project in terms of creativity. In the third phase, additional data were obtained using the KEYS instrument. Their findings suggest that employee perceptions of the organisational creative context (climate for creativity) differentiated between high creativity projects and low creativity projects. The high and low creativity work projects still had substantially different perceived work environments after controlling for project type, size, length of project. While creative projects are not necessarily innovative (indeed, Levitt, 2002, suggests creativity may even hinder innovation if it focuses on abstract ideas without considering how to implement them), the definition of creativity in this study is the production of novel and *useful* ideas, which suggests a clear link with innovation.

Not all studies support the link between organisational climate and innovation. For example, de Jong and Kemp's (2003) study of the determinants of co-workers' innovative behaviour did not support the majority of the climate literature. They collected survey data from 360 knowledge workers and did not find any direct associations between firm climates supportive of innovation (measured using Anderson and West's, 1998, scale) and innovative behaviour (measured using Kleysen and Street's, 2001, scale). A possible explanation, they suggest, is the measure of innovation under investigation and they posit "innovative climate has a deferential impact on a new service development, depending on the degree of

newness. In a recent study in business services, a supportive climate appeared to be a success factor for highly innovative, new-to-the-world services, but for incremental innovations it was less important (De Berntani, 2001)...Because innovative behaviour is primarily related to incremental innovation, finding no significant effect may not be surprising. On the contrary, for radical innovation it can still be a key factor. Radical innovation requires more support of colleagues because it implies moving into uncharted areas, requires more resources, etc" (p.201). While the latter study indicates that climate may not be associated with certain types of innovation, the literature in general, would suggest that:

Hypothesis 4: Innovative climate will be positively associated with market innovation.

4.4 Organisational Learning

The second organisational variable under investigation is organisational learning. An important body of literature has recently begun to examine how firms can develop competitive advantage through organisational learning (Nahapiet & Ghoshal, 1998; Schulz, 2001). While interest in this area can be traced back as far as the 1960s (Arygris, 1964; Cyert & March, 1963) it was only in the 1990s that this area emerged as an important topic in organisational literature (Prange, 1999). Since then, organisational learning has received considerable attention and this attention is unlikely to diminish. Easterby-Smith, Snell and Gherardi (1998) suggest that three main reasons for the rapid growth in the literature on organisational learning are the speed of technological change, increased competitiveness and globalisation. As a consequence it is no longer enough for firms to rely on established practices, needing instead to invent new ways of doing things. There are many diverse approaches to this area incorporating both pragmatic and theoretical perspectives, leading to much debate within the literature regarding the most effective approach. Theoretical divergence within the area has led understandably to some confusion due to the lack of common agreed definitions of organisational learning and Prange (1999) has described this body of literature as an "organisational learning jungle, which is becoming progressively dense and impenetrable" (p. 24). While some would suggest that the establishment of core definitions would aid understanding of this area (Huber, 1991; Nicolini & Meznar, 1995), Easterby Smith et al. (1998) suggest that this

disciplinary diversity is helpful on the grounds that different disciplines have different ontologies that make integration difficult. They believe that differentiation will aid progress but only if focus is maintained within each school of thought.

Another important distinction in the literature is whether learning can be considered as a process rooted in the individual or whether it is more a social/cultural process. The former position includes the traditional psychological approach to learning that concentrates on the individual and for the most part is based on observable behaviour (Probst & Buchel, 1997). Alternative psychological approaches focus on the cognitive interactions between individuals and their environment, concentrating on changes in potential behaviours and the underlying mental processes (Bandura, 1979). If this cognitive approach is adopted, learning becomes a function of many different factors incorporating experience, intelligence and cognitive ability. However, most psychological definitions of learning remain at the level of learning by the individual (Probst & Buchel, 1997).

When discussing collective or organisational learning, this approach becomes problematic. Prange (1999) describes the way in which learning might be considered organisational as one of the greatest myths of organisational learning and argues that there is an unclear distinction in the literature between individual and organisational learning. Cook and Yannow (1993) also express concern that there is no clear justification for extrapolating ideas of individual learning to the collective level and argue that the group should be the primary level of analysis when exploring organisational learning.

In order to discuss organisational learning, it is important to give prominence to interactions between the individual, the group and the organisation (Argyris & Schon, 1978; Morgan, 1986). By focusing on these interactions, a social perspective of learning is adopted, moving from individual cognitive process to an understanding of the social dynamics. Elkjaer (1999) manages to bridge the gap between individual and social perspectives on learning by viewing learning as a "reconstruction and reorganisation of experience" (p. 81) that is both individually and socially shaped. She also highlights the importance of emotion in the learning process, a topic that has come into prominence recently but still remains rare in the literature on organisational

learning. Thus, there is a shift from conceptualising the learner as an individual processing information in isolation to a situation where the learner is perceived as a social and emotional being who processes and modifies information through their interaction with their environment. Therefore, as Gherardi, Nicolini and Odella (1998) suggest the "locus of learning process shifts from the mind of the individual to the participation framework in which it takes place" (p. 277). While a social perspective of learning takes into account the learning environment, Richter (1998) is critical of the lack of linkage between individual, micro processes and the macro organisational processes in the organisational learning literature. He argues that more attention needs to be focused on the learning patterns of senior executives, in order to understand how they learn as individuals and how they influence organisational learning, an area under investigation in this study.

4.5 Organisational Learning and Knowledge Creation

When defining organisational learning it is worth noting some of the tensions that have emerged between the ideas of organisational learning and knowledge management (Easterby Smith et al., 1998; 2000). Nonaka and Takeuchi (1995) dismiss organisational learning as being too reliant on stimulus response theory and of being little value to knowledge creation. They maintain that many of the definitions of organisational learning focus excessively on utilising extant knowledge without giving sufficient attention to the idea of creating new knowledge. However, Easterby Smith et al. (1998) attribute the above criticism to a restricted definition of organisational learning and argue that the organisational learning literature does include both extant and new knowledge.

Clearly, most recent definitions of organisational learning incorporate some reference to knowledge creation and exchange as well as exploitation of extant knowledge (see Nahapiet & Ghoshal, 1998; Qureshi, 2000; Nonaka, 1996). Probst and Buchel (1997) see organisational learning as "the process by which the organisation's knowledge and value base changes, leading to improved problem solving ability and capacity for action" (p. 15). However, Nonaka (1996) contends that the success of this learning process depends on the "recognition that creating new knowledge is not simply a matter of 'processing' objective information. Rather, it depends on tapping the tacit and often highly objective insights, intuitions and hunches of individual employees

and making those insights available for testing and use by the company as a whole" (p.19). However, while it is generally agreed that organisational learning leads to knowledge generation, it is less clear which learning processes lead to which kinds of knowledge (Prange, 1999). The definition of organisational learning used in this research draws on the knowledge creation component of learning, focusing on two different aspect of knowledge creation – the *ability* to share knowledge and the *motivation* to share knowledge (Nahapiet & Ghoshal, 1998).

4.6. Models of Organisational Learning

There are many different models of organisational learning including Argote's (1999) three components of learning (knowledge acquisition, knowledge retention and knowledge transfer) and Schulz's (2001) learning framework (exploration, codification and exploitation). However, Nahapiet and Ghoshal provide a simple but convincing model depicting organisational learning as occurring primarily in two ways – through the combination and exchange of knowledge (Schultz, 2001; Nahapiet & Ghoshal, 1998). This study operationalises Nahapiet and Ghoshal's model in order to measure (in so far as one can) organisational learning.

4.6.1. Combination and the Creation of Knowledge

The combination of knowledge involves a sharing of existing knowledge in order to create new knowledge and this perspective has become the starting point for much of the work on organisations as learning systems (Kogut & Zander, 1992; Nahapiet & Ghoshal, 1998). New knowledge can be created through incremental changes or what Schumpeter (1934) refers to as "continuous adjustment in small steps" or it can be created through radical change. Incremental change is similar to Argyris's single loop learning or adaptive learning whereas radical change is similar to Argyris's double loop learning or reconstructive learning. These changes, whether incremental or radical, involve making new combinations "either by combining elements previously unconnected or by developing novel ways of combining elements previously associated" (Nahapiet & Ghoshal, 1998, p. 248).

4.6.2. Exchange and the Creation of Knowledge

The second mechanism identified by Nahapiet and Ghoshal in their framework of creating knowledge is the exchange of knowledge. They note that because knowledge

is held by different parties exchange of knowledge is a prerequisite for the combination of knowledge (see also Querishi, 2000). This exchange can involve either explicit or what Spender refers to as "conscious" knowledge or tacit "automatic" knowledge (Spender, 1996 as cited in Nahapiet and Ghoshal, 1998, p.247). Explicit knowledge is objective, can be codified and easily transferred. Tacit knowledge and skills are subjective, difficult to codify and transfer. Tacit knowledge is also intuitive, unarticulated and often the result of sustained learning by individuals and teams where the knowledge becomes deeply embedded. Polanyi's famous quote succinctly describes tacit knowledge as "We can know more than we can tell".

Although conceptually it is possible to differentiate between these two types of knowledge, Lam (2000) argues that they are not separate and discrete in practice. The exchange of both types of knowledge has been identified by researchers as an important source of competitive advantage (Prahalad & Hamel, 1990; Nahapiet & Ghoshal, 1998, Nonaka & Takeuchi, 1995) and Lam (2000) suggests that the interaction between explicit and tacit knowledge is vital for the creation of new knowledge. However, Bonache and Brewster (2001) argue that tacit knowledge can remain locked within the employees who have no desire or see no necessity to share it, and in doing so hinders organisational learning. In attempting to understand how individual learning can become organisational learning, Nonaka and Takeuchi (1996) developed a spiral of knowledge suggesting that new knowledge begins with the individual and can only become organisational knowledge when translated into a new process or activity that makes this tacit knowledge available to others. Nonaka (1991) proposes four approaches to creating knowledge: socialisation (tacit to tacit), articulation (from tacit to explicit), combination (from explicit to explicit) and internalisation (from explicit to tacit).

4.6.3. Conditions Necessary for Organisational Learning

Moran and Ghoshal (1996) identified three conditions that must be satisfied in order to facilitate organisational learning. The first condition is access. It is imperative that the opportunity to combine and exchange information exists. This means firstly gaining access to the different parties and secondly, the ability to draw upon the different information sources and knowledge bases of these parties. While gaining access to different knowledge communities may seem an obvious starting point, Tsai

(2001) argues that less attention has been focused on this condition than others. Alavi and Leider (2001) also stress the importance of bringing knowledgeable individuals together in a collaborative way so that knowledge can be shared. But is providing a platform for learning enough?

In order to continue with these learning activities, it is important that the participants perceive the outcome to be of value, even though they may not be sure of what the outcome will be. The second condition is that the different parties envisage the exchange and combination of knowledge to be a worthwhile activity. The third condition necessary for learning as identified by Moran and Ghoshal (1996) is motivation. It is not enough that the parties involved anticipate that value will be created as a result of the learning process, it is also important that they feel their own involvement will be worth their while. Participants need to feel that the outcome will be of value but also that the value will be appropriable to them even if they are not certain of what that newly created value will be.

A fourth condition necessary for learning added by Nahapiet and Ghoshal (1998) is combination capability. Even when all three conditions discussed above exist, the combination and exchange of knowledge cannot take place unless parties are capable of doing so. Cohen and Levinthal (1990) refer to this as "absorptive capacity" where the creation of knowledge depends not only on the capacity to recognise the value of new knowledge but also the ability to assimilate and use this knowledge. In addition, they maintain that this "absorptive capacity" does not reside in any one individual but depends on the links that exist between different individual's capabilities. Tsai (2001) also identifies capability as an integral factor in the learning process, recognising that even though the knowledge may be available, parties may not have the capacity to absorb and apply it for their own use.

The identification of learning conditions is useful as a meaningful theoretical construct to measure the often difficult-to-measure knowledge creation and dissemination. This study measures organisational learning using items based on the four learning conditions discussed above (Nahapiet and Ghoshal, 1998). The development of these learning items is discussed in chapter 5.

While the literature might differ on the precise nature of organisational learning and in which discipline it is situated, there is little critical debate within this area. Coopey (1995) is one exception and is critical of much of the writing on organisational learning on the grounds that it is politically naïve. He maintains that more attention needs to be given to power dynamics and political activity that takes place within organisations as this can determine access to knowledge. Huysman (1999) echoes this criticism and suggests that due to a preoccupation with the individual learner the role played by institutional forces and the power structures can be overlooked. Much of the organisational learning literature takes an optimistic and humane stance and assumes a mutuality of goals and shared participation. This assumption, Huysman argues, can overlook aspects of organisational life where individuals are striving for personal and sometimes conflicting goals.

However, while the majority of the learning literature conceives of learning as a beneficial process for both individual and organisation, there is recognition that learning can at times be dysfunctional (March & Olsen, 1976; March, 1991). Learning that is based on misunderstanding and defensive routines can lead to a distorted type of learning (Argyris, 1990; 1992). The reasons for this are many including scape-goating, inadequate regulation and enforcement, poor problem definition and complacency (Smith, 1999). According to Argyris and Schon (1978) many organisations fail to balance the preservation of existing knowledge and the creation of new knowledge because of 'limited learning systems' that conceal errors and encourage organisational defensive patterns. Organisational defensive patterns are mechanisms adopted automatically to protect individuals and groups from painful and threatening information (Argyris, 1990; Probst & Buchel, 1997). Storey and Quintas (2001) argue that failure to consider the human dimension of knowledge sharing can deter learning within organisations. They argue that organisational climate and culture play a key role in the transformation of individual learning into organisational learning and this area is addressed later (see section 4.7.2).

Coopey (1998) has taken a more critical stance, suggesting that organisational learning can have very negative repercussions for the employee. He and other critics suggest that the learning organisation and its rhetoric of empowerment masks control mechanisms that serve the interests of the powerful elite. Another criticism levelled

against the learning organisation is that the language may serve to blind employees to visions and goals that may conflict with their own (Driver, 2002). Furthermore, it has been argued that the learning environment may be painful for employees and open them up to psychologically threatening experiences (Tran, 1998). However, Driver (2002) in an attempt at reconciliation between the positive and more critical perspectives of organisational learning, asks whether an organisation (learning or otherwise) can ever be free of control mechanisms and painful experiences for some of its members. Learning organisations are trying to balance the qualities of traditional organisations with those that enable learning and therefore Coopey (1998) suggests that the learning organisation has, like any organisation, strengths and weaknesses – but, at its best, the learning organisation may grow to be a part of a larger societal change or social movement towards more empowering and participatory organisational structures.

4.7 Organisational Learning, Innovation and Organisational Climate

4.7.1. Organisational Learning and Innovation

Many researchers believe organisational learning to be the principle process by which organisational innovation occurs. Stata (2004) argues that the rate at which individuals and organisations learn may become the only sustainable competitive advantage, especially in knowledge intensive industries. Nonaka (1994) further extends this argument by suggesting that the ability of organisations to act innovatively is critically dependent on how the organisation obtains and exploits new sources of information (higher learning or double loop learning). The definition for organisational learning adopted in this study is the organisation's *ability* and *motivation* to combine and exchange information and knowledge and this knowledge sharing is crucial to the innovation process.

West and Anderson (1996) have identified the cross fertilisation of information as integral to the creative and innovative process. Findings from their longitudinal study of 27 top management health teams indicate that participation within top teams predicts the number of innovations introduced by the team. Their measure of participation is conceptually similar to the measure of learning utilised in this study (participation items included "We share information generally in the team rather than

keeping it to ourselves") and this result suggests that high levels of interaction and information sharing are important determinants of innovation.

Cohen and Levinthal (1990) argue that the ability to recognise and use the value of new information is vital to organisational learning and innovation. They argue that a firm's 'absorptive capacity' (the ability to recognise the value of new, external information, assimilate it and apply it to commercial ends) is critical to a firm's innovative capabilities. There is empirical support of this relationship. Stock, Greis and Fischer (2001) hypothesised that the capability to acquire and exploit external information (absorptive capacity) would lead to more effective product development. They tested this hypothesis using data from the computer modem industry over a 24 year period. Their results indicate that there is a significant relationship between absorptive capacity and new product development performance but that the relationship is nonlinear. An inverted U shape suggests that absorptive capacity has diminishing returns, which suggest there may be diminishing returns to investments in learning.

Caloghirou, Kastelli and Tsakanikas (2004) argue that the firm's internal capabilities and openness towards knowledge sharing are critical to a firm's innovative performance. Their study, carried out in seven European countries, provides empirical support for their argument. They surveyed 558 firms in seven European countries, and and found interfirm linkages and knowledge sharing encouraged innovativeness (innovation was measured as the percentage of firms' sales that can be attributed to products or services that were significantly improved or new to the firm in the last three years). Similarly, Tsai (2001) in his research on business unit innovation found knowledge access and learning capacity were critical to innovation. He gathered data from 24 business units in a petrochemical company and 36 business units in a food manufacturing company and his findings suggest that units high in absorptive capacity (ability to successfully absorb and replicate new knowledge) have a better chance to successfully apply new knowledge towards generating innovation.

Chaston, Badger, Mangles and Sadler Smith's (2001) study on small UK manufacturing firms also suggests that firms that adopt higher learning will more likely be more innovative. They surveyed 168 small UK manufacturing firms to

determine the learning systems used by small manufacturing firms. They also sought to determine whether a relationship exists between learning style and the competences dispayed by the organisations. Their findings suggest that semi-higher and higher level learners report statistically significant higher competences in the areas of developing new products, increasing the number of launches, reducing time to market and developing products to enter new markets. These findings suggest that adopting higher level learning enhances innovative competencies, thus increasing competitive advantage. From both a theoretical and an empirical standpoint, it is reasonable to suggest that:

Hypothesis 5: Organisational learning will be positively associated with market innovation.

4.7.2. Organisational Learning and Organisational Climate

There is a growing tendency to describe organisational learning as embedded in routines, policies, climates and cultures (Cook & Yanow, 1993, Huber, 1991). However, there has been little empirical research conducted that seeks to identify what constitutes a knowledge/learning centred climate (Janz & Prasarnphanich, 2003). What are the key organisational characteristics that facilitate both the sharing of knowledge and the creation of knowledge? Do different organisational characteristics affect certain dimensions of learning in different ways and if so, how? In attempting to answer these questions, the potential effects of the organisational culture and climate on individual and collective learning need to be explored. As mentioned in the section on organisational climate, organisational culture and climate are closely related and in general, an organisation's climate is thought to be a behavioural manifestation of the organisational culture (see section on organisational climate for a more in-depth discussion).

The link between organisational climate, culture and learning is nothing new. How employees perceive their work environment is often associated with employees' approaches to learning (Kirby et al., 2003) and individual and team learning (Alavi & Leidner, 2001, Janz & Prasarnphanich, 2003). A climate conducive to learning is likely to enhance learning processes, knowledge generation and sharing (Litwin & Stringer, 1968; Janz & Prasarnphanich, 2003) organisational performance (Moss-

Kanter, 1983) and the development of interfirm partnering competence (Johnson & Sohi, 2003).

The literature suggests that if risk taking is rewarded and there is an acceptance that mistakes and failure can represent learning, both individual and collective learning are more likely to take place. However, if there is a culture of fear and recrimination learning is hindered as individuals become reluctant to voice worries about problems and cover up mistakes (Elliott et al., 2000). This can to lead to what Argyris defined as 'skilled incompetence', the use of "strategies based on theories of action, aimed at loss of face. Explanations, distortions, inexactitudes, omissions, excuses and so on are skilfully deployed in the interests of keeping what one has" (Probst & Buchel, 1997,p. 68). Findings from Hodgkinson and Wright's (2002) qualitative study on strategic inertia in a top management team suggest that defensive routines within the top team can jeopardise organisational learning.

Organisational climate is often operationalised as a set of organisational characteristics perceived by the individual to be in place that represent the organisation's value system in terms of risk, experimentation, innovation etc. In the present study, risk, experimentation and support for innovation are the dimensions representing organisational climate (referred to in this study as climate for innovation) and from an organisational learning perspective, an organisation that encourages risk taking and experimentation would be required to support learning and knowledge creation/sharing (Garvin, 1993).

The empirical evidence is supportive of the theoretical arguments. Latting et al.'s (2004) study set in the service sector explored relationships between support for innovation and learning. Results from an employee sample within six non-profit organisations indicated that top management support for innovation was associated with supervisor support for staff empowerment and learning. Gold, Malhotra and Segars's (2001) study of 323 senior executives provides further support. They found a positive association between culture/climate (items include "Employees are encouraged to explore and experiment" and "Senior management clearly supports the role of knowledge in our firm's success") and effective knowledge management (items include " Over the past two years, my organisation has improved its ability to

reduce redundancy of information and knowledge" and "React to new information about the industry or market"). While this study suffers from potential response bias associated with the single informant (a problem typical of survey research), the research is strongly supportive of the climate – learning association.

In a similar vein, Janz and Prasarnphanich empirically investigated the attributes of organisations' climate that may be associated with knowledge creation. Climate was measured with 21 items adapted from Litwin and Stringer's (1968) instrument and the climate attributes included risk, support and experimentation (these are the climate attributes adopted in this study also). They surveyed 28 teams belonging to 13 organisations across the United States and Canada and their findings suggest that there is a positive association between organisational climate and knowledge related activities like knowledge sharing and cooperation. Therefore, it is posited that

Hyothesis 5a There will be a positive association between innovative climate and organisational learning.

To summarise, certain determinants of organisational innovation have been reviewed. A number of variables at top team level and organisational level have been derived from the literature, which have not been integrally tested as determinants of organisational innovation. Chapters 2 and 3 explore the role of the top team (composition and processes) in fostering innovation. Chapter 4 reviews the organisational context literature. The inclusion of the organisational context broadens our understanding of innovation and combining the team variables and the organisational variables enables both a micro and macro approach to understanding what makes an organisation innovative. The following section will review the literature on innovation, and will address such issues as the definition of innovation adopted in this research, measurement issues and an exploration of the determinants of innovation.

4.8 Organisational Innovation

The outcome measure in this study is organisational innovation. The ability of an organisation to innovate is a critical factor in today's ever-changing business environment and should be considered as an important performance measure.

Technological change, globalisation, and what D'Aveni (1994) terms hypercompetition[1] are good reasons to believe that an organisation's ability to innovate is a critical factor in the long term survival of the firm and should be considered as an important performance metric (D'Aveni, 1994). Research on small and medium sized enterprises (SMEs) has shown that measures of success based on profitability and productivity are highly correlated to the emphasis a company places on innovation (Baldwin, 1995). Tidd et al. (2001) found the literature on innovation to be highly fragmented with much of the research conducted within different disciplines and with relatively little interaction. Certain researchers suggest that this lack of consensus in the innovation literature is in part due to the different measures for innovation. For example, West and Anderson (1996) have identified problems in conceptualising and operationalising innovation. Wolfe also identified these concerns in 1994 when he suggested that the problem stems from lack of researcher appreciation for the differences among innovation research streams, leading to confusion concerning the state of development in the area. He has also identified a failure to clearly specify the characteristics of the innovations studied, the stages of the innovative process considered and the types of organisations included in the study as hindering the research on innovation.

4.9 Defining Innovation

Despite the confusion surrounding innovation, the many definitions of innovation are similar in their approach. Kimberley and Evanisko (1981) describe innovation as occurring in three ways: as a process, as discrete items including products and services, as an attribute of the organisation (i.e. an innovative organisation). These three innovation types are not mutually exclusive, rather they are conceptually compatible and inextricably linked as "the innovation 'process' culminates with innovation 'items', and firms that cycle through the process relatively frequently are described as 'innovative'" (Bantel & Jackson, 1989, p. 108).

West and Anderson (1996) adopt West and Farr's (1990) inclusive definition of innovation as "the intentional introduction and application within a job, work team or organisation of ideas, processes, products or procedures which are new to that job, work team or organisation and which are designed to benefit the job, the work team or

[1] An environment characterised by intense and rapid competitive moves, in which competitors must move quickly to build advantage and to erode the advantages of their rivals (D'Aveni, R, 1996:218)

the organisation" (p. 681). This definition captures several important factors. It incorporates the notion of intent – innovation is restricted to intentional efforts to innovate. It does not restrict the benefits of innovation to economic profit only, therefore including social and administrative benefits. Also, the definition includes innovations in administration, human resource management, and market as well as technological innovations. This is an important inclusion – although new products are often viewed as the innovative output of the firm, innovation in processes is equally relevant as the ability to make something more effectively or more cheaply can also be a major source of competitive advantage (Bommer & Jalajas, 2002). It is also important to note that this definition does not require absolute novelty – it is sufficient that ideas are new to the unit of adoption (West & Anderson, 1996).

While it is clear that innovation plays a pivotal role in the success of today's organisation, it is worth noting that there may be such a thing as too much innovation. Innovation for innovation's sake can have negative repercussions for the organisation. Vizard (2002) argues that when it comes to innovation "the extreme swings of the pendulum can have equally bad results" (2002:61). Too much innovation can lead to a lack of focus and confusion. This can also apply to the customer and Vizard argues that with " too much innovation...customers cannot keep pace. It takes years for most companies to master a new set of technologies, so when the industry proceeds to leapfrog from one innovation to the next, customers get frustrated at a perception that companies are not maximising their investments" (2002: 61). However, there is a wealth of literature that suggests that focused, well managed innovation is a prerequisite for organisational success.

This study adopted several definitions of innovation. Innovation was treated as a discrete item, defined as the number of new products/services or the number of major adaptations produced by the company (Kimberly, 1981). Another definition of innovation adopted in this research incorporates both technical and market innovation and assesses the percentage of new products going to new markets. Bantel and Jackson (1989) utilized a similar measure of innovation in their study on innovation in the banking sector. This measure is based on the Boston Consulting Group share growth matrix, which differentiates successful products from non-successful products and is one of the de facto measures of product success in marketing. It is focused on

innovations that target growth areas (see also Varadarajan, 1983, for an extended classification of product/market growth matrix). Such new products are critical because of their ability to become a means of market share gain and revenue growth (Bergstein & Estelami, 2002). King and Tucci (2000) argue that organisations that target innovation towards new markets will increase in overall value. This measure of innovation is similar to Miles and Snow's prospector strategy where the emphasis is on meeting new product-market opportunities.

4.10 Different Research Approaches to Innovation

Wolfe (1994) has identified three main streams in the innovation literature. While each stream is concerned with innovation, each focuses on different characteristics of innovation. Wolfe maintains that recognition of these different streams will contribute to more appropriate comparisons of extant and future research, thus enhancing the understanding of innovation. The three streams are summarised in Table 4.1.

Table 4.1 Different Research Approaches to Innovation

Research Question	Research approach	Research focus
What is the pattern/rate of diffusion of an innovation	Diffusion of innovation	Focuses on diffusion of an innovation over time and space
Investigating organisational innovative determinants	Organisational innovativeness research	Focuses on the determinants of the innovativeness of organisations
What are the processes organisations go through in implementing innovations	Process theory research	Focuses on the process of innovation within organisations

The first stream in the innovation theory identified by Wolfe is the diffusion of innovation. The objective of this approach is to predict and explain rates of innovation over time. The second stream of research is organisational innovativeness, where the determinants of the organisation's propensity to innovate are investigated. As organisational innovativeness is the perspective adopted in this study, more attention will be focused on this stream of research. When adopting the organisational innovativeness approach to studying innovation the unit of analysis is the organisation. While researchers have focused on the influence of individual, organisational and environmental factors, the focus tends to be on organisational

factors. Wolfe suggests that this emphasis may be due to the view that organisational variables are the primary determinants of organisational innovation (Wolfe, 1994; Damanpour, 1991). This research focuses on the top team level (TMT composition and group processes) and organisational level (climate for innovation and organisational learning) determinants of innovation.

Wolfe does highlight a number of important criticisms of this stream of research mainly concerning the static orientation inherent in the research. Meyer and Goes (1988) note that while many determinants of organisational innovation have been investigated, there is little research conducted exploring how these determinants interact. This is somewhat addressed in this research as relationships between the different determinants of innovation are also investigated. Other criticisms include innovation attributes being perceptually based and therefore organisation specific (Downs & Mohr, 1976). Wolfe does provide several prescriptions to improve research conducted in this area including:

- Moving from the adoption decision being the dependent variable towards conceptualising it as extent of innovation implementation.
- Moving away from a static, over-determined perspective towards investigations of the nature of innovative processes.

(Wolfe, 1994)

The third stream within the innovation literature is process theory models where the nature of the innovation process is under investigation. Important questions include the reasons for the emergence and development of innovations. Process theory research focuses on the component phases and the sequential nature of the innovative process. The process approach does not aim to extend the list of determinants of innovation, but rather to describe the characteristics of the process itself.

The stream of innovation literature adopted is likely to affect the research methodology chosen by the researcher. Both the diffusion of innovation and the organisational innovativeness approaches favour quantitative approaches and tend to rely on the survey questionnaire to gather data. The process approach is more qualitative in approach and data collection methods "tend to be less removed and the

data more qualitative than in variance research" (Wolfe, 1994, p.411). This study adopts the organisational innovativeness approach which adopts a variance research model "whose orientation is towards explaining the variance in some dependent variable" (Mohr, 1982, p.9).

4.11 Determinants of innovation

Salaman and Storey (2002) draw attention to the contradictions inherent in innovation, stating that "paradox is at the heart of innovation. The pressing need for survival in the short term requires efficient exploration of current competencies and requires 'coherence, coordination and stability'; whereas exploration/innovation requires the discovery and development of new competencies and this requires the loosening and replacement of these erstwhile virtues" (p.160). Fiol (1995) agrees and warns against the reliance on linear frameworks of the innovative process, which she maintains "fail to capture the creative process" (p. 20). Further research is needed to explore these ambiguities, and in order to do so in a balanced manner both internal and external processes need to be investigated.

While there has been a tendency to focus on organisational structure within the organisational innovation literature, there has been some research investigating the effects of team composition and group processes within the top team on innovation. The firm's capacity to innovate has been linked to team diversity, constructive conflict, trust and reflexivity (McHenry 1989; Song & Dyer, 1998; Shih, 1993; West 2000). West and Anderson (1996) found support for innovation (the expectation, approval and practical support of attempts to introduce new ways of doing things in the workplace, West, 1990) to be the principal predictor of innovation in their study of UK hospitals. Their findings also revealed task orientation and participation to be important predictors. Interestingly, team objectives did not emerge as a determinant of group innovation in this study. Tidd et al. (2001) have identified a shared vision, leadership, effective communication, creative climate, knowledge creation and dissemination as important components of the innovative organisation. This study focuses on the top management team (composition, trust and reflexivity within the TMT) and the organisational context (innovative climate, organisational learning) as potential determinants of innovation.

4.12 Summary

This chapter reviews the literature on organisational climate, learning and innovation. Firstly, organisational climate and the different approaches adopted within the literature are discussed. This section highlights some of the problems inherent in the research, including lack of consensus regarding definition, uncertainty surrounding the level of analysis and a lack of theoretical studies on climate. This study focuses on a specific climate – climate for innovation – and hypotheses are generated from the literature.

Secondly, the area of organisational learning is reviewed. The debate on how organisations learn is fractured. Researchers who adopt an individualistic perspective to this topic tend to view organisational learning as individual learning within the organisational context. Others argue that this perspective fails to take into consideration the social context within which learning takes place. However, recent writers in this area manage to bridge the gap between individual and social perspectives by viewing learning as a process that is both individually and socially shaped. Models of organisational learning are presented, paying particular attention to Nahapiet and Ghoshal's (1998) model, which focuses on the information exchange/knowledge creation aspect of organisational learning. Using this model, several hypotheses are generated and it is suggested that there will be positive associations between organisational learning and innovation.

Lastly, the literature on the dependent variable, innovation, is reviewed. Several definitions of innovation are presented and the different streams in the innovation literature identified. This study adopts the organisational innovativeness research approach, which focuses on investigating organisational innovative determinants. This approach favours quantitative research methods, relying on the survey as a data-gathering tool.

CHAPTER 5
RESEARCH APPROACH

5.0 Introduction

This chapter outlines the overall research approach, the rationale for the study and the research objectives and questions. It also describes the research strategy adopted to address the research questions and related hypotheses. It will set out the research design of this particular study and the plan of investigation used to obtain the information. As can be seen, the various areas warranted the use of both quantitative and qualitative methods. It will also provide an exposition of the framework of analysis developed for the purpose of this research.

5.1 Overview

The research methodologies employed comprise a range of inter-related and sequential components, namely (i) semi-structured interviews with senior management team members in 35 Irish software companies (ii) statistical analysis of a questionnaire based survey completed by managerial respondents in each of these companies; statistical analysis of a questionnaire based survey completed by core workers within each of these companies (iii) in-depth interviews with top team members from five companies (iv) and the gathering of longitudinal innovation data from the CEOs of participating companies by telephone and email.

The research methodology involved three levels of analysis and two different time periods. Data were gathered from the CEO, senior team members and core employees. Data were gathered in two phases, time 1 (1998-2000) and time 2 (2003) and comprised of:

- Data gathered from CEOs who identified their top management teams and provide key insights on team process and effectiveness.
- Data gathered from members of the TMT and data gathered from core workers. CEOs were asked to endorse participation in the study before approaching other employees regarding their participation.

- Data were gathered during time 1 of the research (CEO interviews and survey) and time 2 of the research (follow up TMT interviews and collection of innovation data by phone and email 2-3 years after initial data collection).

5.2 Rationale

The rationale for this study was built on earlier investigations relating to top team structure and behaviour (Flood et al., 1997, Knight et al., 1999). This and other research evidence indicates the top team as a whole, rather than the CEO in isolation, is a better predictor of an organisation's fate (Finkelstein & Hambrick, 1996). However, there are those who argue that the importance of the top team composition literature is exaggerated (West & Schwenk, 1996) and much of the literature available yields contradictory results and ambiguities. This evidence has stimulated a need for research to further understand the nature and processes of top management teams (TMTs) and to explore the effects of TMT dynamics such as trust and reflexivity on team and organisational performance (in this study market innovation). This study aims to fulfil that need and explores the relationship between:

- TMT diversity and organisational innovation
- TMT diversity and the organisational context
- TMT diversity and affective and task group processes

While the importance of TMT is well documented in the innovation literature, the organisational environment also plays a key role in determining organisational outcomes. Organisational variables such as climate for innovation and organisational learning have been found to enhance individual, group and organisational innovation. Therefore, the inclusion of both TMT characteristics and organisational variables in this study provides a more holistic picture of organisational innovation and is done by exploring relationships between:

- Climate for innovation and market innovation
- Organisational learning and market innovation

In addition, much of the research on top management and group processes neglects the impact of top management on organizational dynamics such as organizational learning and climate (and vice versa). Such gaps and discrepancies suggest a need for

further research in this area. Therefore, there is a need to explore relationships between:

- TMT diversity and the organisational context
- TMT group processes and the organisational context

5.3 Literature Review

The objective of the literature review is to establish the (a) current state of knowledge on top management teams in general and more specifically the effects of team composition and team processes on innovation, (b) to gain an insight into the role of the organizational context in determining levels of innovation and (c) to identify from the literature key areas for further exploration.

The first step of the literature review was a library search using the main business and management abstracts. The next step involved a search of computerised data bases such as Searchbank, Business Source Premier, emerald and ABI inform. Manual searches of newspapers, and general business journals and magazines were also conducted.

5.4 Research Objectives and Research Questions

5.4.1 Conceptual Frameworks

Saunders, Lewis and Thornhill (1997) stress the importance of theory in generating research questions and objectives. Gill and Johnson (1997) define theory as 'a formulation regarding the cause and effect relationship between two or more variables' (p.178) and the theory underpinning the research questions formulated can be very useful when devising a framework to organise and guide data analysis (Yin, 1984). While Bryman (1988) warns that this might precipitate an untimely closure on the issues to be examined, Saunders et al. (1997) also advocate the use of such a framework with the researcher allowing for flexibility in terms of modification as new issues arise or emerge from the study. In order to devise such a framework Gill and Johnson (1997) suggest that the researcher identifies which concepts, themes and issues represent important aspects of the problem under investigation and the predicted or presumed relationships between them. In devising a conceptual model Miles and Huberman (1994) suggest that:

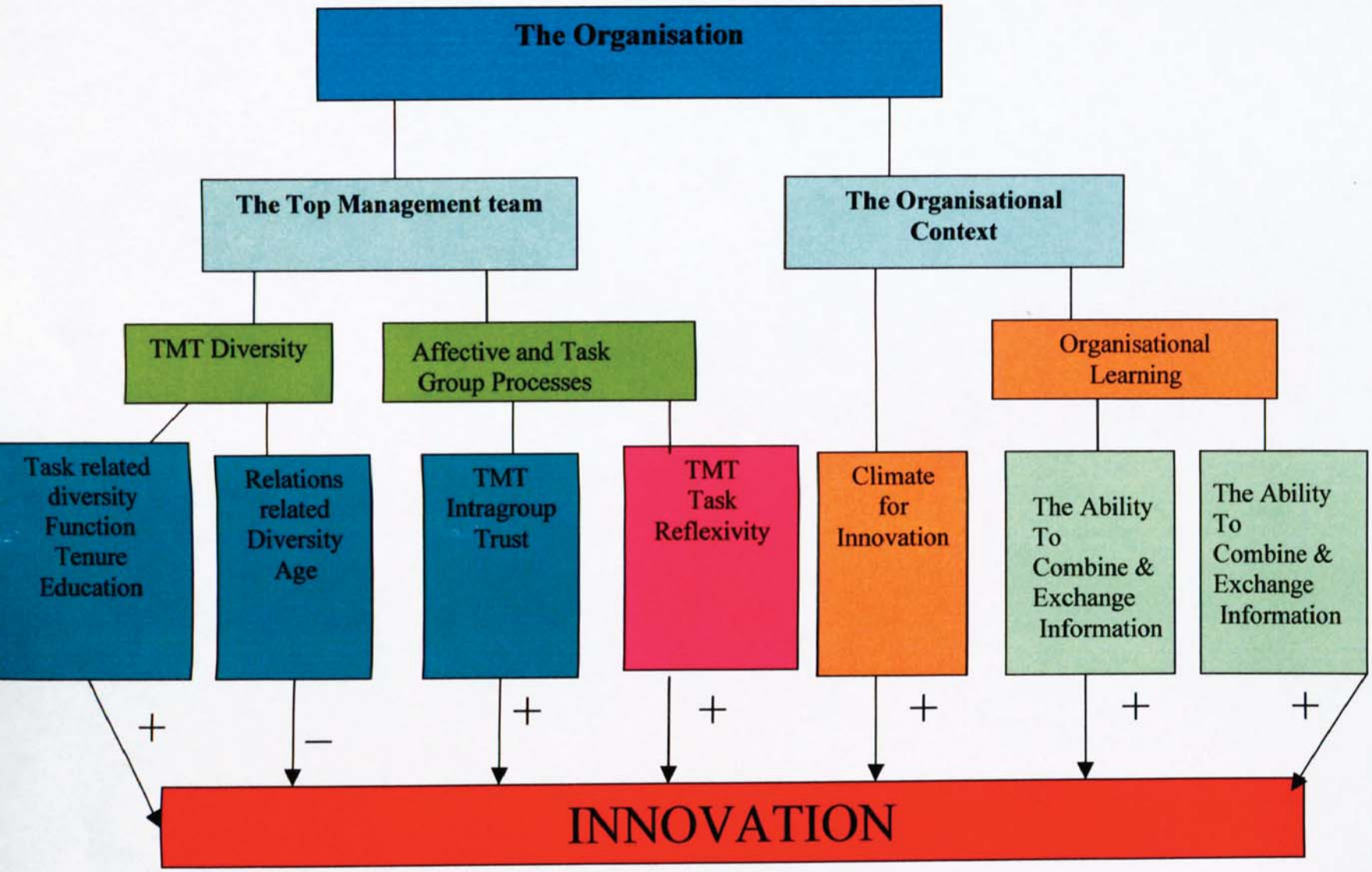
- Conceptual frameworks are best done graphically rather than in text.
- Rework the framework as you progress
- Prior theorising and empirical research are important inputs. It helps to lay out your own orienting frame and then map it onto the variables and relationships from the literature available to see where the overlaps, contradictions, refinements and qualifications are.

Following this advice the following were used in developing a conceptual framework for this study:

- The key issues as defined and highlighted by the literature
- Prior work and experience researching the area of top management teams.
- Previous results of work carried out by this and other researchers

From this a framework for analysis was developed (see Fig. 5.1). This provides an integrated graphical representation of the contexts, processes and theoretical constructs etc as derived from the three key input variables highlighted above.

Figure 5.1 Conceptual Framework



5.4.2. Formulating a Research Question

When engaging in a project the researcher can either formulate hypotheses and test them or develop theories. The former is usually more appropriate when there is a considerable body of research in the particular area. The latter when the area to be explored is relatively under-researched or there are contradictions and ambiguities in the research. In this case because there is a considerable body of literature in the areas of top management teams, group and organisational processes, and innovation, the author formulated key research questions, the subsequent answers being used to 'build' the theory. From these research questions, hypotheses were formulated in the literature review and tested in the findings chapter.

The conceptual framework provides a useful tool in formulating the key research questions. According to Miles and Huberman (1994) the researcher can utilise the 'bins' and their contents to develop the questions. Therefore, examining the conceptual framework developed here and the bins and directional arrows contained within the context of the top management team and the organizational context, two main themes emerge. The first broad theme is the exploration of the effects of top team composition and processes on innovation. The second theme is to explore the relationship between top management team composition, organizational context and innovation. According to Miles and Huberman (1994) it is better to have a small number of key research questions and to have sub-questions within these. This ensures clarity and helps prioritise the research work. The resultant research questions are as follows:

The first set of research questions concern the effect of the top management team on market innovation :

(a) What relationship exists between top team diversity and innovation in time one and time two?

(b) What relationship exists between the group dynamics of trust and reflexivity and market innovation in time one and time two?

(c) What relationship exists between top team diversity and the group dynamics of trust and reflexivity in time one and time two?

The second set of research questions concern the effect of the organizational context on market innovation:

(a) What relationship exists between organizational climate and market innovation in time one and time two?

(b) What relationship exists between organizational learning behaviour and market innovation in time one and time two?

The research questions were later used to guide the formulation of hypotheses in chapters 2, 3 and 4 (see Table 5.1 below for a summary) and the development of the instruments for the interviews and questionnaires and for ensuring field-notes during data collection remained relevant to the study.

Table 5.1: Outline of the Research Hypotheses

	Main Hypotheses	Sub hypotheses
H 1	**TMT task diversity will be positively associated with innovation & TMT relations diversity will be neg associated with innovation**	1a TMT intragroup trust will be negatively associated with TMT diversity 1b TMT task reflexivity will be positively related to TMT task related diversity and negatively related to TMT relations related diversity 1c Organisational learning will be positively associated with TMT task diversity and negatively associated with TMT relations diversity
H 2	**TMT intragroup trust will be positively associated with innovation**	2a TMT intragroup trust will be positively associated with TMT reflexivity 2b TMT intragroup trust will be positively associated with organisational learning 2c TMT intragroup trust will be positively associated with innovative climate
H 3	**TMT task reflexivity will be positively associated with innovation**	3a TMT task reflexivity will be positively associated with organisational learning
H 4	**Innovative climate will be positively associated with innovation**	
H5	**Organisational Learning will be positively associated with innovation**	5a Organisational learning will be positively associated with innovative climate

5.5 Choosing a Sample

The sample consists of 35 indigenous Irish software firms. Given the sample size, this permits in depth qualitative and quantitative analysis of the data gathered. An incentive for participation included an offer to provide a summary of the findings,

along with aggregated data from each firm that shows where it stands on key variables. As one of the main areas under investigation in this study is the top management team, it was necessary to ensure that an established management structure was in place. Therefore, only firms with 30 employees or more were considered.

5.5.1 Identifying the Target Population

The list of potential companies was developed using five different sources:

- The National Software Directorate (NSD), an electronic database of software companies based in Ireland.
- The Kompass directory. This directory was used as a search tool for locating high-technology firms.
- Information technology (IT) and Business publications. Scanning a number of IT publications, including The Sunday Business Post, Business & Finance, Business Plus and Computimes (IT Section in The Irish Times) provided valuable leads.
- Liaising with Shannon Development on the identification of candidates.
- News groups: The author subscribed to a newsgroup, TIU Infobrief, and was subject to daily e-mail targeting. This also provided a source of leads as much of the content focused on the major players in the IT sector in Ireland.

Over one thousand five hundred firms were identified through the sources listed above. These were then contacted by phone in order to assess their suitability based on the three criteria outlined – that the companies operated in the software industry, that they were indigenous Irish companies and that they employed over thirty employees. The majority of firms were discounted due to a low employee base. Many of the firms employed twenty or less. Others out of the one thousand five hundred identified did have more than thirty employees but they were not indigenous Irish firms, rather branches of multinational companies based in Ireland. As a result only one hundred and fifty indigenous software firms were identified as potential participants.

5.5.2 Negotiating Access

One of the biggest obstacles facing the researcher is often one of access to the research subject. Researchers often come up against resistance because of suspicion regarding the aims of the researcher. There is also the problem of time constraints. This is especially pertinent when dealing with top management teams where time is a very precious commodity. In order to achieve access many researchers use incentives such as a report that may be of use to the company (Brannick & Roche, 1997). For this research project, there were obvious concerns regarding the amount of time consumed by the investigation and also, there was a sense of survey-fatigue. In order to persuade top teams to participate, it was decided to make a report available to each company. The feedback reports provide both an overview of the findings and specific benchmarks of the company versus the composites of the other firms. Thus, participants will receive a report providing them with insights into their tangible assets as well as a comparison of how other similar high tech companies are developing and exploiting their intangible resources. Because the project is linked to the Irish Management Institute (IMI), the problem of access was lessened considerably as many of the participating companies are members of the IMI.

5.5.3 The Final Sample

Out of one hundred and fifty firms identified only forty-seven agreed to participate, resulting in an initial firm response rate of 31%. The remaining firms were either too busy or no longer in business. Out of the forty-seven that agreed to participate several failed to return a sufficient number of questionnaires and were thus excluded from analysis. The final number of cases was thirty-five resulting in a final response rate from participating firms of 23%. However this participation rate is good considering the demands placed on respondents, the senior level of respondents and the pace of change in the industry. The companies that agreed to participate did not differ significantly in terms of employee numbers from those not participating ($t140 = 1.585$, ns). It was not possible to obtain employee number information for ten of the non-respondents.

Longitudinal data were also gathered in time two of the research. Phone calls were made to CEOs of participating companies, requesting innovation data two to three years after initial data collection. Of the 35 companies who had participated in the

study, only 29 companies participated in time two of the research. (Two companies had gone out of business and four companies refused to participate in further research due to time constraints).

5.6 Research Tools

The main research tools utilized in this study were the top team survey, the CEO interview and the in-depth top team member (TMT) interviews. The CEO interview and the TMT survey were both quantitative in nature whereas the in-depth TMT interview was qualitative in nature. CEO phone calls were also carried in order to obtain additional innovation data. Data collection occurred over two time periods; the CEO interview and the TMT survey took place in time one (1998-2000) and the in-depth interviews and CEO phone calls took place in time two (2003).

5.6.1 The CEO Interview

The first step in the research process was the CEO interview. This interview (which was approx 50 minutes – one and a half hours) was conducted with the CEO of the company and was the first step in conducting the fieldwork. Involvement was solicited by sending letters to targeted software/high tech firms inviting their participation. This was followed by a face-to-face interview with the CEO of the company. The purpose of the CEO interview was fourfold:

- Because the CEO needed to identify the top team and core workers, and both groups needed to complete a detailed survey, it was vital to obtain CEO endorsement[2]
- CEOs issued a memo to each of the top team members and core workers, requesting participation in study, thus increasing likelihood of them returning

[2] Identification of top management team included anyone who makes or is involved with decisions affecting the company's strategy; identification of core workers included a set of five to ten (5 to 10) core employees who are fundamental to carrying out your company's strategy. These workers could be in each functional area or they could be a select group of people in specialised areas of the organisation, such as R&D. The key distinction is that they are responsible for developing, defending and maintaining your firm's key strategic resources, whether these are equipment, research and development, marketing, manufacturing or whatever. These employees need not be managers, but may be the line employees that drive innovation or are key to the performance of the firm.

questionnaires (see appendix B)

- To obtain information about firm size (number of full time employees)
- To obtain information about levels of market innovation (percentage of new products penetrating new markets)

This interview required compromise positions. A positivistic approach was retained where the interview followed a fairly standardised set of questions, whilst offering some flexibility in logic and allowing the views and insights of the participant to become known. This compromise was thought appropriate because, while many of the questions asked were fact based, some of the questions were opinion based, requiring a good deal of thought. Also, responses sometimes required further exploration and clarification. This was necessary to understand the constructs that the interviewee uses as a basis for his/her opinions and beliefs about a certain matter or situation (Easterby Smith et al., 1997). Therefore, a semi-structured interview was considered most appropriate where the type and sequence of questioning was consistent but there was flexibility regarding time and depth of answers (Appendix A contains a transcript of the CEO semi structured interview).

5.6.2 The Questionnaire

The second source of evidence is derived from the questionnaire. Again, before deciding on the questionnaire as a research tool, the research objectives need to be re-examined. What information is being sought after and what is the most effective method to obtaining that information?

In the context of this research, the questionnaire was considered suitable for the following reasons:

- It was considered the most effective and fastest method to elicit a range of factual information on team background and heterogeneity.
- By using validated measures of trust and reflexivity it is possible to compare findings with other studies.

This highly structured questionnaire consisted of a carefully prepared and piloted set of questions. Piloting was based on the initial study carried out by University of Limerick and University of Maryland. This was distributed, with a letter of

endorsement from the CEO, to the members of the top management team identified by the CEO in the interview, core employees also identified by the CEO and the HR manager. The survey was designed to obtain information about the make-up, functioning and social networks of the top team and core workers. Key themes covered in the survey concern participants' background and features of the top management team including:

- TMT diversity (items measured include age, function, tenure and education)
- TMT trust using Likert scale (items include "This TMG's members are known to be successful at the things they try to do", "Members of the TMG really look out for what is important to me" and "Sound principles seem to guide the behaviour of members of this TMG")
- TMT task reflexivity (items include "We regularly discuss whether the TMG is working effectively together", "In this TMG, we modify our objectives in light of changing circumstances")
- Organizational learning (items include "Employees believe that by combining and exchanging ideas, they can create value for the company", "Employees in this organisation are always available to discuss new ideas or developments")

(See appendix C for a complete version of the TMT survey. The following chapter discusses in detail how these measures were derived, reliability, validity etc.)

A questionnaire was also sent to each of the core employees identified by the CEO. Data were gathered from the core employees on two variables; organisational learning (the same measures were used as in the TMT survey thus reducing single source bias) and organisational climate (items included core workers perceptions of the organisation in terms of risk, experimentation and innovation).

Before deciding on the questionnaire, it was first necessary to take into consideration the design and layout of the questionnaire. In addition to the researchers own questions, it was thought necessary to adopt validated measures trust and reflexivity in order to compare findings with other studies.

The type of survey chosen was self-completion, using the Likert scale and was highly structured. This was considered the most appropriate option, primarily because of the length of the questionnaire. As this research project is part of a larger study, several different areas are under investigation. Thus, the questionnaire is quite time consuming. Also, because there are sensitive areas, a series of indirect questions was used where a direct question was thought unlikely to prompt an honest response.
The strengths of the methodology are:

- It is quick to complete and analyse.
- It also allows for generalisation -because the sample is representative of the population from which it is drawn (indigenous Irish high-tech firms) it should be possible to generalise from the results for the sample to the population at large.
- This method is also economical compared to other approaches.
- It can also help in highlighting broader and more general patterns and relations - this can provide a basis for the formulation of explanation and theories.

A worry was that the respondents might give extreme answers - either exaggerate or understate their responses in order to give the socially desirable answer. Bryman (1988) found that participants tended to err on the side of caution when completing questionnaires because they could never be sure what the data would be used for. The subject matter of this survey is sensitive in areas (how they deal with conflict, levels of openness within the team) - this may affect how they answer the questions. Another consideration is confidentiality. While there will be complete confidentiality regarding any information obtained about participating companies, participants may be concerned about results getting into the wrong hands. This can depend on the respondents' perception of the purpose of the study and the characteristics of the people carrying out the study.

Another problem with the survey method is there may be a significant difference between what people say they do or think and what they actually do. It is essential that the survey asks exactly what it sets out to ask. A common mistake in designing questionnaires is to ask about beliefs but not actions (what people actually do in certain situations). When there is an interplay between qualitative and quantitative methods, there needs to be flow back and forth between the two. Questions can be

built in to highlight discrepancies between belief and action. This was taken into consideration when designing the survey. However, this does not eradicate the self report bias that people often believe they act differently than they do. In order to capture the subtle differences in behaviours and views between different respondents, a prolonged qualitative approach was considered necessary.

One of the primary aims of this study was to explore the role of top management teams in determining innovation. This objective had positivist undertones and a quantitative survey method seemed the most obvious choice. However, the study also had a clear naturalist/phenomenological leaning and the use of qualitative methods appeared appropriate also. Qualitative methods can be used to obtain intricate details about phenomena such as feelings, thought processes and emotions that are difficult to extract through more quantitative methods (Strauss & Corbin, 1996). Therefore the researcher was faced with the prospect of approaching the research from a combination of stances. It was considered necessary to include an in depth, qualitative interview with top team members in order to elicit richer data in areas such as trust, reflexivity and organizational learning.

5.6.3 The TMT Interview – Time Two

The second interview was conducted during time two of the research. These interviews were conducted after the analysis of the quantitative data and were considered necessary in order to further explore some of the findings that emerged. The interview (which was approx 40 minutes to one and a half hours) was conducted with the CEO and top team members of five of the companies that participated. The companies chosen were those emerging as the high innovators from the quantitative study. Involvement was solicited by telephone. This was followed by face-to-face interviews with the CEO and top team members. No less than 50% of the complete top management team was interviewed. This interview was more qualitative in nature than the initial CEO interview in time one. Max Weber (1968) observed that the adequate exploration of any human or organizational action required 'adequacy on the level of meaning' (p.231) therefore in order to make sense of the objective factors Salaman and Storey (2002) argue that it is necessary to understand 'the sense that is attached to them by those involved' (p.148). The open and in-depth interview was considered appropriate in order to achieve this 'adequacy of meaning'. Burgess

(1982) argues that this type of interview provides the researcher with the opportunity to probe deeply, to uncover new clues and to gain valuable insights into the respondents' personal experiences. The in depth interview is appropriate when:

- It is necessary to understand the constructs that the interviewee uses as a basis of her/his beliefs, values and attitudes
- It is important to gain some insight into the interviewee's 'world'
- The subject matter is confidential or sensitive
- Trust needs to be established

In this study, it was important to understand the beliefs and attitudes of the managers involved and to gain an understanding of their 'world'. In order to understand the management of innovation, it was deemed necessary to approach the problem from an analysis of the accounts, interpretations and beliefs of the actors who are closely engaged in the process. In order to do this trust needs to be established between interviewer and interviewee. Hence the in depth interview was deemed the most suitable method in order to elicit a richer analysis of the interviewees' theories of innovation.

It is important in the analysis of this data to ensure that these additional factors are taken into account:

- the reflexivity of the researcher and the impact of their own feelings, emotions and reflections on the research process.
- the need to interpret actual and latent meanings from the data and in turn to reconstruct that reality which they have interpreted (Schofield, & Spooner, 1999).
- Interviewer's biases, where the researcher may attempt to impose their own beliefs or frame of reference through the way they ask the question (this can be done through non-verbal behaviour or tone of voice).
- Issues of trust and credibility are also important, especially if the information is sensitive. The credibility of the interviewer is important - age, gender, expertise, knowledge of subject, interviewing skills will all have influence the process.

The research interviews were structured around the following areas:

Firstly, top managers were asked how important they felt the role of innovation was within the organization. Secondly, they were asked how innovation was encouraged.

What did they feel encouraged innovation and what did they feel hindered innovation. Thirdly, they were asked about knowledge sharing within the organisation. Did people feel comfortable sharing information? Did people feel comfortable questioning and challenging? Did people feel comfortable taking calculated risks and admitting to mistakes? Were they reflexive as a team? In what ways? The top managers were asked about levels of trust within the top team both in terms of managers' competence and also their benevolence towards each other. Finally, the top managers were asked for innovation measures - estimates of the number of entirely new products developed in the last two years; estimates of the number of adaptations developed in the last two years; the percentage of new products going to new markets in order to get longitudinal data. (All participating companies were asked to provide the latter data of which 29 companies responded). (see appendix E for a list of the questions asked). Detailed notes were taken throughout all interviews and interviews were taped when possible and later transcribed. Central themes were then developed based on the interview findings.

5.6.4 CEO Telephone Interview

Short CEO telephone interviews were also conducted in time two of the research. The primary objective of these telephone calls was to elicit information on innovation two-three years after the first collection of innovation data. An additional innovation measure was added in time two and CEOs were asked to provide information on:

- The number of entirely new products developed in the last two years
- The number of major adaptations of existing products[3]
- The percentage of new products entering new markets

5.7 Analysis of the Data

The survey data were analysed using both descriptive and inferential descriptives. While the inputting of the data was carried out by an independent body funded by the research programme, it was felt that this did not hinder familiarity with the data. Initial analysis involved doing factor analysis on the items used in order to establish validity. Descriptive statistics were used to summarise the data and because the data

[3] The number of major adaptations was included in time two to broaden the classification of innovation. The inclusion of this measure reflects the opinion of many of the top team members who, when interviewed, considered the number of major adaptations to be an important indicator of innovation.

were interval the mean and the standard deviation were calculated. The next step in the analysis was to construct scales from the multiple items. Factor analysis was carried out on the variables that were conceptually similar and factors loading of greater than or equal to the absolute value of .50 were treated as meaningful for interpretation (see chapter 6 for a detailed discussion on this). I then examined the reliability of the scales by calculating the Cronbach's alpha. Relationships were then tested using crosstabulations. The hypotheses were tested using simple and hierarchical regression analysis. In order to ensure that the results were reliable, multicollinearity was tested for. In keeping with Pedzahur (1982) the control variable, firm size, was entered on the first step. The details and findings of the hierarchical regression analysis are discussed in detail in chapter seven.

The in-depth questionnaire was analysed in line with qualitative methods outlined by Strauss and Corbin (1998) – themes were developed based on the interview findings. From early on in the research certain central themes emerged as important, these central themes could be linked to other areas in order to elicit more information about these themes or phenomena. For example, from very early on, the exchange of information emerged as an important step in the innovation process, but in order to understand how and why this happens, this had to be examined in the light of other categories such as trust and openness.

5.8 Summary

The objective of this chapter was to outline the research strategy adopted and to critically assess the strengths and weaknesses of the chosen qualitative and quantitative approaches to research. Because of the nature of this study a multi method approach was adopted which involved both quantitative methods (the questionnaire) and qualitative methods (the in depth questionnaire). The next chapter will outline the development of the measurement scales used in this study.

CHAPTER SIX
RESEARCH MEASURES

6.0 Introduction

This chapter provides an overview of the measures used in the quantitative survey. Details of the scale development and the reliability of these scales are provided.

6.1Variable Measurement

6.1.1 The Dependent Variable

Innovation. Several measures of innovation were used in this study. A common definition of innovation adopted by researchers describes innovation as the development of products/services that are new to the firm (Arias Aranda & Molina-Fernandez, 2002; Kimberly, 1981; West & Anderson, 1996). This is one of the measures of innovation used in this study. The number of new major adaptations developed by the firm was added as a measure in time two in order to broaden this classification of innovation. Another measure of innovation used in this study was that of market innovation using a measure initially utilized in a study by Hage and Dewar (1973) and later used by Smith (1991). The innovation measures were collected using the CEO interview (see appendix A). The CEO was asked to calculate the percentage of new products introduced to new markets in the last year and in the last three years. Bantel and Jackson (1989) utilized a similar measure of innovation in their study on innovation in the banking sector (percentage of banks who had adopted the innovation). This measure is based on the Boston Consulting Group share growth matrix, which differentiates successful products from non-successful products and is one of the de facto measures of product success in marketing. It is focused on innovations that target growth areas. Such new products are critical because of their ability to become a means of market share gain and revenue growth (Bergstein & Estelami, 2002). King and Tucci (2002) argue that organisations that target innovation towards new markets will increase in overall value. Miller and Chen (1994) argue that inertia in the form of "market-oriented activity can have an important impact on performance" by "severely retard[ing] adaptation" (p. 2).

Longitudinal measures of innovation were also gathered two to three years after the initial data collection in an attempt to overcome the cross sectional nature of the data. The companies who took part in the research were approached and asked to provide the following information:

- Estimates of the number of entirely new products developed in the last two years
- Estimates of the number of adaptations developed in the last two years
- Percentage of new products going to new markets

Of the 35 companies who had originally participated in the research, two companies had gone out of business and four companies refused to participate in further research due to time constraints. Therefore, 29 companies participated in time 2 of the research.

6.2 The Independent Variables

6.2.1 Top Team Diversity Variables

Hypothesis 1 and its sub hypotheses posited certain relationships between the TMT diversity and variables including market innovation and TMT trust. How the measures for TMT diversity were derived is discussed below.

TMT diversity. The demographic measures used include age, function, education and tenure that were later transformed into measures of TMT diversity. To measure functional diversity, respondents were asked to indicate which category most represented their functional background. Functional diversity was calculated using Blau's (1977) heterogeneity index ($1-\Sigma\ pi2$) where p is the proportion of group members in a category and i is the number of different categories represented in the team squared. Blau's heterogeneity index is used extensively throughout the diversity literature (Bantel & Jackson, 1989; Knight et al., 1999; Simons, Pelled & Smith, 1999; Wiersema & Bantel, 1992). A high score on this indicates variability in the functional responsibilities among top team members or functional diversity; a low score represents greater functional similarity.

The questionnaire asked respondents to report how long they had been in their current position with the team. Tenure diversity was then computed as the coefficient of variation (the standard deviation divided by the mean) of team tenure among top team members. Age diversity was calculated as the coefficient of variation in age of team members. Education was computed as the coefficient of variation of the number of years of postsecondary education for each top management team. Allison (1978) views the coefficient of variation (the standard deviation divided by the mean) as providing a direct method for obtaining a scale invariant measure of dispersion. This measure has also been utilized in studies conducted by Bantel and Jackson (1989) and Knight et al. (1999). A score of zero indicates perfect homogeneity along the given dimension. The team diversity measures were gathered using the TMT survey (see appendix C).

6.2.2 Group Process Variables

Hypotheses 2 – 2c suggested that TMT trust would be positively associated with team and organisational outcomes. How trust was measured is now described.

Affective Group Process – TMT Trust: While there are different components of trust proposed by different theorists, Mayer et al. (1995) highlight three that appear consistently in the literature and encapsulate many of the different typologies: ability, benevolence and integrity. Hence this study utilizes Mayer et al.'s (1995) three components of trust. These three aspects of trust were conceptually developed by Mayer, Davis and Schoorman (1995) and were operationalised by Schoorman, Mayer and Davis the following year. They were then adapted by Mayer and Davis (1999). This measure was chosen because it was specifically designed to measure perceived trustworthiness (found to be the strongest component of trust, Costa, 2003) and has obtained "excellent psychometric properties...and this scale parsimoniously captures the key aspects of the expectations about others' intentions and behaviours." (Becerra & Gupta, 2003, p.37). The TMT questionnaire in Appendix C contains twelve five-point Likert type items which measure the level of trust within the top management team. Each scale ranges from '1 = strongly disagree' to '5 = strongly agree'. Three examples are "I feel very confident about the top management team's members' skills", "Managers in the TMT try hard to be fair in their dealings with others" and "Members of the TMT really look out for what is important to me".

Direct report subordinates of the CEO (i.e. members of the TMT as designated by the CEO) completed the trust measures. Responses to the trust items from the top team members were subjected to exploratory factor analysis to uncover the underlying factor structure. This method of factor analysis was considered the most appropriate given that one of the goals was to explore the number of latent factors underlying the trust construct (Game, 2003).

Conway and Huffcutt (2003), in a review of exploratory factor analysis methods, determined that "the purpose of common factor models is to understand the latent variables that account for relationships among measured variables" (p.150). They also conclude that ... "an oblique rotation (such as oblimin) is preferred. If factors really are correlated, then orthogonal rotation forces an unrealistic solution" (p.153). Therefore, EFA using principle axis factoring with oblimin rotation was applied. While Mayer et al. (1995) make a distinction between trust ability, benevolence, and integrity it may be that employees perceive trust as a unitary concept. The suitability of the trust data for factor analysis was investigated using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. This measure can vary from zero to one and values of 0.6 or above are required for good factor analysis solution (Rivera, & Ganaden, 2001). The KMO for the 12 trust items was .86. In addition, the Bartlett test of sphericity was significant ($p < .001$) indicating that the 12 item correlation matrix was significantly different from a matrix of essentially uncorrelated items (Game, 2003). Factor analysis using principle axis factoring with oblimin rotation was applied to the twelve items[4]. A scree test was the criteria for deciding on the number of factors to be used. Appendix F presents the results of the analysis. Factor loadings of greater than or equal to absolute value of .50 were treated as meaningful for interpretation.

The factor analysis supported trust ability. Three of the ability based trust items loaded onto factor two. Additionally, one of the items conceptually grouped with integrity loaded highly (.55) on the ability factor ("Sound principles seem to guide the behaviour of this TMT"). One explanation for this may lie in the semantics of the word principle. While the word principle is usually interpreted as a moral rule for

[4] This was applied to all other variables under investigation, reflexivity, organizational learning and climate

guiding behaviour, it is also described in the Collins English dictionary as a "scientific law as to the working of something". If the latter interpretation is taken into consideration, it becomes clearer how a measure of principles (e.g. business principles) could be conceptualised as a measure of ability in the sense that sound business principles underlie managerial competence (Farrell, 2002).

Six out of the remaining eight items loaded onto one single factor. This implies that the separate measurement of integrity and benevolence was not supported by factor analysis. Factor one was composed of four items from the measure of benevolence based trust and three items from integrity based trust. Each of these sets of items loaded heavily (above .50) onto factor one (see appendix F). Thus the results suggest a two-dimensional model of trust. Based on this analysis the second dimension of trust has been named benevolence-based trust (Farrell, 2002).

Having identified the two latent variables underpinning TMT trust in the data set the internal reliability of each of the scales was then tested. The Cronbach's alpha test of reliability indicated that both dimensions of trust fell well above the accepted norm (Factor 1: $\alpha = 0.82$; Factor 2: $\alpha.= 0.81$). In terms of intragroup agreement, the James, Demaree and Wolf (1984, 1993) within-group inter-rater agreement statistic, rwg(j) was used (rwg is a measure of agreement for single item scales, whereas the rwg(j) statistic is a measure for multiple item scales). They argued for a criterion value of .70 and above as being indicative of an acceptable agreement level within groups. The rwg(j) scores of the benevolence (rwg(j) = .89) and competence (rwg(j) = .90) based trust indices indicated that it was acceptable to aggregate them to team level. Table 6.1 presents the two factors used in this study.

Table 6.1 Factor Analysis of the 10 Trust Items used in this Study

Item	Factor 1	Factor 2
TMT know to be successful at the things they do	-0.10	**0.69**
Feel confident about TMT member skills	0.08	**0.76**
TMT members are capable of performing their jobs	-0.03	**0.69**
Sound principles seem to guide the behaviour of this TMT	0.32	**0.55**
Members of the TMT will go out of their way to help me	**0.66**	0.03
My needs/desires are important to other TMT members	**0.61**	0.01
Managers in TMT try hard to be fair in their dealings with others	**0.55**	0.31
Members of the TMT have a strong sense of justice	**0.61**	0.10
TMT members are very concerned about my welfare	**0.89**	-0.17
TMT members look out for what is important to me	**0.50**	-0.01
Factor eigenvalues	**5.13**	**1.41**
% of variance explained	**42.78**	**11.74**
Cronbach's alpha	**0.82**	**0.81**

Task Group Process - Reflexivity: Hypothesis 3 concerned the task process under investigation, TMT reflexivity. It was posited that TMT reflexivity would be positively associated with team and organisational outcomes. TMT reflexivity was measured using seventeen items from Part H in the TMT survey. The items in the questionnaire are representative of Carter and West's (1998) model of reflexivity and have demonstrated acceptable reliability in several studies (De Dreu, 2002; Hirst & Mann, 2004; Tjosvold, Hui and Yu, 2003; West, Patterson & Dawson, 1999). While the model incorporates task and social reflexivity and conflict, this study focuses on the former only. Task reflexivity refers to the extent the team reflects upon and questions how they carry out tasks. The data from TMT questionnaires was combined in order to derive an organisational level measure of reflexivity. Three examples of the reflexivity items are "We regularly discuss whether the TMT is working effectively together", "The TMG often reviews its objectives" and "When things at work are stressful, the TMG is not very supportive". A full list of the reflexivity items can be seen in appendix C.

Responses to the seventeen items from the top team members were subjected to exploratory factor analysis to uncover the underlying factor structure. This was adopted to explore the number of latent factors underlying this construct and investigate if the respondents make a distinction between task reflexivity and social reflexivity. The KMO measure was .84 and the Bartlett test for sphericity was

significant (p >.001). Principle axis factoring and oblimin rotation were applied. Items with an absolute value of greater than .50 were treated as meaningful. The seventeen items measuring reflexivity loaded onto four factors (labelled task reflexivity, social reflexivity, stress and skill reflexivity, see appendix F). The primary focus of this research was task reflexivity and four items measuring task reflexivity loaded onto factor two above the .50 level indicating that together they form a labelled factor task reflexivity. Tests on the scale reliability of these four items indicate a Cronbach's alpha score of 0.80. The rwg(j) value is .81 indicating that it is acceptable to aggregate to team level. Table 6.2 presents details of the factor used in this study and appendix F presents full details of the complete factor analysis.

Table 6.2 Factor Analysis of the Four Task Reflexivity Items used in this Study

Items	Factor 2
Employees regularly discuss if TMG is working effectively together	**0.65**
TMG often reviews its objectives	**0.85**
In TMG we modify objectives in light of changing circumstances	**0.64**
TMG often reviews its approach to getting the job done	**0.60**
Factor eigenvalues	**2.27**
% of variance explained	**13.36**
Cronbach's alpha	**0.80**

6.3 Organisational Context Variables

Hypotheses 4 and 5 posited certain positive relationships between the organisational context and market innovation. How these measures were derived is detailed below.

6.3.1 Climate for Innovation

Organisational climate was measured using 26 items in the core workers questionnaire. While the measure used is the employee's subjective perception of the type of organisational climate that exists, organisational climate has been defined by Schneider (1990) as 'the shared perception of organizational policies, practices and procedures or a shared perception of the way things are done around here", hence the self report method was considered suitable. The items used were adapted from O'Reilly, Chatman and Caldwell (1991) and because climate is concrete and facet specific (as opposed to culture) these measure were considered to be more a measure

of climate than culture. The specific climate under investigation is climate for innovation. A specific domain of climate was used because the multi-faceted nature of organizations and perceptions implies that perceptions of the organizational environment can be focused on a wide variety of more specific targets. Moran and Volkswein (1992) describe climate as embodying members' collective perceptions about their organisation with respect to different dimensions of climate including autonomy, trust, support, recognition, innovation and fairness. Schneider (1975) suggests that these dimensions of organizational climate will differ depending on the purpose of the investigation and the criterion of interest, and that general measures of organizational climate will contain dimensions that are not relevant for each specific study. This line of argument has encouraged the development of measures of several dimensions of climate such as service (Schneider, 1990) and innovation (West, 1990; Bunce & West, 1995).

The scales used to measure organisational climate were five-point Likert type items ranging from '1 = strongly disagree' to '5 = strongly agree'. These 26 items from the core worker level go some way to addressing single source bias within the research, given that much of the data comes from the top management team. By including information from the core workers, the problem of common source bias is reduced. Participants are asked to rate their organisation in terms of being innovative, risk taking and being willing to experiment (see appendix D).

While agreeing on a specific definition of climate has proven elusive, Anderson and West (1996) suggest that deconstructing the concept of climate into subdomains will help resolve this dilemma. Schneider and Reihers (1983) go so far as to argue that discussing climate in general terms is meaningless and that it is a far more useful concept when discussed in specific terms (e.g innovative climate, team based climate). With this in mind, responses to the 26 items from the core members were subjected to exploratory factor analysis as before to uncover the underlying factor structure. The KMO measure was .78 and the Bartlett test for sphericity was significant ($p > .001$). Items with an absolute value of greater than .50 were treated as meaningful. Subdomains of the concept of climate were then constructed. The twenty six items loaded on to seven factors (labels included climate for achievement, climate

for fairness, team oriented climate, climate for detail and climate for innovation[5]). The primary focus of this research was climate for innovation. The items for this subdomain were devised from the literature and consistently emerge as important in the innovation literature (e.g. risk, experimentation).

Three items measuring innovative climate loaded on to factor four (see table 6.3). Each of three items loaded on to factor one well above the .50 level and tests on the scale reliability of these three items indicate a Cronbach's alpha score of .70. The rwg(j) value was .71 indicating that it was acceptable to aggregate to team level.

Table 6.3 Factor Analysis of the 3 Organisational Climate Items used in this Study

Item	Factor 4
1. Being innovative	**.64**
2. Risk taking	**.76**
3. Willing to experiment	**.72**
Factor eigenvalues	1.69
% of variance explained	6.5
Cronbach's alpha	.70

6.3.2 Organisational learning

Hypothesis 5 posited that organizational learning would be positively associated with market innovation. While actual organizational learning is extremely difficult to measure, conditions of organisational learning were measured using Nahapiet and Ghoshal's (1998) conceptual model, which summarizes many of the conditions of learning occurring such as idea exchange and information sharing. In order to measure conditions of organizational learning, their model was operationalised and seventeen items were developed (see part C of the top team questionnaire and part seven of the core worker questionnaire). The items in these sections of the questionnaire are representative of Nahapiet and Ghoshal's (1998) model of how intellectual capital or organisational learning occurs. According to Nahapiet and Ghoshal (1998) the combination and exchange of information are the underlying tenets of organisational learning. They propose that four core processes facilitate the combination and exchange of information.

[5] The factor analysis for all five factors is in appendix F

They four core processes are:

- access
- motivation to combine and exchange
- anticipated value
- combination capability

Items were then derived from this conceptual framework with different items measuring each of the four core processes facilitating the sharing of information. For example the item "Employees of this organisation meet frequently to discuss work related ideas and new developments" is one of the items measuring access to knowledge. The item "Employees gain great personal satisfaction from working with others in this firm to find new innovations or ideas" is one of the measurements of motivation. The item "Employees in this firm are proficient at combining and exchanging ideas to solve problems or create opportunities" is one of the anticipated value items and finally the item "By combining our ideas, employees in this company find creative ways to develop new opportunities" measures combination capability[6]. See appendix C for full set of items.

As with the trust variables and reflexivity, the scales used to measure the exchange of information were five-point Likert type items ranging from '1 = strongly disagree' to '5 = strongly agree'. The exchange of information items are taken from part C of the top team questionnaire and part seven of the core worker questionnaire (appendices C and D respectively). These seventeen items from the top team level and core worker level were combined in order to create an information exchange index. The data from the core worker questionnaires and TMT questionnaires were combined in order to derive an organisational level measure of learning. The KMO was .88 and the Bartlett test of sphericity was significant ($p > .001$). Appendix F presents the results of the factor analysis.

The seventeen items measuring organisational learning loaded onto two factors. Four items measuring the motivation to share information and two items measuring anticipated value of sharing information loaded onto factor one. Although contrary to a priori expectations, the grouping of these six items is understandable. Both

[6] This dissertation is part of a larger project with the Irish Management and the University of Maryland – Nahapiet and Ghoshal's (1998) model was operationalised by the team and piloted.

motivation to share information and anticipated value of this activity relate to the driving force behind action and the desire to continue such activities. That is, they both focus on what motivates parties to engage in exchanging information and to continue to do so. Each of the six items loaded onto factor one well above the .50 level indicating that together they form a factor entitled motivation to share information. Tests on the scale reliability of these six items indicate a Cronbach's alpha score of 0.84.

Six items with factor values over .50 loaded onto factor two. Four of these items represent the extent to which employees access the information. Another two of the items measure the combination capability of the organisation's members. Together these six items represent the first underlying factor of organisational learning. This factor can be re-conceptualised as the basic abilities that are a precondition to the sharing of information. That is, in order to share information with others it is first necessary to get access to the requisite knowledge and skills. The Cronbach's alpha for this scale was well above the accepted norm at .81.

Contrary to a priori expectations this factor analysis suggests that only two factors underlie the sharing of information in this data set. These two factors are:

- Ability to share information (six items) – access and willingness to share information
- Motivation to share information (six items) – the desire to share information and the anticipation of value attached to this activity

Therefore, it can be argued that the organizational learning variable measures both the conditions necessary to learning (*ability* to share information) and also the conditions necessary to maintain the learning behaviour (*motivation* to share information). Together both factors provide a proxy for organisational learning. Each of the items was then computed into separate indices. The rwg(j) values for both ability and motivation to share information (rwg(j) = .92 and .91 respectively) allowed that these indices be aggregated to organisation level. The factor analysis for the two measures used in this study can be seen in Table 6.4.

Table 6.4 Factor analysis of the 13 Organisational Learning Variables used in this Study

Items	Factor 1	Factor 2
Employees meet frequently to discuss ideas and new developments	0.063	**0.546**
Employees are always available to discuss new ideas/ developments	-0.077	**0.712**
Employees have difficulty getting together to exchange new ideas	-0.109	**0.695**
Employees feel free to contact anyone inside the company to discuss new ideas or developments	-0.035	**0.540**
Employees learned to pool ideas and knowledge	0.142	**0.590**
Employees are proficient at combining and exchanging ideas to solve problems/create opportunities	0.189	**0.521**
Employees are capable of sharing expertise to bring new projects to fruition	0.180	**0.513**
Employees believe that by combining and exchanging information they create value for the organisation,	**0.558**	0.118
Employees believe that exch\combining ideas moves new projects faster	**0.602**	0.143
Employees find exch\combination of ideas with members of this firm one of the most motivating parts of their jobs	**0.880**	-0.201
Employees feel working with other employees to develop new ideas for the organisation is one of the most enjoyable aspects of their jobs.	**0.745**	-0.018
Employees find it exciting to work with others to develop new ideas	**0.527**	0.155
Employees gain personal satisfaction from working with others on new ideas	**0.620**	0.110
Factor eigenvalues	**5.78**	**1.76**
% of variance explained	**34.02**	**10.33**
Cronbach's alpha	**0.84**	**0.81**

6.4 The control variables

The aim of this research is not to explore a complete model of innovation, but rather to examine the role of top team composition, certain process variables and certain types of organizational climate (namely learning and innovative climate) in determining innovation. In testing these hypotheses it is important to keep in mind the potential influence of other variables on innovation that need to be controlled.

6.4.1 Firm size

I controlled for firm size as this variable has frequently been identified as influencing organisational outcomes and is used consistently in the top team/innovation literature as a control variable (Simons, Pelled and Smith, 1999; Smith et al., 1994). Firm size was the number of full time employees reported by the CEO in the CEO interview. Size has been found to affect levels of innovation in both positive and negative ways and has also been found to influence the innovation strategies adopted by industries (Tidd et al., 2001). There is a significant body of research that indicates that larger firms tend to innovate more because they have more resources to do so (Blundell, 1995). Large firms may have more access to a wider range of knowledge and intellectual capital than smalls firms, leading to higher rates of innovation (Rogers, 2004). This assumption was corroborated by a Canadian survey conducted by Baldwin et al. (1994) studying 1500 small industrial firms.

However, there is also evidence that suggests that smaller firms are more innovative. Van de Ven (1986) observes "the older larger and more successful organisations become, the more likely they are to have a large repertoire of structures and systems which discourage innovation while encouraging tinkering" (p.595). Wynarczyk (1995) has found that small flexible firms tend to innovate more in the private sector. Although organizational size was not a focus of this study, it was assessed and treated as a control variable.

6.4.2 Market Innovation

Previous innovation measures (market innovation measured in time one) were used as a control variable when studying innovation time two. As discussed previously, longitudinal innovation data were gathered in time two. As it is likely that previous innovation will influence current innovation, innovation time one was controlled for. Innovation time one was the percentage of new markets going to new products. Therefore, innovation time one was both a dependent variable and a control variable.

6.5 Summary

This chapter outlined the different measures used in this study. Results from factor analyses demonstrated that the measures used in this study work well in terms of internal reliability and conceptual coherence. The following chapter considers the findings.

CHAPTER SEVEN
RESEARCH FINDINGS

7.0 Introduction

This study seeks to evaluate what role the top management team (TMT), organisational learning and organisational climate play in determining innovation. The five key possible determinants examined, namely, TMT diversity, TMT intragroup trust, TMT task reflexivity, organisational learning and innovative climate, are the focus of the five central hypotheses outlined in chapters 2, 3 and 4. These hypotheses suggest that TMT task diversity will be positively associated with innovation time one (t1) and time two (t2)[7] and TMT relations oriented diversity will be negatively associated with innovation t1 and t2 (Hypothesis 1), that TMT trust and TMT task reflexivity will be positively associated with innovation t1 and t2 (Hypotheses 2 and 3), and that organisational learning and climate for innovation will be positively associated with innovation t1 and t2 (hypotheses 4 and 5). This chapter addresses these hypotheses, presenting the empirical data collected during the course of this thesis. It first describes the top management team profile and presents correlations across all the study variables. Predictive validity analyses (variance in innovation measures accounted for by inputs and group processes) are then described. Finally, the longitudinal data are presented.

7.1 Descriptive Statistics

7.1.1. Top Management Team Profile

The final sample size was 35 companies. The number of members in the top team ranged between two and eight and the average team size in the sample was five. The average number of top team members who responded to the survey was three. There are disadvantages and advantages associated with both small and large teams according to the literature. Smaller teams are faster at completing tasks but, when involved in problem solving, larger teams seem to consistently achieve better results

[7] Time 1 – data gathered 1998-2000
Time 2 – data gathered early 2003

(Robbins, 2000). The TMT response rate per company varied from 33% to 100%. So although the response rate for five companies was below 50% the larger margin of the teams had a response rate of over 50%. Thirteen TMTs had a response rate of 65% and over.

Data were also gathered from core workers in the 35 companies. CEOs in each firm identified core workers, who were key employees other than members of the TMT, responsible for developing, defending and maintaining the firm's key strategic resources. Core workers were included in the study to minimise the problem of single source bias to the results The number of core workers identified by the CEO ranged between one and seven and the mean was five. The final sample was 139 respondents and the average number of core workers who responded to the survey was four. The core worker response rate per company varied from 25% to 100% with only four of the companies having a core response rate of less than 50%. 31 companies had a response rate of 50% and over, of which 16 companies had a response rate of over 75%. Table 7.1 below provides core employee and TMT details.

Table 7.1 Core Worker and TMT details

	Core Workers		Top team members	
	Mean	**S.D**	**Mean**	**S.D.**
Team size per company	5.5	1.78	5.5	1.55
Response rate per company	4	1.9	3	1.12
Gender	1.3*	.48	1.2	1.06
Age	N/a	N/a	39	10.8
Tenure	3.16yrs	3.38	3yrs	3.98
education	4.2yrs	1.62	4yrs	2.04

* 1 = male, 2 = female

7.1.2 Composition of the Top Management Team (TMT) and TMT diversity

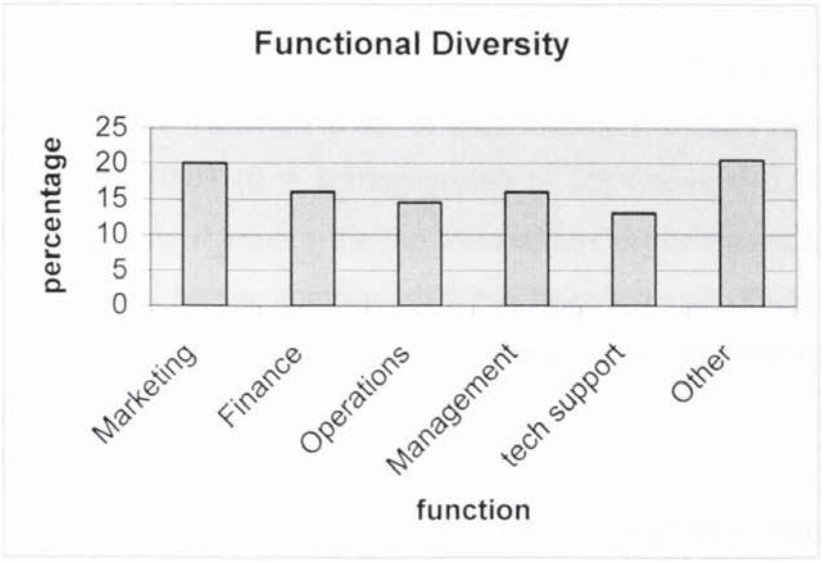
The following section presents a profile of the top teams surveyed, focusing on gender, education, functional area, and age. When investigating the effects of top management team diversity, four measures of diversity were used. Three task-oriented attributes; diversity in function, diversity in tenure, diversity in education and one relations-oriented measure; diversity in age were used in this study (Jackson, 1996).

Gender: The gender representation of the women within the top management teams investigated reflects much of the literature in this area (Davey, 2002; IRS Employment Review, 2001). From a total of 115 TMT members surveyed, 14% were female. Only one CEO of the 35 companies surveyed was female. The majority of the women surveyed were working in areas of marketing, finance and human resources.

Education: In terms of the educational level of the top team members, 85% pursued post second level qualifications. Of these 18% gained post-graduate qualifications. This is slightly lower than other findings, where an average 27.2% of top team members had postgraduate qualifications (West, Patterson & Dawson, 1999). Research on top management teams has found education to predict the quality and creativity of decisions made (Kimberly & Evanisko, 1981; Clark, 2000), where the higher the level of education attained by team members, the more superior the solutions reached within that team. Diversity in education was computed as the coefficient of variation of the number of years of postsecondary education for each top management team. A score of zero indicates perfect homogeneity along the given dimension. Scores on this dimension ranged between 0 and 1.79 (mean = 0.60, SD = 0.53).

Functional area: The majority of team member surveyed were from a Marketing and Sales background (20%), this was closely followed by Finance (16%) and Operations and Production (14.5%). Other functional areas represented within the top teams were Product Development (10%), Technical support (13%), HRM (3%) and General Management 16%, R&D (1%), Customer Services (2%), and Other (4%).

Table 7.2 Functional Areas of the TMTs



To measure functional diversity, respondents were asked to indicate which category most represented their functional background. Functional diversity was calculated using Blau's (1977) heterogeneity index (1-Σ *pi*2) where *p* is the proportion of group members in a category and *i* is the number of different categories represented in the team squared. A score of zero indicates perfect homogeneity along the given dimension. Functional diversity was measured using all teams members, not just those who had participated in the survey. This was considered a more representative measure of the top team functional diversity. Levels of diversity ranged between 0.00 (no diversity) to 0.82 (1 = complete diversity) (mean = .65 and SD = 0.20). Levels of diversity within the top team ranged from no diversity at all (5% of the top teams reported no functional diversity) to almost maximum functional diversity (0.82).

Tenure: Tenure within the top team varied between three months and 17 years (mean = 3, SD = 3.98). The average time the teams had been together was three years, this is slightly higher than other research findings in this area where the average TMT tenure was two years (West, Patterson & Dawson, 1999). Diversity in team tenure was computed as the coefficient of variation (the standard deviation divided by the mean) of team tenure among top team members. Groups ranged on this measure from a score of 0.05 (0 = homogeneous) to 1.95 (mean = .92, SD = .37).

Age: The average age of team members was 35 with ages varying between 27 and 64 (mean = 39, SD = 10.81). While the majority of respondents fell within the 30-40 age range, respondents reported a wide range of ages. Age diversity was calculated as the coefficient of variation in age of team members. Groups ranged on this measure from a score of 0.03 (0 = homogeneous) to 0.5 (mean = 0.16, SD = 0.10). Research indicates that the more the top team differs in their ages, the worse the subsequent profitability for the companies (West, Patterson and Dawson, 1999; Jackson, 1996). The team diversity measures were gathered using the TMT survey (see appendix C).

7.1.3 Group Process Variables

One of the criticisms levelled at the TMT demographic literature is its failure to take into consideration other important TMT factors such as the task and affective group processes engaged in by the team (Chatman & Flynn, 2001). It was therefore considered important to include measures of each of these factors in this study.

Top Management Team Trust: The affective group process of the team was calculated by measuring intragroup trust. A factor analysis (see chapter 6) on the items measuring team trust uncovered two sub dimensions; trust ability and trust[8] benevolence. Responses within the team for trust ability ranged from 2.5 to 4.25 (mean =3.71, SD = 0.46). Benevolence trust responses ranged between 2.42 and 3.83 (mean 3.2, SD = 0.33).

Top Team Task Reflexivity: A factor analysis on the reflexivity measures uncovered four sub dimensions – task and social reflexivity, conflict and stress. The task group process variable under investigation in this study was task reflexivity. Task reflexivity measures the degree of reflection that takes place within the team around task related areas. Responses ranged between 2.44 and 4.38 (mean 3.15, SD = 0.43).

7.1.4 Organisational Variables

The two organisational variables under investigation are conditions for organisational learning and climate for innovation.

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[8] A five point Likert scale was used to measure trust ability ranging from '1 = strongly disagree' to '5 = strongly agree'. The Likert scale was also used to measure task reflexivity, organisational learning and climate for innovation.

Conditions for Organisational Learning (Organisational learning)[9]*:* As discussed in the previous chapter, the factor analysis of organisational learning measures uncovered two distinct dimensions – *ability* to share information and *motivation* to share information[10]. Responses for the *ability* to share information ranged between 2.81 and 3.97 (mean 3.52, SD = 0.29). The findings on the *motivation* to share information ranged from 3.17 to 3.92 (mean 3.59, SD = 0.20).

Climate for innovation: A factor analysis on the items measuring climate uncovered seven sub dimensions; team based climate; security based climate; climate for innovation; achievement climate; cautious climate; detail oriented climate and fairness oriented climate. As this study focuses on innovation within organisations, the sub dimension of climate for innovation was the measure used for climate. Responses ranged from 2.33 to 4.5 (mean 3.60, SD = 0.54).

7.1.5 Dependent Variable

Innovation: The measures used for innovation in time one are the number of new products/services developed[11] and market innovation. This measure of innovation was derived from a growth share matrix that assesses the proportion of company sales to new customers attributable to new products introduced in the last 12 months (see Appendix A).

It is accepted in the economic literature on innovation (based on empirical work by the National Bureau of Economic Research and others in the US) that the new products generated by Research and Development are essential to the market valuation of a company. In fact, Tobin's Q (a measure of the premium assigned by the stock market to a company over and above the book value) is used by investors as a measure of the assumed growth potential of a company. Empirical research (Bergstein & Estelami, 2002; King & Tucci, 2000; Tidd, 2001) has found that this

[9] Organisational learning – what is being measured here are conditions for organisational learning rather than learning as an outcome – see measures in Appendix A and B.

[10] Ability to combine and exchange information refers to what Nahapiet and Ghoshal describe as combination capability. The combination and exchange of information cannot happen unless people feel capable of doing so. Motivation to combine and exchange information refers to the desire to *continue* with the activities of combining and exchanging information rather than the motivation to *start* this process.

[11] This measure was not significantly correlated with any of the variables under investigation. Therefore market innovation is the main innovation measure discussed.

growth potential is closely related to measures (albeit indirect) of innovation such as investment in R&D, market share gain and revenue growth.

Clearly then, the ability to penetrate new markets and acquire new customers is the desired outcome of investment in innovative activities. While the generation of additional business from existing customers may also be a desired outcome (new products for existing customers), if a Small/Medium Sized Enterprise - starting as it does from a small customer base - is to grow, new customer acquisition through innovation becomes an important objective. Therefore, a measure of the percentage of sales that comes from new products sold to new customers is an important indicator of current growth - and future growth potential.

This measure is based on the BCG share growth matrix, which differentiates successful products from non-successful products and is one of the de facto measures of product success in marketing. It is focused on innovations that target growth areas. Such new products are critical because of their ability to become a means of market share gain and revenue growth (Bergstein & Estelami, 2002). King and Tucci (2000) argue that organisations that target innovation towards new markets will increase in overall value. Miller and Chen (1994, p. 2) argue that inertia in the form of "market-oriented activity can have an important impact on performance" by "severely retard[ing] adaptation". The secret of Sony's success is linked to their ability to target innovations to new markets (Schlender, 1992). The majority of companies surveyed had less than 50% of their new products going to new markets. Responses ranged between 0 (0% of new products going to new markets) and one (100% of new products going to new markets) (mean. = .24, SD = .25).

7.2 Intercorrelations and Regression Analyses of Study Variables

Table 7.3 overleaf displays the relationships between each of the variables t1 (see page 152 for the correlation table including the longitudinal innovation variables) under investigation in this study. The mean and standard deviation for each variable is included. By examining the correlations between the different variables, the researcher can get a general overview of the nature of the relationships between the dependent and independent variables.

Table 7.3: Means, Standard Deviations and Correlations for Main Study Variables

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Diversity - Function	.65	.20	1.00											
2.Diversity – tenure	.92	.37	-.17	1.00										
3.Diversity – experience	.56	.34	-.18	.10	1.00									
4.Diversity – age	.16	.10	-.04	-.05	.32*	1.00								
5.Diversity education	.60	.54	.03	.16	-.004	.08	1.00							
6.Reflexivity	3.15	.43	.15	.20	-.13	-.07	.28	1.00						
7.Trust ability	3.72	.46	-.13	.34*	-.37*	-.48**	.22	.40**	1.00					
8.Trust benevolence	3.29	.33	-.07	.22	-.28	-.28	.24	.25	.76**	1.00				
9.Learning – ability to C&E info	3.52	.30	.21	.11	-.03	.01	.04	.23	.31*	.49**	1.00			
10.Learning– motivation to C&E info	3.60	.20	.25	.07	.02	-.03	.10	-.03	.04	.24	.33*	1.00		
11.Innovative climate	3.61	.54	-.07	.10	-.02	-.12	.32*	.21	.41**	.43**	.36*	.48**	1.00	
12.Market innovation	.24	.25	-.09	.03	.06	-.23	-.10	.42**	.29	.23	.10	.41*	.41**	1.00

Note** : Correlation is significant at the 0.01 level. ,*: Correlation is significant at the 0.05level

Regression analysis was then employed to test the hypotheses outlined in chapter 2, 3 and 4. Table 7.4 on page 148 portrays the significant relationships that emerged from the regression analysis.

7.2.1 The Top Management Team and Innovation

Hypotheses 1-3 predicted associations between the TMT composition, group processes and organisational outcomes. The following section will discuss the findings for each hypothesis.

7.2.1.1 Hypothesis 1 – There will be a positive association between task related diversity and market innovation, and a negative association between relations related diversity and market innovation[12].

The first hypothesis proposed a relationship between top team diversity and innovation. The diversity measures under investigation are function, tenure, education, (task related diversity) and diversity in age (relations related diversity). As can be seen in Table 7.1, no significant correlations were found between any of the diversity measures and innovation t1 and no significant correlation was found between level of education and innovation t1. The regression analyses also show no significant relationships between the diversity measures and market innovation. Tests were also carried out for curvilinear relationships between the diversity measures and market innovation and none were found. Therefore hypothesis 1 was not supported.

While top team diversity was not associated with market innovation t1 in this research, it was associated with other important variables, predominantly intragroup trust. Hypothesis 1a proposed a negative relationship between top team diversity and trust. Significant correlations were found between trust ability and diversity in tenure ($r = .34$, $p < .05$) and diversity in age ($r = -.48$, $p < .01$). As shown in Table 7.2, regression results also partially support this hypothesis. The regression coefficients estimated for hypothesis 1a show that only age diversity significantly affected TMT

[12] Jackson, S (1996) developed a simple two-dimensional taxonomy of diversity where diversity can be categorised as either task related or relations related (see pg 12)

intragroup trust[13] (β =-.42, $p < .01$). Thus Hypothesis 1a was partially supported. There was no longer a significant relationship between diversity of top team tenure and trust when trust was regressed on this diversity measure. These findings suggest that age diversity had a negative association with intragroup trust. This concurs with the literature on TMT diversity and trust.

There were no significant correlations between any of the dimensions of diversity measured and the other variables under investigation (namely, reflexivity, organisational learning and innovative climate). Hypotheses 1c to 1d were therefore not supported. There was however one exception: diversity in education correlated significantly with innovative climate ($r = .32$, $p < .01$). This significant relationship was no longer present when climate was regressed on this diversity measure.

7.2.1.2 Hypothesis 2 – TMT Intragroup Trust will be positively associated with market innovation

Hypothesis 2 predicted a positive relationship between the TMT intragroup trust and market innovation t1. As can be seen in Table 7.1, there was no significant correlation between trust and market innovation. Regression results also show a nonsignificant relationship between the trust and market innovation, therefore hypothesis 2 was not supported. However, a significant correlation was found between trust ability and task reflexivity ($r = .40$, $p < 0.01$) supporting hypothesis 2a. The regression analysis also supports this hypothesis, as the regression coefficient was significant when reflexivity was regressed on trust suggesting that trust was a predictor of reflexivity ($\beta = .35$, $p< .05$). Therefore, while it is difficult to establish causality, the findings suggest that there was a positive linear relationship between TMT trust and task reflexivity.

Trust (both ability and benevolence based trust) was also hypothesised to have a positive association with the two dimensions of organisational learning (*ability* and *motivation* to share information). The results show a correlation between both ability

[13]Collinearity can be problematic when doing multivariate analysis and when this is the case Morgan and Griego (1998) suggest that the researcher combine the variables if it makes sense conceptually. As this is the case with the two trust measures, trust competence and trust benevolence are combined due to the high correlation between the two (r = .76**) and an overall scale of trust is used in regression analysis. As the Cronbach's alpha test of reliability indicates, the summated scale of trust is reliable.

and benevolence based trust and the a*bility* to share information ($r = .31$, $p < .05$ and $r = .49$, $p < .01$ respectively). The results of regression analysis are consistent with these findings. As expected, intragroup trust showed a positive influence on the *ability* to share information after controlling for firm size ($\beta = .41$, $p < .01$) providing partial support for Hypothesis 2b. However, correlational and regression analysis show no significant relationship between either measure of trust and the *motivation* to share information. Thus hypothesis 2b was not supported for the *motivation* to share information.

Hypothesis 2c proposed that trust would be positively related to innovative climate. As can be seen in table 7.1, both ability based trust and benevolence based trust were significantly correlated with innovative climate ($r = .41$, $p < .01$ and $r = .43$, $p < .01$ respectively). Regression results also support this hypothesis. The regression coefficients estimated show that TMT trust affected climate for innovation ($\beta = .44$, $p = .01$) after controlling for firm size. Therefore, while no relationship emerged between trust and the dependent variable innovation, strong associations were found between trust and other important variables including reflexivity, organisational learning and innovative climate suggesting it is a variable worthy of investigation.

7.2.1.3 Hypothesis 3 – TMT task reflexivity will be positively associated with market innovation

Hypothesis 3 proposed that reflexivity would be positively related to market innovation. Correlational analysis shows that reflexivity was positively associated with innovation ($r = .42$, $p < 0.01$). The regression analysis shows similar findings, revealing a positive linear relationship between market innovation and task reflexivity after controlling for firm size ($\beta = .41$, $p < .05$) supporting Hypothesis 3. Hypothesis 3a was not supported as task reflexivity was nonsignificantly correlated with organisational learning. The regression results also reveal a nonsignificant relationship between these variables.

7.3 Summary

In general, TMT input and process variables revealed few significant relationships with the output innovation variable. Task reflexivity was the only TMT variable that predicted market innovation (t1) in this research. This suggests that reflecting upon, reviewing and questioning methods of carrying out tasks is an important part of the innovation process. TMT diversity and TMT intragroup trust were not found to be associated with market innovation (t1 of this research). Certain measures of TMT diversity did however predict levels of intragroup trust with the top team (age diversity was negatively associated with TMT trust, a finding that is consistent with the literature). TMT trust may not have predicted market innovation (t1) in this research but it was found to be significantly associated with task reflexivity, organisational learning and climate for innovation. This would suggest that TMT intragroup trust is associated with employees' perception of the organisation and is therefore worthy of further investigation. The TMT findings in time one suggest that it is *what* the top team does (in terms of reflection and adaptation) rather than *who* the top team is (composition) that is important when discussing market innovation. However, team diversity was found to be associated with affective group processes (TMT trust), which in turn was associated with the wider organisational context.

7.4 Organisational Variables and Innovation

The above findings suggest that the association between the TMT and market innovation was not as strong as predicted in hypotheses 1, 2 and 3. However, the findings suggest that there were some significant associations between organisational factors and innovation. It was predicted that organisational climate, namely climate for innovation and organisational learning[14] would be significantly and positively correlated with innovation. The findings suggest that hypotheses 4 and 5 have been partially supported.

7.4.1Hypothesis 4 – Organisational Learning will be positively associated with market innovation

[14] The dimensions of organisational learning under investigation focus on information and knowledge exchange. It measures aspects of learning such as ability and motivation to exchange information

Hypothesis 4 predicted a positive association between both dimensions of organisational learning and market innovation. This was partially supported with the *motivation* to share information being positively correlated with market innovation ($r = .41$, $p < .05$). Regression analysis shows that while the *motivation* to share was no longer significantly related to market innovation it did approach significance. The results of the regression analysis show that there was a change in R^2 when market innovation was regressed on the *motivation* to share information but only at a significant level of .06 ($ß = .40$, $p = .06$). Due to the small sample size, the statistical power of the analysis is compromised and a finding of $p = .06$ indicates good support for the hypothesis under the circumstances. A second regression was performed without the firm size control, and demonstrated strong support for Hypothesis 4 (the *motivation* to share information).

Both correlational analysis and regression analysis reveal a nonsignificant relationship between the *ability* to share information and market innovation. Therefore, hypothesis 4 was not supported for the *ability* to share information.
Hypothesis 4a predicted that the two organisational factors - organisational learning and innovative climate– would be associated in a positive way. This hypothesis was supported with innovative climate being positively correlated with both the *ability* and the *motivation* to share information innovative (*ability* to share information $r = .36$, $p < .05$; *motivation* to share information $r = .48$, $p < .01$). Regression results also support this hypothesis for both the *ability* and *motivation* to share information ($\beta = .33$, $p = .045$ and $\beta = .49$, $p = .003$ respectively). This suggests that innovative climate was a predictor of both dimensions of organisational learning.

7.4.2 Hypothesis 5: Climate for innovation will be positively associated with market innovation

Hypothesis 5 predicted that climate for innovation is positively and directly related to market innovation. Correlational analysis shows a positive association between climate and market innovation ($r = .41$, $p < .01$) supporting this hypothesis. The regression coefficients estimated for this hypothesis also show an association between climate and market innovation ($\beta = .41$, $p = .02$) after controlling for firm size.

Therefore, the results suggest that both organisational variables under investigation were important when predicting market innovation. These variables are explored in more detail later in the next chapter. Table 7.4 reports the regression equations on market innovation.

Table 7.4: Summary of Regression Analyses for Variables Predicting Market Innovation

		R^2	β	F	df	t	Sig. t
Regression 1	Step 1 Control Firm Size	.01	.09	.33	31	.51	.61
	Step 2 task reflexivity	.18	.41	3.22	31	2.46	.02
Regression 2	Step 1 Control Firm Size	.01	. 08	.33	31	.48	.63
	Stage 2 Motivation to C&E info	.17	.40	3.05	31	2.39	.02
Regression 3	Step 1 Control Firm Size	.01	.10	.33	31	.64	.53
	Step 2 Climate for innovation	.18	.41	3.22	31	2.5	.02

Note: Overall significance of Regressions – Regression 1, p =.05, Regression 2, p = .06, Regression 3, p = .05

The above findings indicate that reflexivity, innovative climate and motivation to exchange information all have autonomous potential to predict innovation. Multiple regression analysis was then carried in order to develop a model of innovation. Using hierarchical multiple regression, a significant model of innovation emerged (r^2 = .37, p = .01, see Table 7.5).

Table 7.5 Hierarchical Multiple Regression for Variables Predicting Market innovation

Predictor variable	R^2	Beta	F	df	t	Sig. t
Step 1						
Control						
Firm Size	.01	.07	4	31	.46	.6
Step 2						
Reflexivity	.18	.39	4	31	2.50	.01
Step 3						
Innovative climate	.30	.16	4	31	.88	.38
Step 4						
Motivation to exchange info	.37	.32	4	31	1.78	.08

Note: Innovative climate was no longer found to be a significant predictor of market innovation in this model

The results indicate that both reflexivity and the motivation to exchange information account for 37% of the variance in the market innovation measures[15]. Innovative climate was no longer a significant predictor of innovation. This may be because of the small sample. Another possible explanation is multicollinearlity. The input variables may be as correlated with each other as they are with the response. If this is the case, the presence of one input variable in the model may mask the effect of another input. Innovative climate and organisational learning (motivation to share information) are significantly correlated ($r = .48$, $p < .01$). While this is correlation is not excessively high and indicates that innovative climate and organisational learning are two distinct scales, a masking effect might be taking place. In other words, there may be a certain amount of shared variance between the variables, and the part of the variance explained by climate may be the same part explained by the motivation to share information, and since the effect of the motivation to share variable was stronger, there is nothing left for climate to explain on top of this.

To summarise, regression results indicate that the *motivation* to share information was a predictor of market innovation at a significance level of $p = .08$. However, the *ability* to share information was not related to market innovation in this study, suggesting that access and ability to share information is not related to innovation but

[15] Although the motivation to share information is not strictly significant, is achieves borderline significance and given the size of the sample .08 significance level warrants discussion

the *motivation* to share information is. Therefore, hypothesis 5 has only partially been supported. Climate for innovation was positively related to market innovation in this study, supporting hypothesis 4. However, climate for innovation was no longer a predictor of market innovation when reflexivity and the motivation to exchange information are entered into the analysis. A possible explanation for this is a certain amount of shared variance between the variables. These findings suggest that climate for innovation and the *motivation* to share information had separate and immediate associations with market innovation (t1). However, when developing a model of innovation, innovative climate was no longer a significant predictor. This will be discussed further in the next chapter.

7.5 Overall Summary

To summarise, five hypotheses were formulated predicting relationships between:

- The top management team diversity, intragroup trust and reflexivity and market innovation (t1)
- Organisational learning and innovative climate and market innovation (t1).

A significant linear positive relationship was found between TMT task reflexivity and market innovation. This concurs with the literature on reflexivity suggesting it is an important part of the innovative process. There was no significant relationship between TMT diversity and market innovation suggesting that TMT composition was not associated with organisational outcomes directly – at least in time one of the research. However, TMT diversity in age was found to be significantly and negatively associated with TMT intragroup trust. This corresponds with the literature on diversity and trust. While TMT intragroup trust was not associated with market innovation according to this research, it was found to have significant associations with other important variables, namely TMT task reflexivity, a dimension of organisational learning (the ability to share information) and innovative climate.

Several significant associations emerged between the organisational variables and innovation. While the ability to share information was not associated with market innovation, correlational and regression analysis reveals that the motivation to share information was significantly and positively associated with market innovation.

egression analysis shows a significant and positive relationship between innovative climate and market innovation in this study. However, this relationship no longer exists after multiple regression analysis. The relationship between organisational learning and innovative climate was explored in Hypothesis 4a and innovative climate predicted both the *ability* and the *motivation* to share information.

7.6 Longitudinal Data

Time two of the research involved gathering data on innovation approx. two to three years after the initial data collection. The purpose of this was to overcome the cross sectional nature of the data and to explore if any of the relationships found in time one remained two years on. The companies that took part in the research were approached and asked to provide the following information:

1. Estimates of the number of entirely new products developed in the last two years (product innovation)
2. Estimates of the number of major adaptations developed in the last two years (major adaptations)
3. The proportion of company sales to new customers attributable to new products introduced in the last two years (market innovation)

Of the 35 companies that had originally participated in the research, two companies had gone out of business and four companies refused to participate in further research due to time constraints. Therefore, 29 companies participated in phase two of the research.

7.7 The TMT and Innovation

Table 7.6 displays the correlations found between the independent variables gathered in time one (t1) and the dependent variables (innovation measures as outlined above) gathered in time two (t2). The mean and standard deviation for each of the variables are included. From this table we can get an idea of the different relationships that exist between the input and process variables (t1) and the dependent variables (t2). No significant relationships were found between any of the study variables (t1) and the number of new products (t2). However, there were some significant positive correlations between the two other measures of innovation (t2) and the study variables (t1).

Table 7.6: Means, Standard Deviations and Corelations for Main Study Variables – Longitudinal Data

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1. Diversity - Function	.64	.21	1.00															
2.Diversity – tenure	.92	.39	-.17	1.00														
3.Diversity experience	.58	.36	-.16	.17	1.00													
4.Diversity – age	.16	.10	-.04	-.01	.32*	1.00												
5.Diversity education	.63	.52	.08	.21	-.06	.13	1.00											
6.Reflexivity	3.2	.42	.25	.16	-.12	-.08	.26	1.00										
7.Trust competence	3.8	.42	-.05	.32*	-.37*	-.57**	.15	.35**	1.00									
8.Trust benevolence	3.3	..29	-.01	.26	-.28	-.37*	.18	.34*	.74**	1.00								
9.Learning – ability to C&E info	3.5	.29	.30	.10	-.03	.01	-.01	.25	.17	.33*	1.00							
10.Learning– motivation to C&E info	3.60	.21	.29	.16	.02	-.11	.10	.09	.10	.24	.37*	1.00						
11.Innovative climate	3.7	.50	.03	.15	-.02	-.15	.35*	.28	.44**	.36*	.32*	.47**	1.00					
12.Market inn. Time 1	.27	.26	.01	.01	.06	-.28	-.15	.42*	.24	.19	.05	..32	.41**	1.00				
13. product inn time 1	7.5	9.3	.26	-.25	-.13	-.07	-.08	.12	.19	.12	.08	.11	.04	.52**	1.00			
14. Market inn time 2	.42	.28	-.25	.43*	.20	-.15	..33	.06	.10	.04	-.14	.30	.42*	.40*	.12	1.00		
15. product inn time2	2.93	2.90	.13	.22	-.23	-.09	-.12	.07	-.03	.01	-.17	.27	.12	.28	.01	.09	1.0	
16. adaptations time 2	5.1	4.4	.35*	.20	-.11	-.23	-.06	.32*	.29	.17	.08	.02	.05	.25	.36*	.08	4.2*	1.0

Note: * correlation is significant at the 0.05 level

Time 1: data collected 2000/01

Time 2: data collected 2003

N29.

TMT diversity: The first hypothesis proposed a relationship between TMT diversity and innovation. No relationship was found between the innovation data (t1) and any measure of TMT diversity (t1). However, there was a positive correlation between diversity in tenure (t1) and market innovation (t2) suggesting that any association between diversity in tenure and organisational outcomes may vary with time ($r = .43$, $p < .05$). Simple regression results support this hypothesis also. The results of the regression analysis in which market innovation (t2) was regressed on TMT diversity in tenure (t1) show that diversity in tenure affected market innovation (t2) ($\beta = .43$, $p = .05$). This remained significant when entered into a model controlling for firm size, previous innovation and innovative climate, the only other variable that was significantly correlated with market innovation (t2) ($\beta = .39$, $p < .05$). Table 7.7 presents this model in detail. This finding provides support for the hypothesis.

Table 7.7 Hierarchical Multiple Regression for Variables Predicting Market innovation (T2)

Predictor variable	R^2	Beta	F	df	t	Sig t
Step 1 controls						
Firm size	.01	.16	3.15	22	.83	.42
Market innovation (t1)	.17	.30	3.15	22	1.57	.14
Step 2						
Tenure diversity	.34	.39	3.15	22	2.11	.05
Step 3						
Innovative climate	.41	.29	3.15	22	1.50	.15

A significant positive correlation was found between functional diversity (t1) and the number of major adaptations produced (t2) ($r = .35$, $p < .05$). However, this relationship was no longer significant after regression analysis. When the number of major adaptations produced (t2) was regressed on functional diversity there was a change in R^2 but at a significance level of 0.1 ($\beta = .35$, $p = .07$)[16], all of which suggests that functional diversity (t1) was not a significant predictor of the number of adaptations produced (t2)[17] but that there was a significant correlation between the two variables (see appendix G for a table displaying the results of this regression analysis). Therefore, the results from the longitudinal data partially support hypothesis

[16] after controlling for previous innovation and firm size, the significant level rose to .12 level
[17] Although given the sample size it does warrant discussion.

1 and suggest that the effects of top team composition may differ with time. Tests were also carried out for curvilinear relationships between the diversity measures (t1) and the innovation measures (t2) and none were found.

TMT trust: Hypothesis 2 proposed a positive relationship between TMT trust (t1) and innovation measures (t2). Such a relationship was not found in this research.

TMT reflexivity: Hypothesis 3 proposed a positive relationship between reflexivity and market innovation. This significant positive relationship was found between market innovation (t1) and task reflexivity (t1). While task reflexivity was no longer significantly correlated with market innovation (t2), it did have a significant and positive correlation with the number of new adaptations produced (t2) ($r = .32$, $p < .05$). However, regression analysis did not support this hypothesis. When the number of major adaptations produced (t2) was regressed on reflexivity there was a change in R^2 but only at a significance level $p< .1$. ($\beta = .32$, $p = .09$) although in such a small sample .09 significance level is worthy of comment.

7.8 The Organisational Context and Innovation

Climate for innovation: The only organisational measure that had a significant correlation with the longitudinal data was innovative climate. While organizational learning was associated with market innovation (t1) no significant correlations occurred between organizational learning and the innovation measures (t2). The regression analyses also show no significant relationships between organizational learning and the innovation measures (t2). However, innovative climate (t1) remained significantly and positively correlated with market innovation (t2) suggesting that it was an important part of the innovative process at both times, again supporting hypothesis 5 ($r = .42$, $p < .05$). Regression results provide some support for this hypothesis also. The regression coefficient of climate for innovation after performing simple regression analysis is statistically significant ($\beta = .42$, $p < .05$). However, when the control variables (firm size and previous innovation) and tenure diversity (the only other variable significant correlated with innovation) were entered into the equation, the significance level dropped to 0.15 ($\beta = .29$, $p = .15$) (see table 7.7).

7.9 Conclusion

While no relationships were found between market innovation (t1) and TMT diversity, TMT diversity in tenure and functional diversity were both found to be significantly positively correlated to innovation (t2) (diversity in tenure significantly predicted market innovation t2 and functional diversity significantly correlated with the number of major adaptations t2). This finding is consistent with the upper echelons theory and suggests that TMT diversity can affect market innovation in a positive way. Top team processes were associated with market innovation in this study. One of the criticisms levelled at the TMT literature is the failure to consider top team processes. The findings here suggest that task processes within the top team are directly associated with market innovation as a significant positive linear relationship was found between reflexivity and market innovation (t1). A significant relationship emerged between reflexivity and the number of major adaptations (t2) suggesting that reflexivity was an important part in the innovative process and affected innovation in different ways and at different times.

Changes also occurred in the relationships between organisational factors and innovation (t2). While there was a relationship between a dimension of organisational learning (*motivation* to share information) and market innovation (t1), no significant relationship emerged between the motivation to share information and market innovation (t2) suggesting that sharing information might have different associations with organisational outcomes at different times. While access to learning opportunities is an important first step in the innovative process, these findings suggest that it is not enough. It is the perception of the learning activity as valuable and the willingness to continue with the activity (*motivation* to share information) that is associated with market innovation in this study. Climate for innovation remained positively correlated with market innovation (t2). Regression results also reveal a positive linear relationship between climate for innovation and market innovation (t2) – however, when entered into a model of innovation, controlling for firm size and previous innovation, this is no longer significant.

Overall, the findings provide partial support for the model presented in chapter 5. A revised model reflecting the findings will be presented in the next chapter. The

findings suggest that the top team plays an important role in fostering innovation. However, it was a task process – task reflexivity – that was most strongly associated with innovation, supporting the group process literature. It is interesting that this group process is relatively new to organisational research and relatively rare in practice (West, 1998). The organisational context was also positively associated with market innovation. Climate for innovation and certain conditions (but not all) of organisational learning were associated with market innovation. If learning was not considered valuable, it was not related to innovation.

CHAPTER 8
DISCUSSION OF FINDINGS

"The need to be right all the time is the biggest bar to new ideas. It is better to have enough ideas for some of them to be wrong than to be always right by having no ideas at all." - **Edward De Bono**

8.0 Introduction

This chapter aims to subject the research findings to a detailed analysis and exploration. It engages in an in-depth discussion of the key findings as they relate to the research questions and the hypotheses formulated in chapters 2, 3 and 4. It also draws on the findings from in depth interviews carried out with the top managers from five of the companies surveyed. These interviews contribute to a more fine-grained understanding of the innovative process by analysing the accounts and interpretations of those who tend to be among the closest to the innovative process, namely top managers. The analysis of the managerial discourse with top managers from five of the companies surveyed may hold the key to further understanding the nature of innovation.

8.1 Summary of the Main Findings

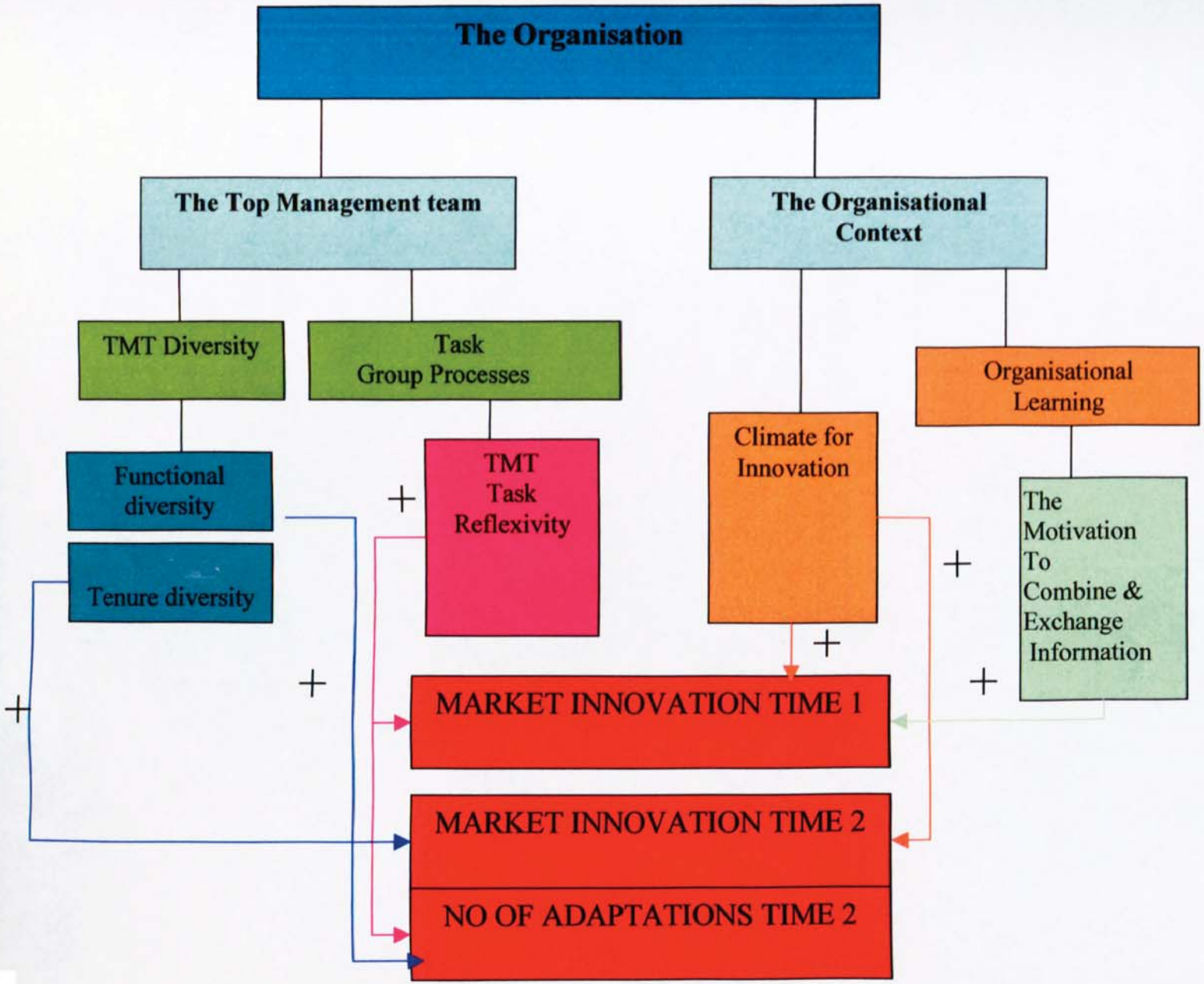
The core objective of this research is to investigate the determinants of innovation in indigenous Irish companies and from this, to build a more informed and evidence based picture of the innovative process. In doing this, the role of the top management team and the organisational environment in fostering innovation has been investigated. As shown in chapter 6 partial support has been found for the hypothesised relationships. In terms of the hypotheses formulated, the results of the survey indicate that:

- TMT tenure diversity and functional diversity are positively associated with market innovation in time two (H1)
- TMT diversity in age is negatively associated with TMT intragroup trust (H 1a)
- TMT intragroup trust is positively associated with TMT task reflexivity (H 2a)

- TMT intragroup trust is positively associated with the ability to exchange information (H 2b)
- TMT intragroup trust is positively associated with organisational climate for innovation (H 2c)
- TMT task reflexivity is positively associated with market innovation time one and number of major adaptations time two (H 3)
- The motivation to exchange information is positively associated with market innovation time one (H 4)
- The ability and the motivation to exchange information are positively associated with climate for innovation (H 4a)
- Climate for innovation is positively associated with market innovation time one and time two (H 5)

Certain hypothesised relationships are not supported in this study. While two dimensions of TMT diversity are associated with innovation time two, there is no significant relationship between TMT diversity and innovation time one in this study (H1). Nor is there a significant relationship between TMT intragroup trust and innovation time one and time two, therefore H2 is not supported. In the light of these findings, it is possible to revisit the conceptual model presented in chapter 5 and provide a revised model of the determinants of innovation. The revised model suggests that TMT reflexivity (H3), organisational learning (H4) and climate for innovation (H5) are particularly pertinent to organisational innovation.

Figure 8.1 Revised conceptual model demonstrating findings



8.2 Hypothesis 1: TMT demographic diversity will be associated with Organisational Innovation

This hypothesis is only partially supported. No significant relationship has been found between TMT diversity and innovation time one. However, there are significant correlations between functional and tenure diversity and innovation time two (tenure diversity predicts market innovation time two and functional diversity is significantly correlated with the number of major adaptations time two).

Top team tenure diversity has been associated with better performance among firms in the oil industry (Murray, 1989), revenue growth for semiconductor firms (Eisenhardt & Schoonhoven, 1990) and faster responses to environmental change in the cement industry (Tushman, 1997). While Lawrence (1997) and Edmondson (1996) have found that tenure diversity is associated with a decrease in team trust and safety levels, most of the literature suggests that tenure diversity reduces complacency and groupthink and enhances creativity and innovation (O'Reilly & Flatt, 1989; Bantel & Jackson, 1989; Katz, 1982). Tenure diversity can increase the motivation to challenge the status quo (Michel & Hambrick, 1992) and newcomers can create benefit for the team by adding fresh perspectives and objectivity. Such positive associations are partially borne out in this research but only in time two of the study where there is a positive association between TMT tenure diversity and innovation (t2) and the reasons for this are almost inevitably multidimensional and are discussed next.

Chatman and Flynn (2001) argue that diversity may at first have a negative effect on team functioning and outcomes but that this will change as team members interact with one another more frequently and establish cooperative group norms. They criticise much of the TMT literature because of its cross-sectional nature, which fails to take into account this dynamic effect. The benefits of tenure diversity may take time to materialise as newcomers will need a period of socialisation within the team and their contribution may not be evident upon immediate entry to the group. Chatman and Flynn (2001) refer to the principle of functional antagonism that describes an inverse relationship between the salience of different social categories and their underlying argument is as follows: that as one of the categories becomes

more salient, others become less salient. They argue that demographic difference in a team will be most salient during the formation stage but if members establish group norms and recategorise themselves as in-group members then the negative effects of team diversity will weaken over time. This would suggest that time plays an important role in examining the impact of team diversity on the functioning of the team. Tenure diversity and the impact it might have on the functioning of the team emerges in the TMT interviews. One TMT member stressed the need for tenure diversity but was concerned about the problem of insiders versus outsiders:

> I think it is difficult for newcomers to have voice here. There are people who have been here from the word go who are very familiar with each other, they remember the good ole days when John's kids would come into the office and play. Now newcomers sees John as mystical – a hero and this stops them from speaking out. There is a line drawn separating people at X (old venue) and those who weren't. There is an assumption that they are the people in the know – hard to break in. It was not a problem for me but in general, I think, new comers find it very difficult to break in. I think it was expected of me to voice my concerns and also John trusted me. But others find it hard. Especially when they see people as heroes
> TMT member, Company 080

This problem is echoed by another member of this top team, who commented:

> It is difficult for newcomers to get heard. The older employees tend to think that was the way we did things before, therefore that works. I think the newcomers lack the confidence to speak up. We have started mixing the tenures in that we are mixing the older employees into teams with the younger (in terms of length of time with company) employees. We need a variety of tenure. The people in teams with newer management are less confident that they will get heard.

These quotes demonstrate what Chatman and Flynn (2001) have asserted in the past, that the effects of tenure diversity may vary depending on just how 'new' the new comer is. It may take some time for new entrants to feel comfortable fully participating in the team and the benefits of tenure diversity may depend on the socialisation process and group norms within the team. Jackson, Stone and Alvarez (1992) argue that the team leader, the nature of the team's task and the team's socialisation tactics can moderate the

integration of newcomers to the team. Who the newcomer is may also be an important factor. The effects of tenure diversity may vary depending on how the newcomer is perceived. One interviewee stressed the importance of the credibility and ability of the newcomer when managing diversity tenure:

> When another director joined....my perception was, I felt it was going to ruffle things up – somebody would ask the four year questions...it didn't happen. The person was not perceived as credible and therefore they weren't as influential. The next (new member) was an international guy who has shaken things up. He had the credibility, the international status and the personality. The top team and the whole company responded very positively.....I think it is crucial if someone is entering the top team, if they are going to be effective, they need a proven track record and credibility.. also crucial that the top team have an awareness of the person coming in, need consensus from the team regarding the new member. TMT member, company 054

Hypothesis 1 also posits that functional diversity will be positively associated with innovation. While no relationship is found between functional diversity and innovation time one, a significant correlation emerges between functional diversity and the number of new adaptations produced in time two of the research. This relationship is no longer significant after regression analysis suggesting that functional diversity is not a significant predictor of innovation ($r^2 = .16$, $p = .14$). However, due to the small size of the sample, the statistical power of the analysis is compromised and a finding of $p = .14$ is deemed to be worthy of discussion in the context of this study.

Functional diversity has been found to enhance creativity and levels of innovation (Chaganti & Sambharya, 1987), clearer corporate strategies (Bantel, 1993) and market share and profit growth (Hambrick et al., 1996). West et al. (1998) suggest that functional diversity will lead to innovation the more complex the group's task and the more threatening the environment, but only when this diversity does not threaten the integration of the group. Therefore, there is evidence that the more diverse the team is in terms of function, the more ideas, knowledge, information and innovation there will be. The results of this research provide limited support to this assertion. Again, the association between functional diversity and innovation is weak and has only been

found to occur after a time lag of two - three years. It would appear then, that the benefits of functional diversity emerge in the longer term rather than the shorter term. As before, a possible explanation for this may lie in the dynamic nature of top team diversity. Chatman and Flynn (2001) maintain that the effects of diversity on certain outcomes differ with time and they argue that the potential of TMT diversity will not be reached unless cooperative norms are established within the team. These findings support Chatman and Flynn's argument that other factors (e.g. team norms) need to be included in TMT research. The argument that functional diversity can have positive implications for the team if managed was reiterated in some of the TMT interviews. As one TMT member commented:

> Our senior team has backgrounds that are very different, from technological background, engineering, HR. This is unusual for this industry as a lot of the time the senior team is made up of techies. Because of our different backgrounds, we come from different perspectives – found that people have strong personalities. It works because we can differ – there is no groupthink
> TMT member, Company 080.

However, she did point out that the advantages of diversity were dependent on the level of respect that team members had for one another and developing collaborative team norms and she expressed concern that such norms were difficult to establish for new comers.

> There is openness around conflict – there is a healthy debate.
> We manage it because of respect. If someone new comes into the group – we have respect for what is already achieved – it is difficult for them to break in.

Another interviewee felt that creativity in the company might have been hindered because the top team lacked functional diversity and was "so laden with engineers – very engineer focused". (TMT member, Company 054)

While two measures of TMT diversity are found to be associated with innovation, these associations are weak and only occur in time two of the research. No relationships are found between the other diversity measures (education or age) and innovation. Contradictory and inconclusive results are a hallmark of the field of innovation. For

several dimensions, such contradictions also prevail in the context of this research. If and how TMT diversity is associated with organisational outcomes may depend on the type of group processes and norms in place within those teams. Failing to take these processes into consideration limits much of the TMT demography research. The relationship between TMT diversity and organisational outcomes may be affected by the psychological mechanisms underlying the team (Lawrence, 1997), for example, levels of trust within the top team may mediate any relationship between TMT diversity and organisational innovation. Group processes such as conflict and reflexivity may help, hinder or prevent the team from operationalising the latent potential that team diversity contains. Exploring any relationship between TMT diversity and organisational outcomes in isolation will never yield a conclusive understanding of the role of diversity, let alone predict cause and effect relationships. However, studying TMT diversity in conjunction with other team and organisational variables can give rise to a more robust understanding of the TMT as a totality.

Linked to the debate surrounding the measurement of diversity is the possibility that the very nature of membership of the top team itself can mean there is a tacit homogeneity in other areas that are more important than demographic variables. The measurement of demographic diversity may mask similarity in world viewpoints and beliefs. There may be certain behaviours, values and experiences that facilitate membership of the top team such as loyalty, commitment, dedication and success. Team members may differ in terms of age and function but may be very similar in terms of how they view success and the types of business values to which they adhere. Therefore, teams that may seem diverse in terms of experience, function etc (what Harrison et al., 2002, describe as surface level diversity) may be similar in terms of values, goals and beliefs and how they do business (deep level diversity, Harrison et al, 2002). This is supported in Hage and Dewar's (1973) study, which establishes a link between TMT values and the subsequent degree of innovation within the organisation. Organisational culture and climate play a part in shaping the values adhered to within the organisation – the organisational culture may support a certain 'type' of top manager regardless of age, function etc.

Therefore, while there is limited support for hypothesis 1, it is necessary to consider any relationships between TMT diversity and innovation with caution. In particular, it is important to adopt other TMT measures such as affective group processes (e.g. trust levels) and task group processes (e.g. reflexivity) in order to get a more conclusive picture of the importance of the top management team.

While there was no evidence supporting the diversity-innovation link in time one, significant relationships emerge between diversity and TMT intragroup trust. TMT diversity weakly and negatively predicts TMT intragroup trust, supporting hypothesis 1a. The social attraction, social categorisation and homophily theories indicate that the more similar individuals perceive each other to be, the more comfortable they will be with one another (Tyler, 2003). Homogeneous teams are more likely to have higher levels of trust than diverse teams (McAllister, 1995) and Williams (2001) suggests that diversity within teams can lead to distrust and suspicion. However, trust levels within the team are influenced by factors other than demographic diversity including the frequency of interaction, effectiveness of communication and perceptions of procedural justice (Eisenhardt, 1989; Kramer et al., 1996). While it is evident that intragroup trust is a complex and incremental process, much of the existing literature and the results from this study would suggest that diverse teams are initially less inclined to trust each other. This is supported in the current research. There is a significant and negative relationship between diversity in age and trust. This finding corroborates Jackson's (1996) work on diversity. In a similar vein, West et al. (1999) found that the more top team members differed in their ages, the worse the subsequent profitability of their company.

Age may be a surrogate for variables such as values and attitudes due to the different social, political and economic events experienced by different age groups (Bantel & Jackson, 1989). Jackson (1996) suggests that it is relations oriented differences (of which age is one) that are likely to have more negative effects on team and organisational outcomes and much of the conflict literature would suggest the same thing. Because difference based on age is often value laden, it may be that this type of

diversity is more likely to lead to distrust. The findings established in this study also indicate that this is the case. This is not to suggest that age diversity within teams should be avoided. Age diversity and the different perspectives that come with it can also facilitate group creativity and debate (Bantel & Jackson, 1989), however the research from this study suggests that it is more likely to be associated with low levels of trust within the team. It is therefore necessary that teams are cognisant of such negative outcomes and are trained to work effectively together to achieve shared understanding (West et al, 2000)[18].

8.3 Hypothesis 2: Intragroup Trust will be positively associated with Organisational Innovation

The second hypothesis focusing on TMT trust proposed a positive relationship between TMT trust and innovation. As can be seen in chapter 7, no such relationship emerges. While it makes intuitive sense to suggest that the more team members trust each other the more they will share ideas and innovate, it is recognised that there is very little empirical work demonstrating this link (McEvily, Perrone & Zaheer, 2003). No link is found between TMT intragroup trust and innovation in this study. However, it may affect organisational outcomes in a more indirect way. For example, if a team is characterised by high trust, members may be less inhibited to share ideas and knowledge and other innovative behaviours which in turn might affect innovation. The findings in this study suggest that this is the case.

TMT intragroup trust is significantly associated with other important top team and organisational characteristics. There is a positive association between TMT reflexivity and levels of TMT intragroup trust. Where there are high levels of trust, there is more likely to be honest group discussion and reflection. Edmondson (1996) found that

[18] Diversity in experience is also negatively associated with intragroup trust. While this measure is a measure of task related diversity, it may in some way tap into a similar type of diversity as age diversity. It makes intuitive sense to assume that the more experience you have, the older you are likely to be – therefore, there is a chance that age diversity and diversity in experience are tapping into similar attributes. This does appear to be the case in this research as diversity in experience is no longer significant when controlling for age, suggesting that diversity in age and experience are measuring the same thing.

psychological safety within teams increased the potential for review and reflecting upon mistakes. West (1996; 2000) cautioned that the act of reflecting back can be discouraging for the team as it is likely that there will be a gap between the real and desired circumstances. When such discrepancies are revealed during reflexive practices the consequences can be 'aversive' leading to anxiety and uncertainty. Trust may play an important role in assuaging these worries. It can also be argued that the more a team trust in each other's competence and good will, the more likely it is they will admit to mistakes and question why projects failed. This finding supports the assertion that trust and reflexivity are linked, supporting hypothesis 2a.

An alternative explanation may lie in the nature of the research design, which in this case relies on a common method of collection. Common method variance may result from the fact that the respondent providing both the reflexivity and trust measures is the same person. There is considerable research suggesting that people try to maintain consistency between their cognitions and attitudes, therefore it is not surprising that respondents would have a desire to appear consistent and rational which in turn may affect the findings (Podsakoff et al., 2003).

TMT intragroup trust is a significant predictor of organisational learning but with one dimension of organisational learning only, thus partially supporting hypothesis 2b. It also predicts innovative climate, supporting hypothesis 2c. These findings suggest that trust levels within the top team are in some way linked to perceptions of employees outside of the team. But why should the trust levels between senior managers impact how employees outside the TMT view the organisation? A possible reason for this is the symbolic significance of the top team. The members of the group themselves will frequently head up their own sub-organisations/functions. If the TMT members trust each other, they are more likely to engage in learning behaviour within the team (Edmondson, 1999) and facilitate the transfer of information across the organisation. This behaviour will diffuse downwards throughout each of the different functions and may encourage others to do the same (Zand, 1972). Therefore, TMT trust is important, not just in terms of the team itself but also in terms of the wider organisation. If the top

team is characterised by trust, the findings in this study suggest that other employees outside the team will feel more comfortable and more able to share information.

Hypothesis 2b also predicted that TMT intragroup trust would be positively associated with the *motivation* to share information. However, this hypothesis is not supported. The *motivation* to share information depends very much on the perceived value associated with this activity. The individual needs to expect a valuable outcome from the learning process – and more so, that that value will be of personal benefit to him or her. The findings in this study suggest that TMT intragroup trust is associated with employees' *ability* to share information but not with their *motivation* to exchange information. In other words trust is associated with opportunities to exchange information but is not associated with the value that people attach to that activity. This suggests that while trust may be a catalysing first step in the learning process, it is not sufficient for its sustenance. In order to continue to share information, employees need to experience tangible outcomes of value that are explicitly associated with the learning process. Therefore, in order to encourage the continuation of this behaviour at an organisational level, the TMT must demonstrate a link between this behaviour and organisational profitability and performance. This study suggests that those links exist at an organisational level as the motivation to exchange information is linked to innovation time one. It is therefore imperative that this activity is encouraged. To do so, this activity must be rewarded in a visible and clear manner.

Levels of TMT intragroup trust predict climate for innovation in this study supporting hypothesis 2c. The more the top team members trust each other, the more likely it is that employees outside the top team will perceive the climate as one supportive of innovation, risk taking and experimentation. A possible explanation is one similar to that outlined above. If the TMT members trust each other, they are more likely to engage in innovative behaviour (Zand, 1972). This will disperse downwards throughout the organisation and may encourage others to do the same. Thus, while TMT trust was not found in this study to be directly linked to innovation, this is not to suggest that it does not play an important role in the innovative process.

While the task related behaviour such as task reflexivity is extremely important in terms of its link with market innovation, it appears to be TMT intragroup trust that is linked with how those outside the team perceive the organisation.

The importance of TMT trust also emerges in the TMT interviews. The TMT members interviewed from the most innovative firms surveyed all stressed the importance of intragroup trust. While the majority interviewed felt that there were high levels of trust within the team, they also emphasised how elusive intragroup trust was:

> Within the top team, I think things are getting better. But you do have people managing things close to their chest – people find it hard to let go"
> TMT member, Company 031

> It can be difficult (to trust). Especially at a certain level. There was a certain amount of vying for the top position. I think in general we trusted each other, but there are always moments when you find yourself questioning another's motives.
> TMT member, Company 054

Trust in ability was deemed particularly important as the following quotes illustrate:

> Yes, it is all about trust, there needs to be transparency of communication. A lack of trust was something that was holding back development but this is no longer the case. I think trust is essential and our outside relationships mean we trust each other implicitly and know each other's abilities, which in turn means we can question each other safely. I think if there is one key thing that gels us as a team that is it.
> CEO, Company 050

> Very high trust level in the team – if there is an issue you would say, it is not like things are left to stir.....Definitely (trust in ability). It helps when you know somebody because you know personally what they can do, what they have achieved in other companies, not just from what they have said in their cvs, you know that because you have known them for quite a while. That is how the guys have built the team up.
> TMT member, Company 050

The above quotes provide some clues to the attributions of the fundamental importance of trust. Factors such as familiarity (e.g. "familiarity allows people to speak their mind"), longevity (e.g. "know each other years and years") and relationships outside of work seem to be important in establishing trust within the teams interviewed. This corresponds with much of the literature on trust. While some assert that trust can be present even from the very beginning of a relationship (Berg et al., 1995), the majority of the research asserts that trust develops over time (Rempel et al., 1985) or that trust between two people is moderated by the duration of the relationship (Gounaris & Venetis, 2002).

8.4 Hypothesis 3: TMT Task Reflexivity will be positively associated with Organisational Innovation

The last TMT variable under investigation was task reflexivity. Task reflexivity was predicted to have a positive relationship with innovation. This hypothesis is strongly supported. While there are relatively few empirical studies investigating the role of reflexivity within teams, it has emerged in this study as an important process and one that may help to differentiate between highly innovative and less innovative TMTs and their organisations. Reflexivity has been found to be positively associated with team outcomes such as team innovation (West & Anderson, 1996), team effectiveness (Tjosvold, 1990) and effective problem solving (Bottger & Yetton, 1987). Teams with a high level of reflexivity and minority dissent were found to be more effective and innovative than teams that had low levels of reflexivity (De Dreu, 2002). This is one of the few studies exploring the relationship between reflexivity and organisational outcomes. The results from the survey and the TMT interviews suggest that this practice is a relatively rare one as the following quotes indicate:

> I think it is good to recap on what we did and on outcomes and we don't do that enough – we probably should do more of that.
> TMT member, Company 050

> I mean it is rare that we ever go to last years business plan and see –we spend an awful lot of time doing the plan but we don't spend enough time looking back

> and saying are we on target with x,y,z – this is what we planned to do, are we meeting that, what has changed. I don't think we ever went back to last years business plan and looked at it
> TMT member, Company 050

> We do not review and by not doing that we have bad experiences with failure – everyone has a different assessment of what went wrong when something fails. If you don't review, there is no collective memory – everyone has their own version. With time each version becomes fact. You end up have four different factual versions about what went right and what went wrong.
> We implement – do not typically get together to question, review.
> TMT member, Company 080

Task reflexivity predicts market innovation time one and is positively correlated with the number of new adaptations produced in the second phase of the research. These findings suggest that reflexivity is linked to innovation in different ways at different times.

The findings above are interesting for a number of reasons. Firstly, they propose the demography of the top team is less important than TMT literature suggests. It is a group process, TMT reflexivity, rather than TMT composition that emerges as a predictor of innovation in this study. Nor does task reflexivity mediate the relationship between TMT diversity and innovation. This indicates that how the TMT approach the tasks that face them on a daily basis is directly associated with innovation – the more review, reflection and questioning regarding tasks that the TMT engage in, the more beneficial in terms of its association with innovation. This also emerged in the interviews. When asked how to foster creativity and innovation within the organisation, one interviewee replied:

> Reflection is the biggest thing... great ideas come from taking unstructured time out to reflect on ourselves and the company. ..need to look backwards, looking back has a lot of relevance to how you move forward
> TMT member, Company 054

Hypotheses 2a– that TMT task reflexivity would be positively associated with organisational learning– is not supported in this study. Levels of TMT task reflexivity do not predict employee perceptions of the opportunities and value attached to information exchange. Therefore, while TMT task reflexivity predicts organisational innovation, it does not appear to predict employee perceptions of the organisation in this study.

8.5 Hypothesis 4: Organisational Learning will be positively associated with Organisational Innovation

One of the major limitations associated with TMT literature is its failure to take into account other organisational factors that may impact on the team and organisational outcomes. Hypotheses 4 and 5 concern predicted relationships between organisational factors (organisational learning and climate) and innovation. The findings in this study support hypotheses 4 and 5, suggesting that the exchange of information and a climate for innovation predict innovation.

Hypothesis 4 predicts a positive association between the exchange of information and innovation. It looks at two important dimensions of organisational learning; the *ability* to share information and the *motivation* to share information (Nahapiet & Ghoshal, 1998)[19].

Only one of these dimensions is directly associated with innovation – the *motivation* to share information. The *ability* to share information is not linked to innovation suggesting that having access to learning opportunities and believing that others are capable of exchanging information is not enough to generate innovation. While the *ability* to share information may be an important step in starting the learning process, the findings suggest that it is the *motivation* to continue to do so that is important in terms of its relationship with innovation in this study. This reflects much of the literature on

[19] The ability to combine and exchange information refers to employees perceptions of access to learning opportunities and their perception of others' ability to transfer information and knowledge in a meaningful way. The motivation to combine and exchange information refers to the value that employees feel is appropriable to them from the learning process.

motivation, in particular expectancy theories (Vroom, 1964). In order to be motivated to exchange information, individuals need to expect an outcome that will be of personal value to them even if they are not certain of what that newly created value will be (Nahapiet and Ghoshal, 1998). This research indicates that the exchange of information predicts innovation when employees can experience the value in the learning activity.

This is evident in the TMT interviews also. Many of the TMT members interviewed emphasised the need for both conditions of learning (ability and motivation). While the majority felt that their organisations were providing opportunities for the exchange of information and knowledge (ability) many felt that success depended on the motivation and encouragement of this activity (motivation).

> I think once you have participation, I think that has to be continually encouraged – getting people involved in decision making, every member should be at meetings and then people will feel they have a genuine input – I think that will encourage people to express themselves and bring forth new ideas.
> TMT member 050

The above quote demonstrates an important link between encouraging participation and the yielding of new ideas. The need to differentiate between the *ability* to share information and the *motivation* to share information was stressed by one TMT member who felt that, while there was a platform to exchange knowledge in the form of meetings and one–to-ones, this platform does not necessarily lead to learning activities, and that the company needs to increase the *motivation* to share knowledge:

> It would be nice if people spoke up then as well, now they do to an extent but not as much as we'd like – I suppose it is a case of people in the management team not forcing the agenda but encouraging the agenda. There is already the platform to do it, it is just a case of encouraging people to do it
> TMT member, Company 050

There is no association between the motivation to exchange information and market innovation in the second phase of the research. These findings suggest three things:

1. TMT trust is associated with the development of *potentially* effective platforms in which meaningful combination and exchange of information is possible (*ability* to share information).
2. If the exchange of information is perceived as being satisfying, valuable and effective (*motivation* to share information), there is a relationship between the exchange of information and market innovation.
3. However, the motivation to share information is only associated with innovation in time one of the research.

One CEO interviewed recognised the need to maintain the sharing of information in the long run and feels that the management of knowledge is a strategic issue. He has appointed a knowledge manager who will be joining the TMT and whose main priority will be the dissemination and management of knowledge:

> We have a new person starting next week who will be a member of the top team .... They will be doing day to day stuff but from our end we recognise the critical importance of knowledge management and getting the right support mechanisms in place and putting all of that information into the system. This is our first time getting someone who is we expect will really make a difference. This person will be managing information and it will be on an equal par with sales and production. It will probably take us 18 months to get this position up and running but when we do we will have a serious edge.
> CEO, Company 071

It is also necessary to take into account the life cycle details of the sample. It is important to note that given the changes in economic climate that have occurred in Ireland over recent years, the data gathered in time two may not be representative of the steady state more characteristic of conditions in time one. Therefore it is impossible to make any causal arguments regarding organisational learning and innovation. It is important not to assume that the sharing and combining of information will impact upon or be linked with innovation. It could be argued that learning may also be linked negatively to innovation if that learning involves such potentially prohibitive dynamics as defensive routines or fear of failure. Therefore while this activity is linked to innovation in time one, its positive association with innovation over time cannot

automatically be taken for granted. The type of learning that occurs in an organisation might differ according to the economic and organisational climate that prevails.

8.6 Hypothesis 5: Climate for Innovation will be positively associated with Organisational Innovation

The second organisational factor under investigation is organisational climate. There is a wealth of literature illustrating the importance of organisational climate but does it have any real tangible association with organisational outcomes? The findings of this research suggest that it does. This finding supports empirical work conducted by Mudrack (1989) and Kanter (1983). Climate is positively associated with innovation both in time one and time two of the research.

This finding supports many studies suggesting that the climate of an organisation is associated with innovation. Kozlowski and Hults (1987) found climate to be predictive of factors related to individual innovative behaviour and Anderson, Hardy and West (1990) found climate to be a predictor of innovation in their case study of the National Health Service in the UK. Pillinger and West (1995) found that organisations characterised by high levels of innovation had climates emphasising good communication, teamwork and reflexivity. Evidence of the importance of a shared frame of reference for employees supports Litwin and Stringer's (1968) assertion that organisational climate influences employees' motivation and behaviour. Organisational climate has been described as the "encapsulation of the organisation's true priorities" (Ahmed, 1998, p.31) and this study indicates that when innovation is prioritised through the encouragement of risk taking, experimentation and top team support for innovation, this translates into organisational outcomes. Management can influence hard measures through the provision of a shared reality that prioritises the organisation's goals and moves away from a defensive culture. As one TMT interviewee commented:

> I.think if you build a culture that is not a blame culture, it's a corrective action culture. I think people react well to that, especially when people see the benefits of putting something in place that makes their life easier the next time round.... We spend a lot time through reviews and through one to one meetings with the

> different team members and encouraging them to speak out and showing them it is not going to reflect badly on them, in fact it will reflect well on them.
> TMT member, Company 070

One TMT member recognised that the part of the difficulty in eliminating a 'blame culture' lay in the different perceptions that management and employees had about the organisation:

> I would say in some departments they wouldn't and in others they would (feel comfortable discussing past mistakes) and I would say in all departments they should feel comfortable making mistakes but we had discovered – we had meetings – the objective was to establish where we had progressed with customers and to make sure everyone knew where they had gone wrong so that they wouldn't make the same mistake again but this was interpreted as a blame culture – and I never saw this as a blame culture but then again I wasn't the person being 'blamed' – I was sitting at the top of the table.
> CEO, Company 017

Another theme that emerged from the TMT interviews was the role that the external environment plays in shaping the organisational climate. Many of the participants referred to the present economic climate as a key influence on innovative climate. Because of the economic downturn, all of the companies interviewed employed a more 'cautious' approach to innovation that may not have existed in more buoyant times:

> Market conditions are very different now and I suppose at the moment innovation doesn't count for a lot – profitability is king – the market has changed, 2 years ago innovation was incredibly important. That's how you differentiated yourself that is how you got more funding but now it is all about how profitable you are, are you making money from what you are doing? I am not saying it is not important I am just saying the market has changed dramatically..... Everything is calculated I suppose, if something was inherently risky we would probably steer away from it. At the moment, anyway. Tend not to take as much risk when the market is as it is.
> TMT member, Company 050

However, while the approach towards innovation may have changed somewhat, the perceived importance of innovation was not diminished. The following quote

demonstrates simultaneously the need to encourage innovation while moving towards a more guarded type of innovation:

> There is no innovation for innovation's sake – which I don't think is a bad thing in that we have never produced something useless. Trying to encourage holistic approach. It is important that people feel that there is a really visible innovative process – process needs to be designed to make it easy to develop product, we need to put the tools in their hands to allow them to do it easier. We need to work on a culture here that makes an educated effort towards making innovation acceptable.
> CEO, Company 080

While innovative climate is a signification predictor of innovation time one when regressed on innovation (controlling for company size), it is interesting to note that after performing a multiple hierarchical regression analysis, innovative climate is no longer a significant predictor of innovation. There are several possible reasons for this occurrence. One possible reason is the small size of the sample. Another reason is that innovative climate is an important predictor of innovation but TMT reflexivity and organisational learning (the motivation to share information) override its influence. One common problem in multiple regression analysis is multicollinearity of the input variables. The input variables may be as correlated with each other as they are with the response. If this is the case, the presence of one input variable in the model may mask the effect of another input. Innovative climate and organisational learning (motivation to share information) are significantly correlated (r =.48**). While this is not excessive and indicates that innovative climate and organisational learning are two distinct scales, a masking effect might be taking place.

Innovative climate remains a significant predictor of innovation time two after simple regression analysis. However, after controlling for both company size and previous innovation, the significance level dropped to .15. While this is no longer significant, given the small size of the sample it does warrant mention.

Finally, an association between innovative climate and organisational learning is identified. Innovative climate is a predictor of both dimensions of organisational learning. In order to combine and exchange information that is of value, there needs to be a shared view regarding the organisation's priorities and goals and a shared frame of reference within which that learning needs to take place. A shared understanding of organisational goals and priorities will facilitate the exchange of information that is considered valuable; this sense of value is an essential part of feeling motivated to learn. The importance of a supportive organisational climate in fostering organisational learning was a recurrent theme in the TMT interviews and many of the TMT members interviewed expressed concerns that this supportive climate was difficult to foster within their organisations. One TMT member felt that individual managers were an important part of this process – whether their influence was positive or negative depended on the individual.

> I think a problem is that we have no formal structure, therefore we are very dependent on the individual managers in terms of sharing knowledge. It is down to the individual. How newcomers feel depends on what people were doing when they entered the organisation. By that I mean what the managers were doing – who they were. I think this is quite hierarchical for a small company, there is a distinct chain of command to get your ideas heard and whether you do depends on your manager. There is no formal structure to elicit those ideas. I think we need to describe what a good job is, people want to please. I think we need to make explicit how important innovation is. Need to set up a structure outside of normal hierarchical lines. Within the hierarchy we are very task oriented. I don't think it is a case of not having the brain power it is just we might not be using it. We don't tap it.
> TMT member, Company 080

Other tensions inherent in the learning process emerged in the interviews and these provide us with clues about an alternative structure fostering learning. One theme that emerges throughout all the interviews is the issue of newcomers versus old timers. While it is acknowledged that there is a need for 'fresh blood', there is a recognition that a conflict between the two can develop. The following quote demonstrates how problems can emerge between insiders who are proud of what is there and newcomers who want to change things:

.... New comers are taking on a lead role. The problem is you have new comers looking at the defects of the product and the people who have worked on the product for ages get defensive, they think "I was at this long before you came in and now you come along and pick holes in it". Old timers are not happy, they developed this from scratch. Again, it comes back to the heroes who joined early on, know the product, the clients etc. We need to encourage these employees to pass on the knowledge. There would be a huge gap if they left. What we have started doing is giving these individual's teams – therefore they pass on their knowledge to their teams and it is getting out. The expert's knowledge filters out to the team.
TMT member, Company 080

The above quote also provides some insight into alternative learning structures and suggests that team learning may be a more appropriate learning strategy.

TMT members also underlined the tension between different departments and functions as a barrier to organisational learning. Another problem highlighted was the 'blame culture' mentality, a phenomenon that was very difficult to eradicate. The following quote illustrates how both these tensions can hinder learning and creativity:

We are better (at sharing knowledge) at senior level. We do not do at all well at lower levels – very limited knowledge sharing and listening. There are natural poles here. Implementation people blame development people and vice versa. There are factions and we have not been good at creating the mechanisms that resolve that naturally. There can be a rush of bad activity around people's versions of things. Something happens – a catalyst – and people blame. We sort out issues – not processes. We are reactive – need to be more focused on long term issues. When someone tries to transfer knowledge, sometimes people won't listen. They feel it is admitting blame to take others' knowledge on board.
TMT member, Company 080

The idea of knowledge as power and therefore to be preserved is another concern voiced by the TMT managers interviewed:

Yeah –there are a couple of cases where that (the sharing of knowledge) is a problem. Where knowledge is power and people want to hold on to it. Some people are here a long time and have their own ways of doing things, not in their interest to do that.
TMT member, Company 080

> I think that is inevitable. People will always feel more vulnerable the more knowledge they share. Having said that, I think there is a lot you can do to stop people being precious with their knowledge. What kind of culture prevails will have a lot to do with it. I think, well I hope, we have a culture that discourages that way of thinking.
> TMT member 054

The findings from the TMT survey suggest that this guarding of knowledge is less likely in organisations with climates supportive of innovation.

8.7 Summary

Innovation is a multidimensional concept. By drawing on the upper echelons and group process theories and by taking into consideration the organisational context, it is possible to enhance our understanding of how and why innovation occurs. This thesis found partial support for the model presented in chapter 5. While the upper echelons theory was only partially supported, there was broad support for the group process theories and the organisational context theories. However, until additional research has been conducted to replicate these findings, one must treat these conclusions tentatively. Like all studies, this research suffers from several limitations. These and the contribution of the research will be discussed in the next chapter.

CHAPTER NINE
CONCLUSIONS

9.0 Introduction

This chapter concludes the thesis with an overview of the main findings. The theoretical contribution of this study is then addressed. Some limitations of the research, suggestions for future investigation and the practical implications of the study will also be discussed.

9.1 Overview of the Research

This main objective of this study was to establish the factors determining innovation in indigenous Irish high tech companies. By exploring the role played by the TMT in conjunction with the organisational context in determining innovation, I explore both team level and organisational level factors, thus gaining a more holistic picture of organisational innovation. In order to achieve both the micro and macro perspective of organisational innovation, the research was carried out in three stages involving a CEO interview, a TMT and core worker survey and in-depth TMT interviews. The first two stages allowed the empirical testing of the hypotheses formulated in the literature review and the final stage provided rich, in depth data to enhance the quantitative results. The key findings (discussed in detail in chapter 8) suggest that both the top team and the organisational context play a role in determining innovation.

The TMT was found to play an important part in fostering innovation. However, it was a group process, rather than team demography, that was most strongly associated with innovation. Task reflexivity, a concept relatively new to the area of organisational theory, was found to be an important predictor of innovation both in time one and two (market innovation time 1 and the number of major adaptations time 2). This finding is consistent with West and Anderson's (1996) suggestion that overall level of innovation may be more a consequence of the team's characteristic social and task processes rather than team composition (although their findings suggest that team composition is an

important predictor of the quality of innovations). Only one measure of TMT diversity was associated with innovation in this study – tenure diversity was positively related with market innovation – and this association took place in time two only suggesting that there is a time lag before the benefits of diversity emerge.

Organisational context played an important role in determining innovation also. Organisational learning was positively associated with innovation – but this was the case for one dimension of organisational learning only. The ability to share information was not associated with innovation but the motivation to share information was (market innovation time 1). Ironically, findings from the interviews and much of the learning literature suggest that it is the former that is most encouraged in organisations. This study suggests that organisations need to link learning behaviours with tangible and valuable outcomes if these behaviours are to have organisational value. Climate for innovation was also associated with innovation (market innovation time 1 and 2). If employees perceive the organisation to support risk, experimentation and other innovative behaviours, this study suggests that this will lead to hard innovative outcomes. Not a surprising finding perhaps, but an important one all the same.

9.2 Contribution of the Research

At least partial support is found for the majority of the hypotheses posited and the findings suggest that an organisation's innovative capacity and practice derive from an amalgamation of top team composition, process and organisational context. Four aspects of the framework presented in chapter 5 are associated with organisational innovation; TMT tenure diversity, TMT task reflexivity, organisational learning and climate for innovation. In addition, relationships emerged between the input, process and organisational variables that shed some light on other important organisational factors such as organisational learning and climate.

TMT tenure diversity predicts market innovation in time two of the study. While this does partially support the demographic literature the lack of significant relationships between innovation and any of the other TMT diversity measures also challenges the top

team demography literature. It also highlights the need for more longitudinal research in this area.

This research both contributes to and extends our understanding of the trust literature. Research focusing on trust and senior management is neglected in the research and this research goes some way towards redressing this imbalance. While this study finds no direct association between TMT intragroup trust and innovation, it does indicate that TMT intragroup trust is related to other important organisational factors such as TMT task reflexivity, climate for innovation and the exchange of information. TMTs that report high levels of intragroup trust are more likely to engage in reflexive task related behaviour and employees outside the team are more likely to perceive the company as innovative and accessible to learning. However, trust is only linked to employee perceptions of their ability to share information, it is not linked to the value they attribute to that information. Therefore, while this finding supports the literature linking trust and aspects of learning, it challenges the assumption that trust is associated with learning *per se* and suggests that there is a relationship between trust and certain, but not all, measures of learning. While there is some research on trust and group level learning, there is little research linking trust with organisational learning. This study suggests that trust is important in providing a platform for learning (access to people and opportunities to share information and knowledge) but it is not linked to the perceived value of this activity, nor is it linked to the continuance of this activity.

Little previous research has investigated the causes and consequences of reflexivity at work with the notable exception of West. This study goes some way towards addressing this paucity. TMT task reflexivity was found to have a direct association with organisational innovation, both in time one and time two of the research. This finding supports the limited theory on reflexivity (De Dreu, 2002; Carter & West, 1998; West, 1996, 2000). While TMT task reflexivity is not found to be a common practise in this research, those teams that did engage in this process were more innovative in terms of new markets targeted and the number of new adaptations reaching the market. This would suggest that it is a combination of reflecting back and adapting present and future

behaviour that helps foster innovation rather than a preoccupation with simply looking forwards and moving onwards. This finding also makes an important contribution to the upper echelons theories (Hambrick & Mason, 1984) and the group process theories (Shaw, 1981) by demonstrating a link between TMT reflexivity and organisational outcomes (innovation).

The findings also point to the importance of the development of a climate for innovation that is characterised by top management support for innovation and experimentation. Organisations that are perceived as encouraging risk taking and experimentation are associated with organisational innovation in both times one and two. While there is a wealth of literature sustaining the assertion that support for innovation leads to actual innovation (e.g. Amabile, 1983; Anderson & West, 1992; Anderson et al., 1990; Curral et al., 2001), it would be erroneous to take this relationship for granted (see for example, DeJong & Kemp, 2003). However, this finding adds to the weighty evidence that support for risk taking and experimentation does lead to actual innovation. A climate for innovation also predicts the employees' ability and motivation to exchange information in this study. When employees perceive the organisation as one supportive of experimentation and risk taking, they are more likely to find opportunities to share information – and they are more likely to consider the information to be of value. Essentially, these findings support the current literature on organisational climate and add to it by clearly demonstrating the importance over time of what is often considered to be a nebulous phenomenon.

Another important contribution of this research is finding and developing support for much of the organisational learning literature. The evidence presented in this study indicates that certain conditions for learning play an important role in fostering innovation. This study investigated the relationship between the *ability* to combine and exchange information, the *motivation* to combine and exchange information and organisational innovation. While organisational learning is often associated with innovation, this study isolates one dimension of organisational learning as being particularly pertinent to organisational innovation; the motivation to combine and

exchange information. Links to innovation only emerged in this research when the sharing of information was perceived to be valuable and meaningful to those engaged in the activity. Therefore, it is not sufficient to provide opportunities to learn, management must also encourage this activity and link it with visible and valuable outcomes. This distinction between innovation capacity and innovation practice also emerged in the TMT interviews and extends our understanding of organisational learning theory.

Other important tensions associated with organisational learning were highlighted in the interviews and these tensions need to be reconciled if valuable learning is to take place. The tension between newcomers and insiders was a concern for many of the top managers interviewed. The interviews highlighted two issues that need to be addressed, the first being that newcomers may feel intimidated by 'heroes' of the organisation and may not get involved in the learning process, and the second that 'old timers' may become defensive when new comers challenge established practices and ideas. The tension between knowledge versus power also emerged during the interviews. One of the main barriers to learning appeared to be the difficulty in encouraging learning further down the organisation. There seemed to be a self-sustaining inertia when it comes to sharing information outside the top team, which could be a combination of feeling intimidated, powerlessness and a fear of failure.

Finally, this research adds to theories of learning, organisational climate and innovation by extending current operationalisations of these theories. This research is part of a larger project[20] that developed measures of the conditions of organisational learning, organisational climate and innovation. In order to measure conditions of organizational learning, Nahapiet and Ghoshal's (1998) conceptual model was used, which summarizes many of the conditions of learning occurring such as idea exchange and information sharing. Organisational climate was measured using items adapted from O'Reilly, Chatman and Caldwell (1991) and the measure of innovation used in this study was that of market innovation using a measure utilized in a study by Hage and Dewar (1973) and

[20] This dissertation is part of a larger project involving the University of Limerick, University of Maryland and the Irish Management Institute.

later adapted by Smith (1991). The innovation measure was collected using the CEO interview where the CEO was asked to calculate the percentage of new products introduced to new markets in the last year and in the last three years. Longitudinal measures of innovation were also gathered 2-3 years after the initial data collection. The purpose of this was to overcome the cross sectional nature of the data and to explore if any of the relationships found in time one remained two – three years on. The use of longitudinal data is an important contribution to the TMT and the innovation literature.

9.3 Research Limitations and Directions for Future Research

The aim of this work was to provide a focused and contextual framework of organisational innovation. In doing so, I focused on indigenous Irish companies in the software industry. While this approach has helped in the interpretation of the data, it does limit the generalisation of the findings to other industry environments. Replicating this study in other industries would increase generalisability and confidence in the results.

The sample in this study consisted of only 35 top management teams. While this is sufficient to test the hypotheses, it is not ideal and may be yielding an unrepresentative picture of the relationships under investigation. A larger sample would have provided the degrees of freedom necessary to test more complex hypotheses. Considering the demands on respondents and the organisational level of participants, this response rate is quite strong and does permit regression analysis.

Organisational innovation is multidimensional and is inevitably influenced by both internal and external factors. Here the research focused on internal factors. While this facilitated a focused exploration of organisational innovation that would not be possible if a multitude of variables were examined, it does not provide insights into the ways the external environment might shape organisational innovation. The importance of the external environment in influencing innovation is recognised (Porter & Stern, 2001). However, in this study, the effects of differences in environment on different industries were minimised by studying one industry (Bantel & Jackson, 1989). Future research

could expand the present model to incorporate these additional environmental factors and examine possible links with innovation.

There are several limitations associated with the design of the study and the instruments used to collect the data. One of the main limitations concerns the cross-sectional nature of the research design. While there are theoretical arguments for predicting the causal effects of organisational learning on organisational innovation there are also arguments for reverse causality. For example, innovative firms may develop a reputation for being pioneering and this may foster an environment of knowledge creation. Thus, while organisational learning may impact on organisational innovation, the conditions for learning may also be influenced by successful innovation. This study has overcome these limitations to some degree through the collection of longitudinal innovation data and controlling for innovation in time one. However, it is difficult to make causal inferences about the relationships between the other variables under investigation. While the study would have been enhanced if data on all the study variables had been collected in time two, it is still possible to infer the most likely causal direction from the structure of the data. However, caution is necessary when making such inferences about the direction of the relationships between the variables in this research.

A further limitation of the research relates to the absence of hard performance indicators. The dependent variables explored in this study represent CEOs' estimates of innovation rather than objective innovation measures. While self-report is considered a valuable means of gathering information, future research would benefit from the inclusion of hard performance indicators. Typical macro measures that senior management should be interested in include return on innovation investment (ROII) and general strategic measures, for example brand innovation quotient (Smith, 1997).

Linked to this is the problem of single source bias. Members of the TMT completed all survey items, except the climate items and this can lead to common-method bias. Common method bias may inflate or moderate correlations between variables (Conway, 2000). This is rectified to some degree by including the organisational context measures:

organisational learning and organisational climate. Only the core worker sample completed the organisational climate items and both the TMT members and core workers completed the organisational learning items. The inclusion of the core workers in the research lessens the problem of single source bias. However, future research that seeks to explore possible associations between the top team and organisational outcomes must deal with the problem of single source bias. In order to overcome this problem, data on the top management team could be collected from other levels of the organisation and validation research could examine whether the TMT self -reports are correlated with employee TMT reports.

Another means of rectifying this problem would be to correlate TMT self-reports with independently rated observations of TMT behaviour (Game, 2003). Researchers could observe team meetings and video the team behaviour they observed using the ratings developed in this study. However, there are drawbacks associated with overt observation. It is often argued that people behave differently when aware that they are under observation - the 'observer effect' - and that the presence of the researcher will affect the phenomena under observation in some way (Gill & Johnson, 1997). However, it might also be argued that the observer's presence is less likely to affect the behaviour of those under observation if it entails no interaction and is unobtrusive.

This research operationalises measures for organisational learning targeting attitudes and perceptions about the degree to which organisational members share and combine knowledge. Therefore, conditions for learning rather than actual learning are measured. There are no items, however, that explicitly measure the degree to which learning at organisational level has taken place. It would be useful to gather further information regarding the construct validity of the learning measure used in this study and also to extend this measure to include learning outcomes (e.g. "we have developed new and improved ways for completing tasks throughout the organisation").

Another limitation stems from the diversity measures. Researchers have not consistently agreed on the best way to represent demographic diversity. Pfeffer (1983) and

Daellenbach et al. (1999) state demographic measures are at best proxies for underlying managerial processes. Future research could include other measure of diversity for example cognitive style and personality type using instruments such as Allinson's cognitive style index and the Myers Briggs Type Inventory.

The innovation measures used in this study are focused on the quantity of innovations (e.g. number of new adaptations) not the quality. West and Anderson (1996) make an important distinction between the number of innovations and the quality of innovations and found that both measures had different predictors. Future research could include quality measures of innovation using West and Anderson's four dimensions of innovation: 1. magnitiude (how great would be the consequences of the changes produced), 2. radicalness (to what extent the status quo would change as a consequence of the innovation), 3. novelty (how new were the changes), and 4. impact (to what extent would the innovation improve effectiveness).

Other important measures of innovation such as task innovation or processual innovation are not included in this study. It is acknowledged that such specific measures of innovation are open to challenge. However, the differentiation of complex and multi-faceted constructs is a useful way of advancing understanding (Clegg et al., 2002). While it would be beyond the scope of this research to study all measures of innovation, future research could include other important measures of innovation. For example, some argue that innovation studies have been too focused on innovation as an outcome (Kuczmarski, 2001; Argyris, 1985) and that more process studies of innovation are needed. While it is recognised that such studies would be difficult, Van de Ven and Poole (1988) provide some useful guidelines to identify processual patterns of innovation. They suggest that researchers need to combine both qualitative and quantitative methods of data collection and to engage in longitudinal and participative research in order to get a true picture of the innovative process.

9.4 Applications of the Research

This study also has some practical implications for managers.

Firstly, the findings provide some interesting leads regarding the potential of TMT diversity that could help to understand the role of such dynamics as TMT development and TMT evolution over time. One task related measure of diversity, tenure diversity, was found to predict innovation measures in time two. This corresponds with much of the literature on TMT diversity (Bantel & Jackson, 1989; Katz, 1982; Michel & Hambrick, 1992) and tentatively suggests that top teams where membership changes over time are more likely to have higher levels of market innovation. It is important that managers exploit the new perspectives and ideas that newcomers bring to the team and the organisation. This point was also reiterated in the TMT interviews. One way of managing tenure diversity within top teams is through the socialisation process adopted by the team. Jackson et al. (1992) found that social exchanges between team members were positively associated with newcomer performance. They argue that certain characteristics of the team (e.g. team longevity, team size and type of leadership) can affect the integration of newcomers. The type of relationship between the leader and the newcomer can impact the socialisation process and thereby affect how the newcomer mixes with the team.

Team building interventions are another way that tenure diversity can be addressed. Team building sessions focusing on the integration of newcomers into the team can help mimimise potential tension between newcomers and insiders. Such interventions can provide new team members with an opportunity to share their ideas and insights about the team with other members.

Another finding in this study suggests that diversity in age (relations related diversity) within the top team is negatively associated with trust within the top team. This finding is also consistent with the literature (West et al., 1999). A possible reason for this is related to the notion that age is a proxy for other types of diversity such as values and beliefs. Different age groups may have different world-views (West et al., 1999) that may hinder the development of trust. While it would be inappropriate to construct teams

where all members were of a similar age, it is important to be aware of the potential negative effects that diversity in age can bring. I would suggest teams engage in training to work effectively together as a team with a shared understanding of the team's goals and a commitment to maximising the benefits of diversity rather than falling prey to the negative aspects.

The findings from this research suggest that top mangers need to actively encourage the development of trust within the top teams. The area of organisational trust has gained momentum of late but there is still relatively little empirical evidence linking trust with hard outcomes. While this research does not find associations between trust and organisational outcomes, it does find links between top team trust and organisational factors, namely conditions for organisational learning and climate. It would appear that how the top team feel about each other affects how other employees feel about the organisation as a whole. It is important that top managers are aware of this cascading effect and work towards acting as a team in its truest sense. The CEO, through his/her actions may play a vital role in developing trust within the team and there is some empirical evidence linking transformational leadership behaviour to the development of trust. The leadership research would suggest that the following leadership behaviours are associated with TMT trust: showing a genuine interest in employees' well being, encouraging participation and not shooting down ideas because they are different from the leaders, recognising success and providing encouragement after failure.

There is some research indicating that frequency of interaction between team members is associated with intragroup trust (Eisenhardt, 1989). Data from the interviews confirms this. In order to trust team members' competence and benevolence, it is important to have both professional and personal information about them. Therefore, if top team members are to establish trusting relationships with other team members, they need to meet often as a team both formally and informally. While this may not always be possible given their many different obligations, it is important that interactions are encouraged and supported where possible. Team building sessions can also be useful as

they can help create a team identity, which is an important facilitator of trust in a team context (Jarvenpaa et al., 1999)

Effective communication is also found to be associated with higher levels of trust (Jones & George, 1998; Kramer, Brewer and Hanna, 1996) and this was supported in the interviews. Organisations could develop short training courses aimed at enhancing senior managers' communication skills. Areas to be covered in such a training session could include

- The role of team members
- Quality of team communication (Jones & George, 1998 found open and participative communication fostered trust)
- Barriers to communication (Dirks & Ferrin, 2001 found inconsistent messages and false feedback hindered the development of trust)
- Team interaction frequency
- Conflict resolution in the team

The perception of procedural justice has also been found to enhance intragroup trust (Eisenhardt, 1989). It is important that the policies and procedures guiding the team are seen to be equitable by all team members. When team leaders adopt a more participative approach, team members see the process as being fairer and have greater trust in their leader (Dirks & Ferrin, 2001; Korsgaard, Schweiger, & Sapienza, 1995). While it may not be always possible to achieve consensus, it is important that team members have an understanding of why people are acting as they do (Tyler, 2003). Mutual accountability within the team can also build trust, so it is important that the team accepts both individual and group accountability for the achievement of team and organisational goals (Flood, MacCurtain & West, 2001).

TMT task reflexivity emerged as an important process in this research as significant associations surfaced between task reflexivity and innovation in time one and two. Task reflexivity is an activity that is gaining prominence in the literature but is still relatively rare in practice (West, 1996; 2000). This study indicates that this team process can

influence organisational outcomes. However, in ever changing, fast paced dynamic environments this process is often considered to be a luxury rather than a necessity. This research suggests a change of mindset is needed regarding reflection. Managers need to encourage this activity within teams, focusing on both dimensions of reflexivity – reflection and adaptation. In order to do so, certain behaviours should become routine. These include questioning, planning, exploratory learning, analysis, diversive exploration, making use of knowledge explicitly, planning and reviewing past events with self-awareness. Managers can encourage these behaviours by:

- Paying attention to team objectives, strategies and processes
- Being aware of team and individual performance
- Questioning how or why particular actions or decisions should be viewed by the team
- Reviewing past decisions, successes and failures
- Exploring the advantages and disadvantages of team objectives
- Providing time for discussion and the exploration of different possibilities for the team to achieve goals
- Developing plans for achieving goals
- Explicitly discussing assumptions within the team
- Providing time for discussions/workshops exploring how the group learns

(Swift and West, 1998)

To engage practitioners in reflection, Saban et al. (1994) suggest that participants adopt a centrism point of view, involving egocentrism (where actions or ideas are explored from the perspective of the individual), allocentrism (where participants consider actions and ideas from others' perspectives), and macrocentrism (where actions and ideas are viewed from an organisational perspective). Group members are encouraged to develop questions for the team that represent these view points and to share their thoughts with the group.

Management also need to be aware that providing a platform for the sharing of information does not necessarily lead to learning. While it is important to put structures

into place that provide opportunities to share knowledge, this is not sufficient. In order to create knowledge and promote learning that leads to hard outcomes, management must provide tangible links between learning behaviours and personal value. This research suggests that one particular dimension of learning is associated with certain types of innovation – the motivation to share information. This dimension of organisational learning measures the perceived personal value of the learning activity and the motivation to continue to engage in this behaviour. Therefore, opportunities to learn may not yield benefits unless there is also the motivation to do so. Management need to actively encourage this activity and reward it in a visible manner. Management also need to foster a climate that reduces the chances of defence reaction formation and encourages experimentation. Organisations could develop training courses or open forums aimed at enhancing learning within the organisation covering:

- The identification of managers learning needs
- Mechanisms to share knowledge (IT, time, physical space)
- Regularly reviewing performance and learning
- Providing feedback on performance and learning
- Developing learning activities and reviewing such activities
- Providing a forum where learning activities can be shared within the company
- Recognising the importance of emotions in the learning process

9.5 Overall conclusion

One of the few things that organisational researchers agree on is the importance of innovation to organisational competitiveness and effectiveness (Wolfe, 1994). Innovation is widely recognised as "both a major goal of economic activity and one of the most important instruments through which organisations and countries gain and sustain competitive advantage in globally competitive marketplaces. A central plank of the European Community's industrial policy, for example, is that:

The Community and the Member States shall ensure that the conditions necessary for the competitiveness of the Community's industry exist. For that purpose, in accordance with a system of open and competitive markets, their action shall be aimed

at:...fostering better exploitation of the industrial potential of policies of innovation, research and technological development. (European Act of 1986 – 130.1 Th.) (Fonseca, 2002). Therefore, it is not surprising that a wealth of research is dedicated to the question – what determines innovation?

Kanter (1988) argues that social arrangements foster innovation and that an organisation's leaders can design these social arrangements. She believes that an organisations top team and the 'right' environment (one where there is support for risk taking and creativity) are important predictors of the innovative process. While the exploration of the role of top team and the 'right' environment in determining innovation is nothing new, most studies focus on either one or the other. This research explores innovation at both a team level and an organisational level in order to get a richer understanding of this valuable yet often elusive phenomenon.

A better understanding of innovation not only enhances competitiveness and productivity but also enriches the experiences of those working in organisations and enables them to reach their full potential. After all, as Arthur Koestler once remarked "the principle mark of genius is not perfection but originality, the opening of new frontiers".

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APPENDIX A

CEO Interview Schedule

This thesis is part of a larger project – appendix A includes items used in this thesis only

Introduction Outline **CEO INTERVIEW** [CEO copy]

CODE:_____

Thank you for seeing me today. I am visiting with you today to talk about an important study we are conducting at The Irish Management Institute and The University of Limerick. A similar study is underway at the University of Maryland in the United States. We are all talking to a select group of companies like your own.

2. Purpose of the study.

Researchers have found that knowledge can be a critical competitive advantage for many companies, especially those in your type of industry where innovation and new approaches drive performance. Knowledge and how it is developed and exploited is of particular interest to us because it represents an intangible resource that rival firms will have difficulty understanding and imitating. Despite its importance, management researchers have not focused attention on how to effectively manage knowledge, or more importantly, how to compete or sustain competitive advantage in an era where effective knowledge management is critical.

The present research explores how and in what ways investments in human, intellectual and social skills enhance the knowledge capability of the firm and how these relate to organisation performance. Of particular interest are the organisational processes and systems, such as information technology systems and human resource systems that allow a firm to capture the benefits of knowledge, as opposed to losing these benefits to individual employees or competitors. We are also interested in how hard assets are distributed in a firm and how this distribution interacts with the development of knowledge as a strategic asset. We want to investigate the types of resources that matter, the ways in which different types of resources are best combined, and how all of these resources relate to performance.

There will be approximately 35 firms similar to yours in our Irish sample. The study is sponsored by the Irish Management Institute in collaboration with the University of Limerick; a similar study, on over 60 high-tech firms similar to your own, is being undertaken at the R. H. Smith School of Business at the University of Maryland in the United States. The study will have specific pay-offs for each participating firm in the form of numbered feedback reports and research summaries. The feedback reports will provide you with both an overview of the findings and specific benchmarks of your company versus the composites of the other firms, both Irish and US in the study. Thus, you will have a report that provides you with insights into your intangible assets as well as a comparison of how other similar high-tech companies are developing and exploiting their intangible resources. It is also probable that we will conduct a

conference at the Irish Management Institute to which you would, of course, be invited.

We would like your company to participate in the study. Would you agree to participate?

Participation requires the following.

- There are four types of survey instruments that we will administer: This interview (which will take about 40 minutes), a top management team survey, a survey of the core employees your firm relies on to implement its strategy, and a human resource survey by the HR manager.
- You need to define the top management group and a set of key core workers within your organisation.
- Each of the individuals in these groups will receive a questionnaire which can be completed here or at home in less than one hour.
- We will also require annual financial statements (for purposes of linking certain variables to performance). All of the information we collect from your company will be kept **strictly confidential**—at no time will we release any information on specific firms. Our focus is on trends across firms such as yours.
- After we have collected all the data we will spend approximately 3 months analyzing the data. At that time we will be contacting you and providing you with detailed summaries of our study.

Can we count on your help?

Procedures.

The first step is to initial this Memo to each member of your top management group, HR manager and core workers indicating your desire for them to complete the questionnaire within the next three [3] days. I will include the letter in a special envelope for each participant.

I will return within a week for the completed questionnaires.

I also need the name of a contact person who can hold the sealed envelopes containing the completed questionnaires until I return.

- **The Top Management Group.**

We define the top management group as anyone who makes or is involved with decisions affecting your company's strategy. At the extreme, the team could include all employees. However, we only want to tap the very top-level members, perhaps the top 4, 5 or 6 most important employees.

<table>
<tr><td></td><td colspan="2">How many members are in your top management group?</td><td></td></tr>
<tr><td rowspan="2">Top Team Members</td><td colspan="3">Who are they?</td></tr>
<tr><td colspan="3">1.
2. Tt
3. Tt
4. Tt
5. Tt</td></tr>
<tr><td rowspan="2">CODE:
• IR---</td><td rowspan="2">Name of Contact Person</td><td colspan="2">Telephone No:</td></tr>
<tr><td colspan="2">Email:</td></tr>
</table>

We also want to identify a set of five to ten (5 to 10) core employees who are fundamental to carrying out your company's strategy. These workers could be in each functional area or they could be a select group of people in specialised areas of the organisation, such as R&D. The key distinction is that they are responsible for developing, defending and maintaining your firm's key strategic resources, whether these be equipment, research and development, marketing, manufacturing or whatever. These employees need not be managers, but may be the line employees that drive innovation or are key to the performance of the firm.

Who are these core employees and what areas are they in?

If you can't identify specific core workers, can you tell us which departments are core to the organisation and give us the names of managers in those departments so we can contact them for specific names?

Core Workers	1. A. N. Other 2. cw 3. cw 4. cw 5. cw 6. cw 7. cw

OK, now we can turn to today's interview; what follows are the questions directly relevant to the study.

Q1. Let me ask a couple of questions regarding the **Size** of your company.

1a	No. of fulltime employees in 1997	
1b	No. of fulltime employees in 1998	
1c	Percent of professional management vs. core employees vs. non core employees	
1d	Number of physical locations	
1e	Percent of Sales derived from international business	
GnTxt	• ..	

Q2. Now, let's talk about **Innovation.** In these questions we will be trying to assess the degree to which production or process innovation plays a role in your company's strategy.

2a	Please tell me the number of completely new **products** developed in the last year?		
	...last three (3) years		TMs
2b	Please tell me the number of **patents** filed for in the last year?		
	... last three (3) years		
2c	Please tell me the number of people assigned to R&D		
2d	Please tell me the number of scientists vs. other workers		
2e	What per cent % of your budget is R&D?		

2f	Could you please describe a recent innovation in product/service/process? When did this occur? Who was involved? • T • T • T	
2g	NEED TO PROMPT How do you try and encourage employees to exchange and combine ideas in order to enhance knowledge and the development of new ideas within the organisation? • ...	
2h	Do you provide specific **Time, Places** and **Systems** for employees to meet together to exchange and combine ideas in order to enhance knowledge and the development of new ideas within the organisation? Please describe. • ...	
2i	**Intellectual Capital**, and intangible assets in general, are often viewed as a function of the interactions between internal systems and structures, external constituencies, networks and structures, and human competencies. Please distribute 100 points among these three categories that reflects your perception of how your organisation **creates** intellectual capital.	
	• External Constituencies, Networks and Structures (Links to customers, suppliers, and various external networks)	
	• Internal Systems and Structures	
	• Human Competencies (Knowledge, Know-How and Experience)	
2j	In your estimation, what percentage % of the market value of this firm is composed of intellectual capital?	
GnTxt	• ..	

Q4. Now, let's talk about the **Core Competencies** of your organisation.

4a	What are the key functional areas of your organisation – those you consider core to the overall goals of your organisation? • ... • ...
4b	How do these core areas relate to competitive advantage? • ... • ...
4c	How do they relate to the products and services that you offer? • ... • ...
4d	How many workers assigned to build, defend and exploit these core competencies?
4e	Where are they located? • .. • ...
4f	Why are these workers core? • ... What do they do? • ...

Q6. Now we move to the **Network** of the Top Management Group.

6a	Does your TMG concentrate on building internal relationships, or does it focus most of its attention on building contacts outside the organisation? • .. Please Explain: • ..
6b	How do you encourage your top management team members to develop and maintain contacts with **KEY outside** constituencies such as key suppliers, competitors, customers etc. ? [Examples of things companies may do include; expense accounts, released time, your own time to support their efforts etc.] • ..
6c	How do you encourage our top management team members to develop and maintain contacts with **KEY internal** constituencies – the core employees or departments? [Examples of things companies may do include; expense accounts, released time, your own time to support their efforts etc.]

What per cent % of your business falls into each of the following categories? [Total = 100%]

		PRODUCTS OR SERVICES	
CLIENTS		Existing Products	New Products
	New Clients		
	Old Clients		
GnTxt	• ..		

Q10. PERFORMANCE:

a. What is the proper way to evaluate your firm's performance (your objective), and why?:

b. How does your firm compare to the industry average on this measure?

I now want to ask you how your company is currently **performing compared** to other companies in the same industry. [Use the table below and circle the relevant number]

How would you assess your company's .....

	A lot better than average	Better than average	About average for the industry	Below average	A lot below average	No comparison possible	Relevant data not available
ROS	1	2	3	4	5	6	7
ROA	1	2	3	4	5	6	7
ROI	1	2	3	4	5	6	7
SG	1	2	3	4	5	6	7

	How much do you think this company is worth right now? £ or $	
	How much do you think it was worth a year ago? £ or $	

And now just a few final questions on your top management.

	Would you describe your senior managers as a top management team (TMT) or a top management group (TMG) ? • ..
	Are there advantages to one over the other? • .

	What are the most difficult situations that you face in managing this top team/group? • .
	How do you handle these? • . .
	How do you handle tension within the top team/group?
	And one final question, How and When was this company started [spin off multinational; MBO, entrepreneurial start-up etc.] When: _____ How ?....

Thank you.

APPENDIX B

Letter of Endorsement

Company name

Date

Dear

The Irish Management Institute and the University of Limerick are conducting an important survey on Management, Knowledge and Intellectual Capital within indigenous Irish companies in the software and IT sector.

I would be very grateful if you would give your full co-operation to the researchers by completing the attached survey. Individual responses will not be revealed to anyone either within or outside **Company Name.**

The benchmarks resulting from this research may prove useful to us in the future.

Yours sincerely,

Name of Company CEO

APPENDIX C

TMT Survey

This thesis is part of a larger project – appendix C includes items used in this thesis only

Part A: Background Information

Regarding yourself:

1. What is your current age? _____ years
2. What is your gender? (check one) ☐ Male ☐ Female

Regarding your present employer:

3. What is your job title?
   - ☐ Chief Executive Officer
   - ☐ Chief Operating Officer
   - ☐ Executive Vice President
   - ☐ Senior Vice President
   - ☐ Chief Financial Officer
   - ☐ Vice President
   - ☐ Other: _____
4. What is your functional area?
   _____
5. How long have you had this job?
   _____ years _____ months
6. How long have you worked for this employer?
   _____ years _____ months

Regarding your entire working career:

7. About how many different jobs have you had with this employer?
   _____ different jobs
8. What role did you play in the founding of this organisation?
   - ☐ I am the sole founder of this firm.
   - ☐ I am a co-founder of this firm.
   - ☐ I was not involved in founding this firm.
9. How long have you worked full-time?
   _____ years _____ months
10. How many years have you worked full-time in this industry?
    _____ years _____ months
11. In how many industries have you worked full-time during your career? _____ different industries
    What industries? _____

Regarding your educational background:

12. How many years of post-2nd level education do you have?
    _____yrs. Which 2nd level school? _____
13. Please check all the post-2nd level qualifications you have and list your major areas of study and the names of the degree-granting institutions:

- ☐ Cert./Diploma
  What was your major(s)? _____
  Where did you receive your degree _____
- ☐ BSc/BA/BComm
  What was your major(s)? _____
  Where did you receive your degree _____
- ☐ MSc/MA/MBS
  What was your major(s)? _____
  Where did you receive your degree _____
- ☐ Ph.D.
  What was your major(s)? _____
  Where did you receive your degree _____
- ☐ Additional degrees: _____
  What was your major(s)? _____
  Where did you receive your degree _____

Part G: Group Dynamics

The following items ask about how the **top management group (TMG)** in your company works together. Please ***write in*** the number showing how much you agree with each of the following statements, using the following numbers:

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

___ 1. This TMG's members are known to be successful at the things they try to do.

___ 2. Our TMG tends to be very formal in its interactions.

___ 3. Members of the TMG really look out for what is important to me.

___ 4. Members of the TMG are very capable of performing their jobs.

___ 5. In this TMG, members are sometimes angry after a decision has been made.

___ 6. Communication between TMG members is always in writing.

___ 7. Members of this TMG are ready to defend each other from criticism by outsiders.

___ 8. My needs and desires are very important to other TMG members.

___ 9. There are personality clashes within this TMG.

___ 10. Our TMG uses rather formal communication channels.

___ 11. Within the TMG, some members always share the same positions and interests on the strategic decisions we make.

___ 12. There is a great deal of competition among TMG members.

___ 18. Differences about the factual content of decisions rarely occur in this TMG.

___ 19. Members of the TMG will go out of their way to help me.

___ 20. I never have to worry about whether members of this TMG will stick to their word.

___ 21. Managers in the TMG try hard to be fair in their dealings with others.

___ 22. In this TMG, there are often disagreements over different ideas about important decisions.

___ 23. This TMG has stable alliances among some of the members.

___ 24. The members of this TMG have much knowledge about the work that they need to do.

___ 25. There are many different ideas expressed within the TMG when making important decisions.

___ 26. Members of the TMG have a strong sense of justice.

___ 27. TMG members are very concerned about my welfare.

___ 28. I can usually predict which members of the TMG will support each other's positions on the strategic decisions we make.

___ 29. Members of the TMG are willing to help each other on the job.

___ 13. Interactions between TMG members are very informal.

___ 14. I sense personal friction between members of the TMG.

___ 15. Members of the TMG really stick together.

___ 16. Sound principles seem to guide the behavior of members of this TMG.

___ 17. There is harmony within this TMG.

___ 30. There is tension between members of this TMG.

___ 31. Members of the TMG get along with each other well.

___ 32. I feel very confident about the TMG's members' skills.

___ 33. Within our TMG, a subset of the members work together to support each other's positions.

Part H: TMG Climate

The next set of items ask about **how the TMG operates as a team.** Please ***write in*** the number indicating how much you agree or disagree with each of the following statements, using the following numbers:

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

___ 1. We regularly discuss whether the TMG is working effectively together.

___ 2. The TMG often reviews its objectives.

___ 3. In this TMG, we modify our objectives in light of changing circumstances.

___ 4. The TMG often reviews its approach to getting the job done.

___ 5. This team is prepared to challenge organisational practices and policies.

___ 6. People in this TMG often teach each other new skills.

___ 7. How well we communicate information is often discussed.

___ 8. TMG members are often unfriendly.

___ 12. The methods used by the TMG to get the job done are often discussed.

___ 13. Team strategies are rarely changed.

___ 14. When things at work are stressful, the TMG is not very supportive.

___ 15. The way decisions are made in this TMG is rarely altered.

___ 16. TMG members provide each other with support when times are difficult.

___ 17. People in this TMG are slow to resolve arguments.

___ 18. Conflict tends to linger in this TMG.

___ 19. Conflicts are constructively dealt with in this TMG.

___ 9. When things at work are stressful, we pull together as a team.

___ 10. Within this TMG, members who voice their opinion in group discussions are perceived as valuable team members.

___ 11. TMG members are encouraged to speak their minds.

___ 20. TMG members are open to constructive criticism from each other about work ideas and arguments.

___ 21. It is expected in this TMG that we will fully disclose critical information with each other.

The next set of questions below ask about **your own beliefs and attitudes.** Please ***write in*** the number indicating how much you agree with each of the following statements, using the following numbers:

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

___ 1. I often review my work objectives.

___ 2. I often review the methods I used to get the job done.

___ 3. I often review how well I communicate information with colleagues on work-related issues.

___ 4. I often review my approach to getting the job done.

___ 5. I often reflect upon whether I am working effectively.

___ 6. I rarely change my work strategies.

___ 7. I rarely change the methods and information I use to make decisions at work.

___ 8. I am prepared to challenge organisational policies and practices.

PART I: ORGANISATIONAL LEARNING

Please use the following scale to rate the extent to which you agree with these statements regarding how information is exchanged in your organisation:.

1 = strongly disagree 2 = somewhat disagree 3 = neutral
4 = somewhat agree 5 = strongly agree

1. _____ Employees in this organisation meet frequently to discuss work-related ideas and new developments.
2. _____ Employees have difficulty getting together to exchange new ideas or developments.
3. _____ Employees feel free to contact anyone in the organisation to discuss new ideas or developments.

4. _____ Employees in this organisation are always available to discuss new ideas or developments.
5. _____ Employees here feel free to contact anyone outside the organisation to discuss new ideas or developments.
6. _____ Employees are restricted from talking to people outside the company about their current projects.
7. _____ Employees see benefits from exchanging and combining ideas with each other.
8. _____ The most valuable ideas seem to come when our employees pool their efforts.
9. _____ Employees believe that by exchanging and combining ideas they can move new projects or initiatives forward more quickly than they can by working alone.
10. _____ Employees believe that, by exchanging and combining ideas, employees in this firm can create value for the company.
11. _____ Getting employees to discuss new ideas and developments is critical for the success of this company.
12. _____ Employees gain great personal satisfaction from working with others in this firm to find new innovations or ideas.
13. _____ Employees find that exchanging and combining ideas with their coworkers is one of the most motivating parts of their job.
14. _____ Employees here feel that one of the most enjoyable aspects of their job is working with other employees to develop new ideas that help this company.
15. _____ In general, employees find it exciting to work with others to develop new ideas that help our business.
16. _____ Employees in this firm are proficient at combining and exchanging ideas to solve problems or create opportunities.
17. _____ Employees in this company **do not** do a good job of sharing their individual ideas to come up with new ideas, products, or services.
18. _____ Employees here are capable of sharing their expertise to bring new projects or initiatives to fruition.
19. _____ The employees in this company have learned to effectively pool their ideas and knowledge.
20. _____ It is rare for our employees to exchange and combine ideas to find solutions to problems.
21. _____ By combining our ideas, employees in this company find creative ways to develop new opportunities.
22. _____ Employees at this company keep each other on track concerning ideas and new developments
23. _____ Our employees track their progress over time on ideas and new developments.
24. _____ Employees here periodically reflect on what direction their efforts are taking them.
25. _____ Employees make adjustments in how they are working with others if they begin to see that their efforts are taking this company down the wrong path.
26. _____ Employees learn from one another on a daily basis.

27. _____ Employees in this company grow and develop on a daily basis from their association with other employees.

28. _____ The opportunity for individual growth and development in this organisation is low.

29. _____ At the end of each day, our employees feel that they have personally grown and developed from exchanging and combining ideas with other employees.

30. _____ It is difficult to keep abreast of all that ideas that are being exchanged and combined in this organisation.

31. _____ Employees at this company walk away from their interactions with each other with more knowledge than they had when they started.

That was the final set of questions for the survey. We appreciate your time and effort in answering these questions. Thank you again for your help!

ADDITIONAL COMMENTS FOR THE RESEARCHERS:

We certainly encourage any comments (please feel free to use this page) that you might have about how your company encourages employees to share information with each other and increase the flow of knowledge. Are there particular practices, policies, systems, events, or actions your company uses to make information more available to employees either by increasing the exchange between employees or by bringing in new information from outside the company. In addition, we would be interested in any other thoughts you might have about this study. Thank you once again for helping us to increase our understanding of how companies like yours increase the flow of knowledge between employees.

APPENDIX D

Core Employee Survey

This thesis is part of a larger project. Appendix D contains only items used in this study

Code_____

GENERAL INSTRUCTIONS—CORE EMPLOYEE

imi

ISH MANAGEMENT INSTITUTE

NIVERSITY of LIMERICK

OLLSCOIL LUIMNIGH

ROBERT H. SMITH SCHOOL OF BUSINESS

SURVEY

This survey is designed to find out about the makeup, functioning, perceptions, and social networks of employees within your organisation. Key themes covered in the survey concern your background, your perceptions of certain characteristics of your organisation, and your connections with other people both within and outside of the organisation.

Please try to answer the questions as honestly and as candidly as possible. ***There are no trick questions***: this is NOT a test, so there are no right or wrong answers. We suggest that you move through the survey quickly without thinking about it too much—your first response usually will be the most accurate. The survey will take some time to complete—we estimate about 45 – 50 minutes. You might consider taking a break midway through. Also, you will probably find some redundancy in the questions. This is deliberate and is done for statistical reasons. Please answer the questions even if they seem similar to ones you've already answered; you need not go back to the previous questions.

This is a strictly confidential survey. ***Under no circumstances will your individual responses be made available to anyone in your organisation.*** Information from the survey will be compiled at the University into overall research reports consisting of aggregated results from many companies. The results may be published at a later time in aggregate form only. Please remember, individual responses will ***not*** be a part of these reports and will **not** be available to anyone except the research team.

In advance, we wish to thank you for your participation in this study. It is through your participation in studies like this one that we can advance our understanding of work organisations. We are confident that results of this study will benefit your organisation and will provide important insights into ways of increasing organisational effectiveness.

Please complete the survey by _____, place in the attached envelope and ***seal***. Return to _____ who is the contact person in your organisation. The researchers will come back to pick up the surveys. Alternatively, you may send your survey back to the researchers using the attached preaddressed, stamped envelope by the date listed above. If you have any questions, please call one of the research directors at the University of Limerick or the Irish Management Institute.

PART 1: PERSONAL BACKGROUND

Regarding your Current Company:

1. What is your title or position?

   _____

2. In what functional area do you work?

   _____

3. Do you receive additional training throughout the year that is specifically related to performing in your current job?

   ☐ *Yes* ☐ *No*

If so, please estimate how many hours of this training are spent on the following:

a. **Formal** on-the-job training: _____ **hours**
b. **Informal** on-the-job training: _____ **hours**
c. Classroom training conducted by other members of your organisation: _____ **hours**
d. Classroom training conducted by people external to your organisation (e.g., seminars, external subject experts): _____ **hours**

Regarding Your Work Experience:

4. How many years have you worked at your **present organisation?**
   _____ years _____ months

5. How many years have you worked in your **current position?**
   _____ years _____ months

6. How many years have you worked **in this industry?**
   _____ years _____ months

7. How many years have you held a **position similar** to the one you currently hold?
   _____ years _____ months

8. How many years of **full time** experience do you have?
   _____ years _____ months

Regarding Your Education:

9. How many years of post-2nd level education do you have, if any?
   _____yrs. Which 2nd level school? _____

10. Check **all** of the post-2nd level qualifications that you have.

☐ Cert/Diploma
What was your major(s)?
_____
Where did you receive your degree
_____

☐ BSc/BA/BComm
What was your major(s)?
_____
Where did you receive your degree
_____

☐ MSs/MA/MBS
What was your major(s)?
_____
Where did you receive your degree
_____

☐ Ph.D.
What was your major(s)?
_____
Where did you receive your degree
_____

☐ Other Degrees
What were degrees and majors?
_____
_____
Where did you receive these degrees
_____
_____

PART 7: ORGANISATIONAL LEARNING

Please use the following scale to rate the extent to which you agree with these statements regarding how information is exchanged in your organisation:.

1 = strongly disagree 2 = somewhat disagree 3 = neutral 4 = somewhat agree 5 = strongly agree

____ 32. Employees in this organisation meet frequently to discuss work-related ideas and new developments.

____ 33. Employees have difficulty getting together to exchange new ideas or developments.

____ 34. Employees feel free to contact anyone in the organisation to discuss new ideas or developments.

____ 35. Employees in this organisation are always available to discuss new ideas or developments.

____ 36. Employees here feel free to contact anyone outside the organisation to discuss new ideas or developments.

____ 37. Employees are restricted from talking to people outside the company about their current projects.

____ 38. Employees see benefits from exchanging and combining ideas with each other.

____ 39. The most valuable ideas seem to come when our employees pool their efforts.

____ 40. Employees believe that by exchanging and combining ideas they can move new projects or initiatives forward more quickly than they can by working alone.

____ 41. Employees believe that, by exchanging and combining ideas, employees in this firm can create value for the company.

____ 42. Getting employees to discuss new ideas and developments is critical for the success of this company.

____ 43. Employees gain great personal satisfaction from working with others in this firm to find new innovations or ideas.

____ 44. Employees find that exchanging and combining ideas with their coworkers is one of the most motivating parts of their job.

____ 45. Employees here feel that one of the most enjoyable aspects of their job is working with other employees to develop new ideas that help this company.

____ 46. In general, employees find it exciting to work with others to develop new ideas that help our business.

____ 47. Employees in this firm are proficient at combining and exchanging ideas to solve problems or create opportunities.

____ 48. Employees in this company **do not** do a good job of sharing their individual ideas to come up with new ideas, products, or services.

____ 49. Employees here are capable of sharing their expertise to bring new projects or initiatives to fruition.

____ 50. The employees in this company have learned to effectively pool their ideas and knowledge.

____ 51. It is rare for our employees to exchange and combine ideas to find solutions to problems.

____ 52. By combining our ideas, employees in this company find creative ways to develop new opportunities.

____ 53. Employees at this company keep each other on track concerning ideas and new developments

____ 54. Our employees track their progress over time on ideas and new developments.

____ 55. Employees here periodically reflect on what direction their efforts are taking them.

____ 56. Employees make adjustments in how they are working with others if they begin to see that their efforts are taking this company down the wrong path.

____ 57. Employees learn from one another on a daily basis.

____ 58. Employees in this company grow and develop on a daily basis from their association with other employees.

____ 59. The opportunity for individual growth and development in this organisation is low.

____ 60. At the end of each day, our employees feel that they have personally grown and developed from exchanging and combining ideas with other employees.

____ 61. It is difficult to keep abreast of all that ideas that are being exchanged and combined in this organisation.

____ 62. Employees at this company walk away from their interactions with each other with more knowledge than they had when they started.

PART 8: ORGANISATIONAL CULTURE

Please use the following scale to assess the following statements describing the culture of your organisation

1 = strongly disagree 2 = disagree 3 = neutral
4 = agree 5 = strongly agree

____ 1. Being innovative
____ 2. Risk taking
____ 3. Willing to experiment
____ 4. Quick to take advantage of opportunities
____ 5. Careful
____ 6. Rule-oriented
____ 7. Security of employment
____ 8. Stable
____ 9. Predictable
____ 10. Not constrained by many rules
____ 11. Respect for individual rights
____ 12. Tolerance
____ 13. Fairness
____ 14. Achievement orientation
____ 15. Action orientation
____ 16. Results oriented
____ 17. High expectations for performance
____ 18. Analytical
____ 19. High attention to detail
____ 20. Precise
____ 21. Team-oriented
____ 22. Working in collaboration with others
____ 23. People oriented
____ 24. Aggressive
____ 25. Competitive
____ 26. Socially responsible

PART 9: ORGANISATIONAL ADAPTIVENESS

Please use the following scale to rate the extent to which you agree with these statements regarding the exchange of information in your organisation:.

1 = strongly disagree 2 = somewhat disagree 3 = neutral
4 = somewhat agree 5 = strongly agree

____ 1. In this organisation, the way people work together is readily changed in order to improve performance.
____ 2. The methods used by this organisation to get the job done are discussed often.
____ 3. There are regular discussions as to whether people in this organisation are working effectively together.
____ 4. Employees have difficulty getting together to exchange new ideas or developments.
____ 5. In this organisation objectives are modified in light of changing circumstances.
____ 6. In this organisation, time is taken to review organisational objectives.
____ 7. I often review my work objectives
____ 8. I often reflect upon whether I am working effectively.
____ 9. I often review the methods I use to get the job done.
____ 10. I modify my work objectives in the light of changing circumstances at work.
____ 11. I rarely change my work strategies
____ 12. I often review how well I communicate information with colleagues on work-related issues
____ 13. I often review my approach to getting the job done.
____ 14. I rarely change the methods and information I use to make decisions at work.
____ 15. I am prepared to challenge organisational policies and practices.

That was the final set of questions for the survey. If you wish to share any additional comments please use the space below. We appreciate your time and effort in answering these questions.

Thank you again for your help!

ADDITIONAL COMMENTS FOR THE RESEARCHERS:

We certainly welcome any comments that you may have about how your company encourages employees to share information with each other and increase the flow of knowledge. Are there particular practices, policies, systems, events, or actions that your company uses to make information more available to employees either by increasing the exchange between employees or by bringing in new information from outside the company. In addition, we would be interested in any other thoughts you might have about this study. Thank you once again for helping us to increase our understanding of how companies like yours increase the flow of knowledge between employees.

APPENDIX E

TMT Interview Schedule

Interview Schedule – code 050

General questions about the team composition
Function of members
Experience of members

Reflexivity

Review of objectives?

Change objectives?

Discuss how things are done?

Do you change the way decisions are made?

Trust

Are people comfortable with each other?

Conflict
Would you be comfortable questioning other team members' viewpoints?

Is there ever tension in the team?

How does the team deal with that?

How does the team deal with conflict?

Would it actively try to create certain types of conflict?

Does conflict ever get personal?

Innovation

How important do you see innovation as being for this company – what it's actual or strategic role?

how is innovation defined in the company? What place does it occupy within the list of organisational priorities?

How did team generate ideas?

Brainstorming etc

Did team feel comfortable sharing ideas?

Was it valuable?

In what way

How could it have been improved?

Did the team question the objectives or processes?

Generate alternative objectives or strategies

Explicitly discuss each others' assumptions about the innovative process?

Discuss how it went

What went right

What went wrong

Why?

How could it have been avoided?

Did you discuss as a team where you went wrong?

In what way do you encourage innovative practice outside the team? What is your sense regarding the adequacy of these arrangements?

How is knowledge /info shared outside the top team?

Do people engage in learning activities? What?

Why?

how do you explain the level of innovation within your company? How do you see the role of existing structures and forces within the org in the encouragement of innovation?

Appendix F

Complete Factor Analysis

Factor analysis - trust items

Item	Factor 1	Factor 2
TMT know to be successful at the things they do	-0.097	**0.694**
Feel confident about TMT member skills	0.076	**0.756**
TMT members are capable of performing their jobs	-0.027	**0.690**
Sound principles seem to guide the behaviour of this TMT	0.315	**0.553**
TMT members have much knowledge about work they need to do	0.114	0.407
Never worry whether TMT members will stick to their word	0.438	0.257
Members of the TMT will go out of their way to help me	**0.663**	0.033
My needs/desires are important to other TMT members	**0.612**	0.005
Managers in TMT try hard to be fair in their dealings with others	**0.554**	0.310
Members of the TMT have a strong sense of justice	**0.605**	0.103
TMT members are very concerned about my welfare	**0.889**	-0.165
TMT members look out for what is important to me	**0.503**	-0.006
Factor eigenvalues	**5.13**	**1.41**
% of variance explained	**42.78**	**11.74**
Cronbach's alpha	**0.82**	**0.81**

Factor Analysis – Reflexivity Items

Items	Factor 1	Factor 2	Factor 3	Factor 4
Employees regularly discuss if TMG is working effectively together	-.07	**0.653**	.089	-.043
TMG often reviews its objectives	.086	**0.849**	-.016	-.117
In TMG we modify objectives in light of changing circumstances	.061	**0.641**	-.014	.084
TMG often reviews its approach to getting the job done	-.061	**0.600**	.104	.208
Team is prepared to challenge organizational practices and policies	.062	-.001	.191	**.675**
People in this TMG often teach each other new skills	.062	.140	.110	**.559**
How well we communicate information is often discussed	-.152	.150	-.058	.465
TMG members are often unfriendly	-.348	-.059	-.128	-.321
When things at work are stressful, we pull together as a team	.194	.160	**.734**	-.024
Methods used by the TMG to get the job done are often discussed	.156	.458	-.145	-.175
TMG strategies are rarely changed	-.314	-.052	.287	-.333
When work is stressful, TMG is not very supportive	-.436	-.077	-.548	-.075
The way decisions are made in the TMG is rarely altered	-.158	-.222	.133	-.239

TMG members provide me with support when things get difficult	.134	-.023	.734	.291
TMG members are slow to resolve arguments	-.777	-.077	-.032	.003
Conflict tends to linger in this TMG	-.899	-.085	-.073	.136
Conflicts are constructively dealt with in this TMG	.597	.047	.258	.048
Factor eigenvalues	**6.23**	**2.271**	**1.24**	**1.12**
% of variance explained	**36.65**	**13.359**	**7.3**	**6.56**
Cronbach's alpha	**0.86**	**0.801**	**0.56**	**0.70**

Factor analysis - organisational climate items

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
1. Being innovative	.331	.122	.225	**.644**	-.158	-.06	.05
2. Risk taking	.153	-.041	-.0027	**.762**	.091	.16	-.16
3. Willing to experiment	.106	.222	-.093	**.723**	.177	.20	-.05
4. quick to take advantage of opportunities	**.512**	.060	.155	.470	-.112	.19	.05
5.careful	-.087	-.208	-.487	.342	.067	.48	-.12
6. rule oriented	.037	-.143	.024	-.257	.081	-.79	.15
7. security of employment	.0007	-.067	.013	-.069	.117	-.04	**.90**
8. stable	.105	.144	.164	-.113	.024	-.14	**.86**
9. predictable	.032	.031	-.043	.513	-.058	.39	-.36
10.not constrained by many rules	.236	.141	-.032	.067	-124	**.79**	-.02
11. respect for individual rights	.073	**.842**	.075	.058	.110	.09	.05
12. tolerance	.033	**.762**	.068	.045	.047	.12	.10
13. Fairness	.188	**.769**	-.067	-.086	.217	.18	-.08
14. Achievement orientation	**.732**	.197	.202	.008	.119	.12	.09
15.action orientation	**.745**	.190	.079	.235	.048	-.10	.17
16. results oriented	**.813**	.024	-.049	.073	-.004	.07	-.02
17. High expectations for performance	**.681**	-.030	.204	.103	.034	.006	-.09
18. Analytical	.334	-.065	.564	.169	.109	.15	.08
19.high attention to detail	.051	.213	.832	.050	.216	-.07	.06
20. precise	.126	.167	.839	.051	.203	-.15	.04
21. team-oriented	.093	.232	.353	.075	**.776.**	-.07	.09
22. working in collaboration with others	.177	.170	.285	.109	**.787**	-.12	.08
23. people oriented	.092	**.532**	.233	.217	.401	-.08	.12
24. aggressive	.336	-.252	.352	.202	**-.520**	-.01	-.06
25. competitive	.381	-.029	.471	.264	-.410	.16	.07
26. socially respnsible	-.027	**.641**	.208	.415	.027	-.25	.17
Factor eigenvalues	5.97	3.87	2.68	1.69	1.31	1.2	1.0
% of variance explained	22.97	14.9	10.3	6.5	5.06	4.6	3.9
Cronbach's alpha	.768	.792	.80	.704	.893	.59	.82

Factor analysis - organisational learning variables

Items	Factor 1	Factor 2
Employees meet frequently to discuss ideas and new developments	0.063	**0.546**
Employees are always available to discuss new ideas/ developments	-0.077	**0.712**
Employees have difficulty getting together to exchange new ideas	-0.109	**0.695**
Employees feel free to contact anyone inside the company to discuss new ideas or developments	-0.035	**0.540**
Employees learned to pool ideas and knowledge	0.142	**0.590**
Employees are proficient at combining and exchanging ideas to solve problems/create opportunities	0.189	**0.521**
Employees are capable of sharing expertise to bring new projects to fruition	0.180	**0.513**
Employees believe that by combining and exchanging information they create value for the organisation,	**0.558**	0.118
Employees believe that exch\combining ideas moves new projects faster	**0.602**	0.143
Employees find exch\combination of ideas with members of this firm one of the most motivating parts of their jobs	**0.880**	-0.201
Employees feel working with other employees to develop new ideas for the organisation is one of the most enjoyable aspects of their jobs.	**0.745**	-0.018
Employees find it exciting to work with others to develop new ideas	**0.527**	0.155
Employees gain personal satisfaction from working with others on new ideas	**0.620**	0.110
Employees believe discussion of new ideas is critical to success in this business	*0.403*	*-0.011*
Most valuable ideas seem to come when our employees pool their efforts	*0.486*	*-0.021*
Difficult to keep up with new ideas being exchanged and combined	*-0.125*	*-0.036*
Employees see benefits from exchanging and combining ideas with each other	*0.182*	*0.456*
Factor eigenvalues	**5.78**	**1.76**
% of variance explained	**34.02**	**10.33**
Cronbach's alpha	**0.84**	**0.81**

Appendix F

Regression analysis for functional diversity predicting number of major adaptations t2

Regression for Functional Diversity Predicting no. of Major Adaptation (T2)

Predictor variable	R^2	Beta	F	df	t	Sig t
Functional Diversity	.12	.35	3.5	26	1.88	.07
With controls						
controls						
Firm size	.002	-.04	1.32	24	-.21	.83
Market innovation (t1)	.07	.26	1.32	24	1.23	.22
Step 2						
Functional diversity	.16	.31	1.32	24	1.51	.14