Organisational Learning and Innovation: Implication of Dual-level Leadership, Trust, Task Interdependence on Intention to Share Knowledge and Innovation

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Abstract

Three models have been developed based on the concepts from Bass and Avolio (1989), Pearce and Gregersen (1991), McAllister (1995), West and Anderson (1996), Bock et al. (2005) and Wang and Howell (2010). Hypotheses defined in the models were examined by using a sample of 143 team members from 41 work teams at a university in Hong Kong. Group- and individual-focused transformational leadership (TFL) behaviours were found to be positively related to intention to share knowledge and team innovation. Group-focused TFL behaviour was also found to be positively related to intention to share knowledge through the mediating influence of task interdependence and positively associated with team innovation through the mediating influence of affect-based trust.

The study makes four contributions to the literature with regard to organisational learning and innovation. 1) The attributes from group- versus individual-focused TFL behaviours were measured simultaneously. Both Group- and individual-focused TFL behaviours were found to be positively related to team innovation and intention to share knowledge. As a result, researchers in team innovation and knowledge sharing should focus on both dimensions rather than only on either groups or on individuals. 2) Task interdependence has been found to be positively associated with intention to share knowledge but not with team innovation. The types of tasks and activities undertaken at educational institutions and the high level of homogeneity in the study sample may not have sufficient variety in task interdependence for any relationship to be detected. 3) Interpersonal trust has been found to be a factor of knowledge sharing in organisations. However, affect-based trust was found to be positively related to team innovation but not to intention to share knowledge in the current study. The findings can lead to a further investigation in this area. 4) Task interdependence and affect-based trust were found to have mediating roles in group-focused TFL and intention to share knowledge, and in group-focused TFL and team innovation respectively. The findings suggest that task interdependence can encourage team members’ intention to share knowledge, and affect-based trust is important to motivate team
innovation in organisations. In short, team leaders are advised to focus on a more interdependent structure at work to cultivate knowledge sharing among team members and build trust to promote team innovation.

Keywords: group-focused TFL, individual-focused TFL, team innovation, intention to share knowledge, affect-based trust, cognition-based trust, task interdependence.
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Chapter 1 Overview

Introduction

This chapter briefly outlines the background of the research, justifies the rationale of the dissertation project, briefly describes the research questions and summarises the hypotheses which are defined in Chapter 3 based on the concepts obtained through literature review. It also briefly explains the methodology adopted in the study and finally reports the findings in the survey.

1.1 Background to the Research

The research has been inspired by the ideas from Leadership and Performance beyond Expectations by Bass (1985), Knowledge Management in Theory and Practice by Dalkir (2005), Affect- and Cognition-based Trust as Foundations for Interpersonal Cooperation in Organisations by McAllister (1995), Behavioural Intention Formation Knowledge Sharing by Bock et al. (2005) and Innovation in Top Management Teams by West and Anderson (1996). As trust is found closely related to the action of knowledge sharing or exchange (Politis, 2003; Huang, Davison and Gu, 2008; Ma, Qi and Wang, 2008) and innovation (West and Farr, 1990) in organisations, the ideas of affect- and cognition-based trust from McAllister (1995), intention to share knowledge from Bock et al. (2005), team innovation from West and Anderson (1996) and individual innovation from Burningham and West (1995) are included in the study.

Exploring the Dual-level Effects of Transformational Leadership on Followers by Wang and Howell (2010) advocates that both individual and group levels leadership behaviour should be evaluated simultaneously in order to investigate the effects on followers at the both levels concurrently. Their scale of dual-level (individual and group levels) effects of transformational leadership inspires me an idea to measure the effectiveness of these two levels of transformational
leadership behaviour on followers’ performance and their intention to share knowledge.

Besides, Wang and Howell (2010) also suggest a further investigation on the moderating role of task interdependence between the dual-level transformation leadership behaviour and team performance. Task interdependence has been found to be potentially related to knowledge leakage among the colleagues who involve in a normal work flow (Smith, Organ and Near, 1983; Wong and Campion, 1991; Stewart and Barrick 2000). The five items of task interdependence from Pearce and Gregersen’s (1991) *Task Interdependence and Extrarole Behaviour* provided in the journal article are adopted.

In short, the dual-level transformational leadership behaviour (group- and individual-focused), interpersonal trust (affect- and cognition-based), task interdependence, intention to share knowledge and innovation (individual and team) are the five main elements to be studied in this research.

1.2 Justification for the dissertation Project

According to Dalkir (2005), innovation is new ideas applied to initiating or improving products, processes or services. Innovation involves change; however, not all changes involve new ideas or lead to improvements (p. 335). Organisational change in terms of innovation needs cooperation of all stakeholders in the organisation participating in the process (Bradshaw and Boonstra, 2004); the participants need to understand the rationale of the change as well as possessing the ability to change.

Dalkir (2005) argues that innovation is commonly mis-conceptualised. It is, in fact, closely linked to the generation of new knowledge or new linkages between existing knowledge rather than happens in isolation (p. 249). Learning from experience is a means of creating competitive advantages. The memory of an organisation is necessary to facilitate the learning process in the organisation (p.
33); therefore, knowledge or experience possessed by individuals in the organisation needs to be shared among individuals for a capacity of organisational memory.

To raise staff members' innovation capabilities, organisations should encourage staff members to participate in the process for sharing their knowledge or experience with other staff members. The increase of the knowledge flow facilitates the learning process of the staff members in the organisations and the staff members to learn with each other, and finally, learning capabilities of the staff members are raised and their ability to make change in the organisations is possibly raised (Hendry 1996).

Also, groups of people (communities) for knowledge sharing are the primary producers of social capital and provide an opportunity for individuals to form networks to share their professional interests (Darliki, 2005, p. 135). An effective knowledge sharing mechanism fosters staff members’ helping intention and learning ability in groups or teams, encourages knowledge exchange, in turn, facilitates innovation by encouraging free flow of ideas and the development of visions and strategies in the organization.

Transformational leadership behaviour influences followers' performance with regard to group or team innovation (Bass, 1985). In recent years, many researchers have investigated the effects of transformational leaders’ behaviour on followers’ performance (e.g. Casimir et al., 2006; Chen, et al., 2007; Schaubroeck and Peng, 2011). Wang and Howell (2010) argue that research focused on either individual or group levels leadership behaviour seems not adequate to discover the effects when two components coexist. The individual and group level effects of transformational leadership (TFL) on followers are; therefore, suggested being bound together for an analysis in order to investigate the effects concurrently.

In the literature review, transformational leadership behaviour, interpersonal trust and task interdependence were found to have significant impact on intention to
share knowledge and innovation. Thus, dual-level transformational leadership, interpersonal trust (affect- and cognition-based trust) and task interdependence are included in the study as the three main independent elements to be investigated for the relationships between the dependent variables, intention to share knowledge and innovation.

1.3 Research Questions and Hypotheses

The research issues in the study focus on the factors of transformational leadership (TFL) behaviour that possibly predict staff members’ intention to share knowledge and determine individual innovation and team innovation in organisations in the context of Hong Kong. Sixteen hypotheses are defined in Chapter 3. A summary of the hypotheses is provided below.

Twelve direct relationships are hypothesised. Individual-focused TFL behaviour is hypothesised negatively related to intention to share knowledge (Hypothesis 1a) but positively associated with individual innovation (Hypothesis 1b). Group-focused TFL behaviour is hypothesised positively related to interpersonal trust (Hypothesis 7a), task interdependence (Hypothesis 7b), intention to share knowledge (Hypothesis 1c) and team innovation (Hypothesis 4b) respectively. Interpersonal trust is hypothesised positively related to intention to share knowledge (Hypothesis 2b) and team innovation (Hypothesis 5). Cognition-based trust is presumed positively associated with affect-based trust (Hypothesis 2a). Task interdependence is hypothesised positively related to intention to share knowledge (Hypothesis 3) and team innovation (Hypothesis 6). Individual innovation is presumed positively associated with team innovation (Hypothesis 4a).

Four indirect relationships consisting of three mediating and one moderating relationships are hypothesised. Group-focused TFL behaviour is hypothesised positively related to intention to share knowledge through the mediating influence of task interdependence (Hypothesis 8). Group-focused TFL behaviour is
hypothesised positively related to intention to share knowledge through the mediating influence of interpersonal trust (Hypothesis 9a) and also positively associated with team innovation through the mediating influence of interpersonal trust (Hypothesis 9b). Lastly, group-focused TLF is hypothesised positively related to team innovation when task interdependence is high (Hypothesis 10).

1.4 Research Methodology

This is a quantitative research project. The survey is cross-sectional by using systematic sampling (one of the random sampling techniques), which targeted at a university in Hong Kong. The target population is all full-time staff members who aged 18 or over and currently working in the university. Since the sample frame is the email addresses of all staff members in the university, all elements in the university have equal possibility to be selected as one of the subjects in the sample.

The instrument involves eight constructs from five areas: 1) transformational leadership (consisting of group- and individual-focused transformational leadership behaviours), 2) interpersonal trust (consisting of affect- and cognition-based trust), 3) task interdependence, 4) intention to share knowledge sharing and 5) innovation (consisting of individual and team innovation) and they have been previously-validated in the past research. All items in the questionnaire were constructed with 5-point Likert scale for an analysis of possible relationships between the variables.

Prior approval has been granted by the authorities of the universities (the host and the target universities) to the researcher before the survey was undertaken in the surveyed university. Primary data was collected via an electronic questionnaire to save cost and administrative workload. Participant information statement with a hotlink to the survey questionnaire was sent to the participants through email. Reminders to the participants were sent weekly for ensuring the response rate.
The questionnaires were filled by the respondents separately when they were available, causality of data is controlled. Also, two different questionnaires were used to collect data from the immediate managers, supervisors or team leaders and their subordinates or team members; the potential problem of common method variance is addressed. Since the research purpose is to test the individual hypotheses rather than the paths of the three models defined in Chapter 3, the structural equation modelling for testing the paths defined in the models will not be undertaken in the current study.

1.5 Major Findings

Two hypotheses with regard to mediation relationship were identified in the research findings. Group-focused transformational leadership (TFL) behaviour was found to be positively related to intention to share knowledge through the mediating influence of task interdependence and also it was found to be positively associated with team innovation through the mediating influence of affect-based trust. No any moderation relationship was identified between the dual-level TFL and the dependent variables in the study, even though such relationship was suggested in the research study of Wang and Howell (2010).

Both group- and individual-focused TFL contribute to knowledge sharing intention of team members. Individual-focused TFL was found to significantly stimulating innovation in individual team members, in turn, such individual innovation contributed to team innovation collectively. Besides the significant relationship with intention to share knowledge, group-focused TFL was also found closely related to affect-based trust, task interdependence and team innovation.

Affect- and cognition-based trust was found to be interrelated as well as individual innovation and team innovation that both pairs of variables can predict with each other. Although affect-based was found to be positively related to team innovation, cognition-based trust was found to be negatively associated with team innovation.
Chapter 2 Literature Review

Introduction

This chapter discusses the issues of individual, team and organisational learning, transformational leadership, the people and task oriented leadership styles, leader-member exchange, interpersonal trust, task interdependence, and knowledge sharing, and its significance, innovation and team performance in terms of knowledge creation and innovation after a literature review covering the peer-reviewed journal papers published between 1930s and 2010s. Finally, the chapter discusses the gaps of research in these areas.

The first section discusses the process of learning in individuals, teams and organisations, and explains how knowledge traverses between individuals to team members and eventually resides in organisations. Employees are not only the targets but also the main media for organisational learning. A cultivation of motivation in organisations to encourage colleagues to share their knowledge with each other, leads to enhanced knowledge creation and retention in organisations (Argote, McEvily and Reagans, 2003).

Transformational leadership (TFL) behaviour is significant because it inspires followers’ motivation (Bass, 1985). In the second and third sections below, the concept of transformational leadership is introduced, and its significance in creativity and inspiration of followers are elaborated accordingly. However, research focused on individuals or groups separately does not adequately address the interdependence between these two levels of analysis (Kark and Shamir, 2002; Wang and Howell, 2010). Wang and Howell’s (2010) dual-level transformational leadership is discussed in the third section as a core concept of the study.

Leadership styles are simply classified as people and task orientations (Blake and Mouton, 1964). People oriented behaviour fosters trust as an issue between leaders and followers; task oriented behaviour provides a connection with task type and task interdependence (TI). In section 4, a grid model, originated by Blake
and Mouton (1964), is introduced to show managerial concerns for production and people. The definitions of people and task oriented behaviour are also included.

Interpersonal trust and task interdependence are presented in sections 5 and 6 respectively, due to the significant effects of trust and task interdependence on the two orientations (people and task). In section 5, a definition of trust is first introduced. Secondly, McAllister’s (1995) affect-based trust (ABT) and cognition-based trust (CBT), the two forms of interpersonal trust, are elaborated in detail. Thirdly, the influence of trust is linked to citizenship behaviours among colleagues in which it is associated with knowledge sharing. Section 6 concerns the history of the concept of and the rationale behind task interdependence. Research results with regard to the relationship between task interdependence and team performance is included.

In section 7, a dyadic relationship between leader and follower, leader-member-exchange, is used to express another concept of leadership. The differences between material and social exchanges, and in-role and ex-role behaviours are explained. The difference of the connections between in-role behaviour and material exchange, and extra-role behaviour and social exchange is also clarified.

Sections 8 to 10 focus on knowledge related issues. Section 8 discusses concepts of knowledge from data to wisdom, explicit and implicit knowledge are also discussed. Bock et al.’s (2005) theory of knowledge sharing is introduced as well. In section 9, two main trends of research focused on knowledge sharing are described. Knowledge transfer, exchange and sharing are differentiated. The last section (section 10) is concerned with the importance of knowledge sharing in organisations. A concept of the relationship between knowledge creation and retention influenced by knowledge sharing is introduced.

Section 11 describes innovation. Guzzo and Shea’s (1992) input-process-output model of team performance is introduced, and the factors for innovation in the model are also explained. Jehn, Northcraft and Neale’s (1999) research regarding the influence of diversity, conflict and performance in workgroups is stated. Finally,
a five-dimensional organisational innovativeness construct, originated by Wang and Ahmed (2004) and adopted by Ellonen, Blomqvist and Puunalainen (2008), is introduced, and the differences between the five dimensions are also delineated.

Section 12 focuses on team performance with regard to knowledge creation and innovation. Prior to an elaboration of the process of knowledge creation or innovation, the relationship between organisational learning (knowledge absorption) and organisational competitiveness is described. The two dimensions of knowledge creation from Nonaka (1994) are then introduced, and the characteristics of tacit and explicit knowledge are clarified accordingly. Finally, the importance of top management in influencing organisational innovation is outlined. West and Anderson’s (1996) research purposes and their results on top management team and team innovation are stated and followed by the conflict and effectiveness of team diversity. The significance of team work and the effectiveness of top management on team building is discussed.

The last section (section 13) outlines the gaps identified through this literature review. Wang and Howell (2010) argue that the approach that separates group- and individual-focused transformation leadership behaviours on an analysis of the effect of transformation leadership warrants further examination. Thus, Wang and Howell’s (2010) dual-level scale is used to examine the dual-level effects on followers. Wang and Howell also suggest future research on task interdependence in the reason of its association with team performance. Moreover, Ma and Wang’s (2008) research findings show democratic leadership and empowerment have no relationship with knowledge sharing. It is suspected that task interdependence is the mediator for leadership to encourage knowledge sharing in organisations. This mediating relationship will be tested in the study accordingly.
2.1 Individual, Team and Organisational Learning

Individual learning aims to enlarge an individual’s capacity to take effective action (Kim, 1993). Team learning occurs through dialogue, which gives team players equal power within the group and which facilitates divergent thinking rather than mutual consent. Conversely, convergent thinking through discussion aims to identify the best solutions/views/arguments by polling different viewpoints (Senge, 1990).

Crossan, Lane and White’s (1999) organisational learning framework propose 4Is (intuiting, interpreting, integration and institutionalising) for organisational learning. At an individual level, individuals learn intuitively by experience and metaphors, interpreted through language and conversation. At a group or team level, learning involves the integration of individual learning which develops mutual understanding and collaborative ideas. At an organisational level, learning occurs when individuals and groups develop routines which are embodied as structures, systems and strategies into the organisations (Crossan, Lane and White, 1999, p. 525). All individuals are embedded in the environment of their organisations, and as a result, are influenced by the culture or climate surrounding them.

Organisational culture is the way people do and perceive things within an organisation (Schein, 1985). Knowledge sharing is affected by many aspects of culture including mutual-trust, and competitiveness in the organisation. Within an organisation, this knowledge sharing culture can be cultivated by groups working as communities of practice (CoPs). CoPs were first discussed by Lave and Wenger (1991) as groups of experts in a common area or background with common goals that solve problems collaboratively. They share best practices, solve problems swiftly, learn from each other and generate new knowledge for new situations or circumstances (Wenger and Snyder, 2000). CoPs support the extraction of value from ongoing and situated learning (Wenger, 1998). As CoPs are difficult to manage (Wenger, 1999) because of their professional or technical competence, creating a desired environment that entails integrating communities
in the organisation to enable CoPs decide what they learn and how they manage the value they create is the potential managerial tactics for managers or leaders in the organisation. Organisations that fail to act in the suggested direction might also fail to maximum the potential of CoPs residing in their organisations (Wenger, McDermott and Snyder, 2002).

2.2 Transformational Leadership

The original concept of transformational leadership (TFL), according to Burns (1978), is a process through which both leaders and followers are raised to higher levels of morality and motivation. Burns (1978) pointed out the difference of behaviour between leadership and management, and established the concepts of transformational and transactional leadership.

Bass (1985) extended Burns’s concepts of transformational leadership and evaluated the impact of motivation on followers in terms of performance accordingly to the 4Is: idealised influence (charisma), intellectual stimulation, individualised consideration and inspirational motivation. Idealised influence reflects the leader as a role model with high ethical standards of behaviour, who is trustworthy and respectable. Intellectual stimulation stimulates followers' creativity. Individualised consideration is leader attention to followers' needs and through inspirational motivation; the leader develops a challenging and attractive vision to inspire followers in order to lead them to higher standards for future goals (Yukl, 1999).

In the organisational context, scholars and researchers tend to focus on factors to capable of motivating followers or subordinates in order to raise levels of performance in organisations (e.g. Bass, 1985; Krause, 2004). Bass (1985) categorised factors of contingent reward and management-by-exception as transactional leadership and stated the limitations of such cost-benefit exchanges to demonstrate the advantages of transformational leadership which, is more
effective than transactional. The four factors of transformational leadership (idealised influence, intellectual stimulation, individualised consideration and inspiration motivation) are active dimensions that are required for high-performing systems (Vaill, 1978).

Transformational leadership cultivates followers in both dimensions of individuals and groups (Bass, 1985; Shamir, House and Arthur, 1993; Conger and Kanungo, 1998). The limitations of past research did not consider the interdependent effects between leaders’ individual- and group-focused behaviours on followers. An elaboration regarding these two dimensions of leadership will follow in the next section.

2.3 Dual-level Transformational Leadership

The individual is the basic unit in an organisation. Groups or teams are formed for collaborative work. A significant challenge for team leaders is not only to enhance individuals’ abilities but also to motivate teams, and maintain the balance between individuals and teams in terms of outcome (Chen et al., 2007). Burns (1978) and Bass’s (1985) theories of transformational leadership accentuated the impact of leaders’ behaviours on individual followers based on individualised considerations. The significant impact of this dimension at group level was typically overlooked (Wang and Howell, 2010).

Wang and Howell (2010) developed a dual-level, individual and group levels, transformational leadership scale by extending Kark and Shamir’s (2002), which, in turn, extended Bass’s (1985) theory. The individual level centres on the individual-focused behaviour of leaders whereas the group level concentrates on the group-focused behaviour of leaders. The construct includes communicating high expectations (House and Shamir, 1993), follower development (Bass’s individualised consideration), intellectual stimulation and personal recognition (Bass’s contingent reward) at the individual level of transformational leadership.
behaviour; emphasising group identity (Bass’s idealised influence), communicating a group vision (Bass’s inspirational motivation) and team building (Podsakoff et al., 1990) at the group level of transformational leadership behaviour. Communicating high expectations emboldens individuals to set high goals to reach the high expectations of the leader in terms of performance (House, 1977; House and Shamir, 1993). Follower development develops individuals’ capabilities via individualised consideration (Bass, 1985). Intellectual stimulation promotes individuals to be creative and innovative (Bass and Riggio, 2006). Personal recognition is a contingent reward to acknowledge individuals’ accomplishment (Bass, 1985). Wang and Howell’s (2010) scale was validated by using a sample of 203 employees from 60 work groups in a company in Canada. Results showed that individual-focused transformational leadership is positively related to task performance, and personal initiative whereas group-focused transformational leadership is positively related to team performance and helping behaviour.

Leadership style can be distinguished not only as individual-focused or group-focused but also as task or people oriented. These two distinct orientations drive leadership behaviour differently. The next section will introduce the concept of task and people oriented behaviours. The determinants of these two orientations will be discussed subsequently.

2.4 People or Task Oriented Behaviours

The managerial grid model was first developed by Blake and Mouton in 1964 that identified five different leadership styles based on the concerns for production (x-axis) and people (y-axis). Each axis ranges from 1 (low) to 9 (high). Leaders with high concerns for both people and production are classified as ‘team style’ (Blake and Mouton, 1964). Effective leaders are involved in facilitating learning and expected to be focused on both task and people oriented behaviours (Misumi and Peterson, 1985). This style of leadership possibly facilitates staff members to understand organisational needs and then encourages them (the people) to be
involved in task decisions. All involved staff members are most likely committed in a common goal linked to organisational needs, and this possibly enables teamwork and facilitates commitment among the followers.

Task oriented behaviour, termed ‘initiating structure behaviour’, centres on tasks and roles specification, planning and scheduling. The power of the leadership stems from a formal authority based on rewards or coercion. People oriented behaviour are termed ‘consideration or relationship oriented’. Leaders show trust and confidence in their followers and concern about their needs (Hitt, Black and Porter, 2009). This literature review focuses on interpersonal trust (people concern) and task interdependence (tasks concern) in the following sections due to the possible significant effects of task oriented and people oriented leadership behaviours on followers.

2.5 Interpersonal Trust – Affect-based and Cognition-based Trust

Trust is a willingness to rely on a person in whom someone has confidence (Moorman, Deshpande and Zaltman, 1993 p. 82). The confidence is associated with the high consistency and integrity behaviours of the person who is trustworthy. McAllister’s (1995) research tested a theoretical model based on two literature streams on trust; sociological (Lewis and Weigert, 1985; Zucker, 1986) and social-psychological (Johnson-George and Swap, 1982; Rempel, Holmes and Zanna, 1985). McAllister’s idea with regard to trust is similar to Moorman, Deshpande and Zaltman (1993) that interpersonal trust is explained as the trust from a person who has confidence in and is willing to act on the basis of the words, actions and decisions of another. McAllister believes that the nature and functioning of relationships of interpersonal trust is the factors influencing trust building.

Affect-based trust is the trust in reciprocated interpersonal care and concern; cognition-based trust is the trust in individual beliefs concerning peer reliability and dependability. These two forms of trust were the principles form of interpersonal
trust tested in McAllister’s research. The results show that generally the level of cognition-based trust is higher than affect-based trust in terms of the trustworthiness of peers among managers (McAllister, 1995). Affect- and cognition-based trust may be causally connected, but these two forms of interpersonal trust are found to be a distinction as separate constructs (Johnson-George and Swap, 1982). The extent of McAllister’s (1995) affect- and cognition-based trust can be used to explore the beliefs of managers about the trustworthiness of peers. Cognition-based trust is necessary for affect-based trust to develop (McAllister, 1995, p. 51).

Interpersonal trust is closely related to the variables of knowledge acquisition. Individual performance can be maximised by the development of trust both through transactional and transformational leadership (Casimir et al., 2006). The effectiveness of transformational leadership in terms of trust is noted as a prominent component of leadership in organisations (Podsakoff et al., 1990). The effects of interpersonal trust on team performance are to a large extent mediated by the intervening variable of knowledge acquisition (Politis, 2003).

Interaction frequency is affected by both consideration and initiating structure styles of leadership, and it influences affect- and cognition-based trust which also influences citizenship behaviour (Huang et al., 2008, p. 81). Initiating structure style of leadership was found to have a stronger effect in the Chinese context compared to consideration (Huang et al., 2008, p. 81). The high consideration and high initiating structure style of leadership potentially enhance affect- and cognition-based trust through the factors such as citizenship behaviour, interaction frequency and reliable role performance, as a result, it encourages the intention for knowledge sharing (Huang et al., 2008, p. 82). Face saving and guanxi (interpersonal relationship) were also found to have a significant effect on the intention to share knowledge in Chinese contexts ((Huang, Davison and Gu, 2008).

The current research investigates the role of leadership and trust in knowledge sharing. Past research also indicates the role of task interdependence in
influencing the relationships between leadership and knowledge sharing. The next section will look into the models with regard to the nature of task interdependence.

2.6 Task Interdependence

There are three levels of Thompson’s (1967) model of task interdependence: pooled, sequential and reciprocal. In pooled interdependence, all individuals in the work group complete tasks without interaction with other group members. No contribution of communication and knowledge sharing or exchange occurs in this mode of workflow. Individual performance is not influenced by any other group members and therefore, group performance is wholly the sum of individual performances. In sequential interdependence, individual group members only need to complete their own part of a task and then pass it to another group member and so on. The process is not reversible and resembles a production line. A single channel of communication flows from the group member who passes his or her partial’s completed work to the next group member. No feedback can be given by the successor, but some knowledge transfer might occur from the predecessor to the successor. Individual performance is affected by the quality of work from the predecessor. Group performance depends on the success of each step in a pre-set order. In reciprocal interdependence, all individuals in the group perform their work in a more flexible way. The output of individual A can be the input for individual B and vice versa. Since the processes can be reversible, communication and knowledge sharing or exchange between the predecessor and successor in the work flow is possibly induced for the avoidance of negative outcomes due to reciprocal disadvantage.

Van de Ven, Delbecq and Koenig (1976) devised team interdependence, based on Thompson’s model of task interdependence, to describe the simultaneous work interaction within a team. Also, Van der Vegt and Janssen (2003) advocate the importance of perceived goal interdependence in the influence of interpersonal helping and coordination within colleagues because the more colleagues are
enabled to perform well, the more contribution to the attainment of their shared goals.

Reciprocal interdependence defines a situation in which team members interact collaboratively jointly to determine work tasks and outcomes. This interactive process involves an exchange of knowledge, ideas or resources. Team members exchange, or share information or resources (Thompson, 1967; McCann and Ferry, 1979) as the nature of reciprocal task interdependence necessitates such sharing to achieve the team’s common goal. Task interdependence, which is related to employees’ cohesion and performance (Fry and Slocum, 1984), has also been found to facilitate employees’ citizenship behaviour because of the reciprocal relationship among the colleagues who work closely with each other, e.g. team or group members (Organ, 1988; Smith, Organ and Near, 1983). Pearce and Gregersen (1991, p. 838) used the term of ‘extra-role behaviour’, which originates from Katz and Kahn (1966), rather than citizenship behaviour to describe behaviour that extends beyond specific tasks to support organisational goals. Task interdependence is an environmental condition which provides a structural setting that facilitates extra-role performance.

Smith, Organ and Near (1983) failed to locate the relationship between supervisor-reported citizenship behaviour and task interdependence, most likely because the mediating variables such as sense of fairness or felt responsibility was not tested in the research (Pearce and Gregersen, 1991). Pearce and Gregersen (1991) noted that task interdependence leads team members to felt a responsibility towards the subject team member who relied on.

Reciprocal task interdependence is a determinant of citizenship behaviours of team members (Smith, Organ and Near, 1983; Organ, 1988). Moderate task interdependence at work seems to be effective in terms of performance and motivation that is mediated by a sense of fairness or felt a responsibility among colleagues in organisations (Pearce and Gregersen, 1991). The action or intention of knowledge sharing might not entirely be based on trust between leaders and
followers or influenced by the leadership skills of leaders. Instead, the social exchange based on the concept of leader-member exchange might be involved in the action of reciprocal knowledge exchange. The concept of leader-member exchange will be introduced in the following section.

2.7 Leader-Member Exchange (LMX)

LMX, evolution of early vertical dyad linkage (VDL), is a social exchange approach to leadership that focuses on the dyadic relationship between leaders and their followers (Dansereau, Cashman, and Graen, 1973; Dansereau, Graen, and Haga, 1975;) through role-making processes (Graen and Cashman, 1975; Graen, 1976; Graen and Uhl-Bien, 2002). LMX involves two major concepts: material exchange and social exchange. In-role and extra-role behaviours are grounded on the approach to materials and social exchange respectively. In-role behaviour, a task based behaviour, is denoted by job descriptions and recognised by formal reward systems (Williams and Anderson, 1991). It is mandatory and normative for staff members who are bound by the contracts, agreements or regulations with the organisation. Extra-role behaviour, a kind of citizenship behaviour, is voluntary (Podsakoff et al., 2000, p. 524). The behaviour might not contribute immediate benefits, but it promotes cooperation among staff members and enhances productivity in terms of organisational performance (Smith, Organ and Near, 1983).

Material exchange is transactional according to Bass (1990), but social exchange requires unspecified obligation (Blau, 1964). While the word ‘exchange’ sounds transactional; LMX, in fact, is transformational (Gerstner and Day, 1997; Graen and Uhl-Bien, 2002) and reciprocal (Graen and Uhl-Bien, 2002). Unlike the material exchange approaches which reflect in-role behaviour with dyadic relationships, high quality LMX entails social exchange processes which encourage extra-role behaviour between leaders and their followers. That is mutual trust, respect and obligation towards members for who are empowered and
motivated to expand beyond formalised work contracts and formalised work roles (Graen and Uhl-Bien, 2002, p. 232).

Graen and Uhl-Bien (2002) demonstrated four stages in the development of LMX theory. The first stage was the stage of discovering the differentiated dyads. In VDL, Leaders developed differentiated relationship with followers in dyads within units (Dansereau, Graen and Haga, 1975). Much research concerning LMX theory was still on the level of ‘in-group’ and ‘out-group’. At this stage, the focus was on leader behaviour. High-quality exchange involved in high trust, respect and obligation that could only be found in the ‘in-group’ dyadic relationship (Graen and Uhl-Bien, 2002).

The focus of the second stage was shifted from leadership behaviour to the relationship between leaders and followers and its outcomes (Graen and Uhl-Bien, 2002, p. 227). Research into the characteristics of the differentiated relationship between leaders and followers were confirmed (Liden and Graen, 1980; Dienesch and Liden, 1986; Graen, 1989; Fairhurst, 1993). In addition, LMX relationship was linked to its outcome – performance. Key findings in this stage showed 1) LMX is influenced by the characteristics and behaviours of leaders and followers, which occurs in the process of role-making and 2) overall, high-quality LMX has a positive relationship with the outcomes for leaders, followers and the organisation (Graen and Uhl-Bien, 2002, p. 229).

The third stage focused on the building of effective leadership (leadership making). Leaders were encouraged to form one-to-one partnerships with individual followers. Rather than the differentiation approach suggested in VDL, leaders should initiate the development of partnership with each follower so followers have had equal access to the process of LMX. Two perceived effects for forming such partnerships with each individual follower are 1) the LMX process may be perceived more equitable and 2) the high quality of partnerships between leader and the followers would possibly increase effective leadership and organisational capability (Graen and Uhl-Bien, 2002, p. 229).
The last stage (stage 4) was the expansion of the LMX partnership to the group and network levels. In this stage, the research foci switched to the quality of relationship and task interdependencies by investigating the mapping of leadership structure on the task structure (Graen and Uhl-Bien, 2002). The research foci of the last stage of LMX is closely associated with the aim of this study, however, the spotlight is not on the mapping of the structures of leadership and tasks. Instead, it focuses on the prediction or determination, in accordance with three main areas which are leadership, trust and task interdependence, of intention for knowledge sharing and innovation. This literature reviews on the three main areas have been discussed; the review now shifts to one of the dependent variables in the study – intention to share knowledge. The following three sections discuss knowledge and its importance.

2.8 Knowledge

Data is the basis of inference (Jashapara, 2004, p. 14). Information is the data organised in systematically way (Meadows, 2001). Knowledge is actionable information for decision making. Wisdom is the high quality denotation for knowledge. Ryle (1949) differentiates knowing how (intelligence) and knowing that (possessing knowledge). Michael Polanyi uses the example of riding a bicycle to show that we know something more than we can tell; tacit knowledge by ‘doing’ but explicit knowledge by ‘being’ (Polanyi, 1969). The concept of tacit knowledge was first introduced by Polanyi and extended by Nonaka (1991) who depicted the concept of knowledge transfer via a spiral process in which tacit knowledge can be diffused from one to another or converted into explicit knowledge by externalisation. Explicit knowledge is able to be shared relatively easily, for example, via written or oral presentation, whereas tacit knowledge can only be possessed by itself (Polanyi, 1966), and it is noncodified so it can only be acquired through an informal learning practice (Howell, 1996); therefore, it is difficult to be fully codified or shared. Previous research suggests that rewards, an apparent
factor for encouraging knowledge sharing, were not significantly related to the attitude towards knowledge sharing (Bock and Kim, 2002). This suggests that leadership behaviour’s capable of facilitating knowledge sharing merits investigation.

Bock et al. (2005) highlighted the potential for the theory of reasoned action (TRA), and examined the effects of extrinsic motivators, social-psychological forces and organisational climate on knowledge sharing in order to identify the mechanism capability of influencing the intention of individuals to share their own knowledge. Investigating this theory, expected rewards was found not significantly related to attitude towards knowledge sharing, instead, a positive attitude towards knowledge sharing leads to positive intention to share knowledge, in turn, to share knowledge eventually (Bock et al., 2002). Also, organisational climate and anticipated reciprocal relationship affect individuals’ intention for knowledge sharing whereas anticipated extrinsic rewards is negatively related to the attitude towards knowledge sharing (Bock et al., 2005).

2.9 About Knowledge Sharing

There are two main streams of research on knowledge sharing: technology and psychology. Technologists and technical partitioners (e.g. Fonseca et al., 2000; Gruber, 1993) investigate in knowledge sharing with a focus on ontologies or taxonomy. Ontology is a knowledge map to show a formal and explicit specification of shared conceptualisation (Gruber, 1993) and shows the relationships between different ideas or concepts by a given domain whereas taxonomy is a hierarchical categorisation or classification (Knapp, 2010).

In the field of human behavioural study, the terms of knowledge sharing, knowledge transfer and knowledge exchanges are always interchangeable. Some researchers (e.g. Alavi and Leidner, 2001; Huber, 1991) consider that knowledge transfer is the same as knowledge sharing. In fact, the success of knowledge
transfer is determined by the transferability of meaning and value (Kostova, 1999). Knowledge is expected to be intact after being transferred from the sender to the receiver through a specific channel within a particular period. The difficulty associated with knowledge sharing was identified in the process of knowledge transfer from one entity to another (Fan, 1998; Argote and Ingram, 2000); therefore, the one who shares cannot expect the shared knowledge to be perfectly received and accepted by all participants.

The term of knowledge exchange is also used alternatively by some researchers (e.g. Thomas-Hunt et al., 2003). Knowledge exchange involves an explicit agreement of a return after someone’s knowledge has been given out. Individuals commonly claim that knowledge is their own intangible asset. The asset accumulates by years of their experience and should not be disclosed easily especially when the specific knowledge is critical in a particular area or situation; thus, no one is expected to share without conditions. However, the action of knowledge sharing is totally volunteered on both the givers and takers. The idea to share is meaningless if no one would like to give or take.

**2.10 Significance of Knowledge Sharing**

In general, knowledge management in organisations focuses on how organisations create, retain, and share knowledge (Argote, 1999; Huber 1991). Knowledge acquisition can be outside-in through external training or staff development programmes. However, when knowledge is not shared among colleagues, knowledge is easily lost over years or after the trained staff members have left the organisation. To avoid the loss of knowledge and repeated effort for solving the same problems (Marks et al., 2008), knowledge residing in individual staff members should be shared among other staff members or their team members in the organisation. Furthermore, individuals do not possess all knowledge in order to complete organisational goals at work; therefore, knowledge sharing in organisations deems to be effective for organisational goal achievement.
and also outside connections to acquire required knowledge is necessary (Anand et al., 2002) if needed.

Knowledge needs to be explored, exploited and then finally shared with specific groups of people with common goals in order to reach an expected, common outcome. These groups of people are also called functional teams in organisations. Knowledge sharing in organisations sharpens organisational competitive edge. However, the members in the same group or team might compete with each other for personal recognition or reputation and/or the reward, which is offered for the outstanding individual in terms of performance. To solve the obstacle of intention to share knowledge, leaders should be able to encourage innovation in organisations (Dalkir, 2005). The failure of knowledge sharing across organisation widens the knowledge gaps within individuals in the organisation, which in turn, produces undesirable work outcomes. On the contrary, the success of knowledge sharing in organisations can be reflected by the degree of innovation to which knowledge is recreated among colleagues or team members (Baird and Henderson, 2001). Through the process of knowledge sharing, retained knowledge can be used for knowledge generation or creation and the new created knowledge can be shared and retained again in the organisation as a repetitive process (figure 2.1).

![Figure 2.1](image.png)

Figure 2.1) Knowledge sharing for knowledge creation and knowledge retention in organisations
2.11 Innovation

Innovation is a process suggested by Dalkir (2005), which is required for knowledge sharing in organisations. It is a process to maintain and enhance the effectiveness of organisational change (West and Anderson, 1996). West and Anderson adopted Guzzo and Shea’s (1992) input-process-output model to examining the factors for team performance. Heterogeneity; team size; team tenure; knowledge, skill and abilities of team members; proportion of innovators in teams and task complexity are the inputs in the model. The group processes include the understanding of and commitment to objectives, participation, task orientation and support for innovation. The outputs are the number of innovations in terms of radicalness, magnitude, novelty and effectiveness. The results indicated that team processes best predict the overall level of team innovation over the other variables, e.g. team size, team tenure and proportion of innovative team members. Jehn, Northcraft and Neale (1999) explored the effect of value, social category (e.g. races, sex, or age) and informational (e.g. educational cultures) diversities, and the moderating relationship of task type and task interdependence on group outcomes. Informational diversity was found to be positively associated with group performance.

Five dimensions of the organisational innovativeness construct from Wang and Ahmed (2004) were adopted by Ellonen, Blomqvist and Puunalainen (2008). They are behavioural, process, product, market and strategic of innovativeness. In accordance to the definitions of these five dimensions (see, Ellonen, Blomqvist and Puunalainen, 2008, p. 164) cited in Wang and Ahmed (2004), product and market innovativeness are more interrelated by having a similar focus on production and targeted markets (product base) whereas process, behavioural and strategic are more related to human and management (human base). Process innovativeness concerns new production methods, new managerial approaches and new technology for improving production and management processes. Behavioural innovativeness involves individuals, teams and management that enables a formation of innovative culture. Strategic innovativeness is the
organisational ability to manage ambitious objectives, identify mismatch of ambitions and resources. It was found that institutional trust (one form of the impersonal trust) has an important role in predicting organisational innovativeness.

2.12 Team Performance in Terms of Knowledge Creation and Innovation

Organisational competitive advantage depends on what the organisation knows, how it uses what it knows and how fast it can know something new (Prusak, 1996). It involves the processes of knowing what, knowing how and speed of knowledge absorption. Learning quality is affected by the source of knowledge. The knowledge absorptive capacity of individual learners in organisations and the source of knowledge can be possibly enriched through knowledge sharing. The ability of organisations to recognise, understand and then successfully apply the new knowledge is critical to innovative capabilities of the organisations (Cohen and Levinthal, 1990).

Absorptive capacity, according to Cohen and Levinthal (1990), is a function of a firm’s level of prior related knowledge and the prior knowledge permits the assimilation and exploitation of new knowledge. Absorptive capacity concerns the ability to exploit the relevant information after an acquisition, and it depends on the knowledge transfer across and within different sections in the organisation. The ability to exploit external knowledge is a vital component of innovation capabilities (exploiting critical external knowledge), and organisational absorptive capacity depends on the individuals’ absorptive capacity (communicating with internal knowledge) in the organisation (p. 131).

Cohen and Levinthal (1991, p. 133) argue that there is a trade-off in the efficiency of internal communication against the ability of exploiting external knowledge since an effective internal communication (knowledge sharing) may lead to the inability of individuals tapping into diverse external sources of knowledge (knowledge diversity). Nevertheless, a shared background is needed for groups of individuals
when the knowledge structures are highly differentiated and individual absorptive capacity can be enhanced through training either from internal or external sources of knowledge.

The authors also assume that R&D (research and development) not only generates new knowledge but also contributes to firms’ absorptive capacity as a by-product of R&D investment (p. 138). Based on the findings of firm research regarding the role of absorptive capacity, the authors suggest that firms should consider allocating resources for innovative activity if the operation of the firms is influenced by the characteristics of their learning environment because R&D generates innovation and also facilitates the process of learning (p. 149).

Nonaka (1994) has explained two dimensions of knowledge creation, epistemological and ontological dimensions. Epistemological dimension focuses on two distinct forms of knowledge, tacit and explicit knowledge. Explicit knowledge is formally transmittable whereas tacit knowledge has personal quality and difficult to formalise and communicate (p. 16). Tacit knowledge is an activity of knowing that involves an analogue process (Bateson, 1973). In the process, individuals communicate in order to build mutual understanding with each other by sharing their own tacit knowledge (Nonaka, 1994, p. 16-17). Ontological dimension is a level of social interaction that organisations provide the environment for creative individuals to create knowledge (p. 17). Team members share overlapping information especially in the stage of concept development. Individuals are then allowed to be involved in the others’ area of operation and also provide suggestions (p. 28). Encouraging creative dialogues and sharing images (i.e. tacit knowledge) is useful at the early stage of information creation (p. 25).

Top management has a prominent impact on organisational innovation (Cummings, 1965; Hage and Dewar, 1973; Bantel and Jackson, 1989; O'Reilly, Caldwell and Barnett, 1989) by setting the direction, providing the field of interaction, selecting the participants to be in a team, establishing the guidelines
and supporting the process of innovation (Nonaka, 1994, p. 31). West and Anderson (1996) research on top management teams aimed to identify the predictor(s) of team innovation. Their findings suggest that researchers need to pay more attention at the impact of group characteristic or group structural factors (e.g. heterogeneity of group composition, group size, and group tenure) on team or group innovation. Diversity creates conflict in teams or groups and eventually influences team or group performance (Jehn, 1995). However, a team normally needs to be involved in colleagues with different expertises in order to achieve common goals or solve problems in the organisation. Team work is described as musicians complementing one another and playing in harmony (e.g. Edmondson, 2012, p. 11). A successful or failure performance of performing a piece of music is seen to be the synergy of all players in the team. Edmondson (2012, p. 14) states that interdependence clarification, trust establishment and coordination forming are old-fashioned teamwork skills for team building since it takes time to build the foundation of familiarity and share experiences through sharing of personal history and experience, and practice working together. Colleagues are suggested to develop and use new capabilities to share crucial knowledge swiftly. Also, managers are suggested to care about the process of teaming because it is the engine for organisational learning.

2.13 Gaps

Transformational leadership (TFL) is commonly agreed as the key factor involved in organisational change and innovation. However, previous studies failed to differentiate between group- and individual-focused TFL (Wang and Howell, 2010). Furthermore, most researchers concentrate on the relationship between leadership behaviour and team performance and neglect the importance of knowledge sharing as a stimulant for organisational learning, which, in fact, promotes team performance in organisations. The study adopts Wang and Howell’s (2010) two levels construct with seven dimensions (communicating high
expectations, follower development, intellectual stimulation, personal recognition, emphasising group identity, communicating a group vision and team building) to investigate colleagues’ intention for knowledge sharing and innovation in an organisation.

This study also responds to Wang and Howell's (2010) suggestion for a future investigation on the impact of dual-level TFL when task interdependence is high. This is based on the findings from Burke et al.’s (2006) meta-analysis, which shows the importance of team leadership with regard to the positive association between high team performance and high task interdependence. Following this, the current study will investigate a moderating effect of task interdependence on the relationship between dual-level (group- and individual-focused) TFL and innovation.

Ma and Wang's (2008) research found that trust is positively related to knowledge sharing whereas justice, democratic leadership style and empowerment are not significant to the members in the surveyed project teams. The result contradicts to Bass's (1985) idea on the effectiveness of leadership style. Recognising that the mediating role between the relationship of leadership and knowledge sharing was not tested in Ma and Wang’s research, the current study will investigate possible mediating factors in the relationship between transformational leadership behaviour and the intention to share Knowledge.
Chapter 3 Theoretical Framework and Hypothesis

Introduction
This chapter outlines the theoretical framework based on the findings through the literature review delineated in Chapter 2. There are three sections in the chapter. The first section defines the research questions of the study that focuses on two main areas: knowledge (intention to share knowledge) and innovation in organisations. The development of the theoretical framework is introduced in the second section, and three models are devised. This section consists of the proposed variables in each model, the relationships between them in each model and the explanation of the relationships that are supported by existing theories or concepts. The last section is the development of hypotheses based on the framework developed in the second section.

3.1 Research Questions
Organisational culture has been found to affecting knowledge management adoption (Alavi, Kayworth and Leidner, 2006) and the endeavour of knowledge transfer (Huber, 2001). In traditional Chinese culture, competitiveness is most likely maintained by keeping a “secret recipe”. The secret is normally imparted from ancestors to descendants or mentors to apprentices only; for instance, a master of kung fu keeps the most important part for his or her most favourite disciples. This implies knowledge transfer with regard to the critical information that would only happens in a very close relationship. Owing to this custom, knowledge sharing in particular areas might become rare. The benefits of knowledge sharing might; therefore, not be persuasive among peers in organisations when the ownership of the required knowledge is crucial for job promotion or possibly affects the incentive or reward system in individuals’ viewpoint. Friehs (2003, p. 13) stated that teachers are not willing to share their knowledge with colleagues when the possession of knowledge is equivalent to a good reputation. However, knowledge sharing is part of the process for knowledge
creation in order to sustain the competitive advantages of organisations (Drucker, 1993). This prioritises Chinese research into the factors capable of facilitating knowledge sharing in organisations.

Innovation is a capability (Kim, 1997) of human resources in organisations for creating new ideas, products, processes, procedures or creative ways to perform daily work or to solve problems. It is defined as an introduction and application within a group, an organisation, or a wide society intended to benefit to the group, the organisation, or the wide society (West and Farr, 1990). Innovation involves changes of normal procedures or regular practices in the workplace based on the goals of the organisation. The success of change needs the attention, understanding and cooperation of all participants who are involved in the process (Kezar, 2001, p. 35). The advantage or improvement associated with innovation is of a value to individuals, organisations and societies (Ouden, 2012); therefore, the understanding of the critical factor(s) for innovation capabilities is important.

The research questions:

What is/are the factor(s) with regard to leadership behaviour that encourages staff members’ intention for knowledge sharing in organisations in Hong Kong?

What is/are the factor(s) with regard to leadership behaviour that encourages innovation in organisations in Hong Kong?

3.2 Theoretical Framework

The construction of the theoretical framework in the study is based on Sekaran and Bougie’s (2010, p. 81) three basic features suggested for any theoretical framework: 1) all variables adopted in the study should be relevant and clearly defined, 2) the conceptual models based on the theories should be provided to show the relationships between the variables and 3) a clear explanation for reasons of the relationships between the variables based on the theories should also be provided. The development of the following two sections follows the
suggestion of Sekaran and Bougie (2010). Firstly, introduce and clearly define the variables adopted in the framework and secondly, delineate the conceptual models and also explain their relationships in between the variables.

### 3.2.1 Introduction of variables in the framework

There are three dependent variables in the framework: Bock et al.’s (2005) 5-item of intention to share knowledge (ISK), Burningham and West's (1995) 2-item individual innovation (IIN) and West's (1987) 5-item team innovation (TIN). Two out of five Bock et al.’s items are for the intention to share explicit knowledge in the future; the remaining three are for the intention of implicit knowledge sharing. Those five items are rated by individual team members. The 2-item individual innovation regarding the individuals’ abilities to generate or improve new working methods in the workplace are rated by the team leader for each team member, and the 5-item team innovation is rated by the team leader collectively for the overall innovation in the team including him or her.

Two independent variables are defined in the framework: Wang and Howell’s (2010) group- and individual-focused transformational leadership (TFL). Thirty-two items in total from Wang and Howell (2010) are used as the core items to measure the behaviour of transformational leadership. Eighteen items for individual-focused transformational leadership (IF_TFL) are composed of 5 items of communicating high expectations (CHE), 5 items of follower development (FD), 4 items of intellectual stimulation (IS) and 4 items of personal recognition (PR); fourteen items for group-focused transformational leadership (GF_TFL) comprise 5 items of emphasising group identity (EGI), 4 items of communicating a group vision (CGV) and 5 items of team building (TB). In these thirty-two items, one item of follower development and intellectual stimulation, and three items of communicating a group vision originated by Bass and Avolio (1989). The original scale from Bass and Avolio (1989) has no subject for each item. Wang and Howell (2010) accepted the argument from Schriesheim, Wu and Scandura (2009) and added an
appropriate referent for each item for the development of the scale. This study follows the same practice as Wang and Holwell (2010) and has added a subject (e.g. S/he) in the questionnaire for each item to specify the referent as the immediate manager, supervisor or team leader of the respondents in order to avoid erroneous results. All items of these two variables are rated by the team members.

Three variables are defined as the mediating variables in the framework: two from McAllister (1995) and one from Pearce and Gregersen (1991). Four items each (totally 8) regarding the interpersonal trust from McAllister’s (1995, p. 37) affect- and cognition-based trust with lambdas higher than .75 are adopted for testing the mediation relationship between the independent (group- and individual-focused TFL) and the dependent (intention to share knowledge, individual innovation and team innovation) variables. The first load of factors consists of five items from Pearce and Gregersen’s (1991, p. 841) rotated pattern matrix concerning to task interdependence are adopted. These five items collectively represent the reciprocal interdependence and optimally for a test of the mediating relationship between the independent and dependent variables. Same as the items for the two independent variables defined previously, all items for these three mediating variables are rated by team members.

One moderating and control variables are defined. Pearce and Gregersen’s (1991) 5-item task interdependence is not only used to test the mediating relationships in between variables but also to test for its moderating role in a model. Team size is the control variable used as a control in the analysis.

3.2.2 The conceptual models and the relationships between variables

Knowledge sharing is a self-learning process towards organisational learning in which it assumes an action of sharing (Shrivastava, 1983). The action is to sharpen organisational competitive edge and compete with external competitors in the turbulent market (Dyer and Nobeoka, 2000). Knowledge acquisition can be
outside-in through training or staff development programme (Tannenbaum and Yukl 1992; Wilson and Berne, 1999; Joyce and Showers, 2002). Knowledge can be transferred internally through sharing among colleagues in teams when the common goals involving a number of tasks which are interdependent. Middle-up-down approach encourages both of the top-down and bottom-up information flows rather than command-and-control efforts towards knowledge conversion and knowledge sharing (Nonaka & Takeuchi, 1995 p. 35-36). Different leadership styles have been shown to affect team performance (Burke et al., 2006). Leadership behaviour focused on the importance of knowledge sharing possibly motivates individuals or team members’ intention for knowledge sharing in organisations in some extent. Following the discussion of team and individual dynamics outlined in the previous chapter, leadership, trust and task interdependence are the three components proposed in the current study as the determinants that predict the intention of knowledge sharing in organisations.

With reference to model 1, the antecedents are the individual and group levels transformational leadership behaviour. With individual-focused leadership style, the leader concentrates more on individual members’ needs whereas the leader with group-focused leadership style inclines to pay more attention to group or team level development. Wang and Howell’s (2010) four dimensions of individual-focused TFL and three dimensions of group-focused TFL are used to test the model. The three mediators demonstrating the mediation relationships between the dependent and independent variables in the model are affect- and cognition-based trust (the two forms of interpersonal trust) and task interdependence. The dimensions of affect- and cognition-based trust originated by McAllister (1995); the dimension of task interdependence refers to Pearce and Gregersen’s (1991) construct of task interdependence. The criterion variable, intention to share knowledge takes a reference from the dimension devised by Bock et al., (2005). In this model, one negative relationship is defined (the line with dotted arrow) as when the leader inclines towards an individual-focused leadership style and pays
more attention to individual members’ development, thus in turn, demoting the intention to share knowledge among the group or team members.

Figure 3.1 Model 1 - conceptual framework of the relationships between intention to share knowledge and its independent and mediating variables

Organisational structure and availability of human resources affects innovation. The innovative capabilities are critical to a survival and growth of organisations in a global society (Kirkeby and Christensen, 2010). Building on Bass’s (1995) idea of intellectual stimulation through transformational leadership that encourages followers to think or do things creatively, many researchers have shown the impact of top management on organisational innovation (e.g. Cummings, 1965; O’Reilly, Caldwell and Barnett, 1989). Leader supportiveness for innovation aims to motivate followers to search for opportunities to improve existing routines to enhance competitive advantage. The motivation is grounded on the level of trust in the leader and; therefore, the confidence level of followers. It involves trust between the two parties. Cohen and Levinthal (1990) proposed that the ability to
explore external knowledge is a critical factor of innovative capabilities and March and Simon (1958) suggested over a half of a century ago that most of the innovations are exploited from other ideas rather than new invented. Task interdependence is possibly a way for tacit knowledge to be shared from one party to another party in teams; therefore, innovation may most likely occur with an existence of trust between leaders and followers, combined with the externalisation and internalisation processes of knowledge transfer (Nonaka and Takeuchi, 1995) through task interdependence.

Model 2 is similar to model 1 except for the outcome. This model depicts the relationships between innovation (individual and team innovation respectively), and all the variables have been clarified in model 1. Burningham and West’s (1995) construct of individual innovation and West’s (1987) team innovation are adopted in this model as the criterion variables. All relationships between variables are proposed to be positive in this model as well as the individual-focused TFL, which in model 1 has been defined as a negative impact on the intention to share knowledge, is proposed to positively promote individual innovation in teams.

![Figure 3.2 Model 2 - conceptual framework of the relationships between innovation and its independence and mediating variables](image-url)
Wang and Howell (2010) argue for the value of moderating relationship between the dual-level TFL and task interdependence. Many researchers have shown task interdependence as a prominent moderator between group or team leadership and group or team performance. For example, Saavedra, Earley and Van Dyne (1993) proposed that group-focused TFL contributes to group performance when task interdependence is high; Liden, Wayne and Bradway (1997) revealed that task interdependence moderates group control over decision making and group performance in large service and manufacturing organisations; Burke et al. (2006) found team leadership to contribute to high team performance when task interdependence is high, and also Sharma and Yetton’s (2003) meta-analysis of the empirical literature provided strong support on the moderation effect of task interdependence between management support and successful information systems implementation. There are also some research findings regarding the moderating role of task interdependence in other aspects; for instance, Bachrach et al. (2006) suggested helping behaviour contributes to group performance when task interdependence is high; Staples and Webster (2008) found that the relationship between trust and knowledge sharing becomes stronger when task interdependence is low; Langfred (2005) found that task interdependence strengthens the relationship between team autonomy and team performance, conversely, task interdependence weakens the relationship between individual autonomy and team performance in the industry of personal care and household products manufactory. Task interdependence appears as a complicated factor and contributes differently in different aspects and; therefore, it is difficult to generalise a common effect. Nevertheless, prior research suggests a moderating effect of task interdependence on the relationship between group-focused TFL and team innovation. Consequently this research investigates the moderating effect of task interdependence as depicted in Model 3.
3.3 Hypotheses Development

3.3.1 Intention to share knowledge and the dual-level transformational leadership

Wang and Howell’s (2010) four dimensions of individual-focused TFL behaviour are (1) communicating high expectations (CHE); (2) follower development (FD); (3) intellectual stimulation (IS); and (4) personal recognition (PR) that empower and encourage individual followers’ development (Wang and Howell, 2010). Communicating high expectations emboldens individuals to set high goals to reach the high expectations of the leader in terms of performance (House, 1977; House and Shamir, 1993). Follower development develops individuals’ capabilities via individualised consideration (Bass, 1985). Intellectual stimulation promotes individuals to be creative and innovative (Bass and Riggio, 2006). Personal recognition is contingent reward to acknowledge individuals’ accomplishment (Bass, 1985). Individual-focused TFL encourages personal initiative and individual task performance (Wang & Howell, 2010) which centres in individual development that might provoke the action of withholding knowledge from colleagues or team members but stimulate individual innovation. Thus,
**H1a:** Individual-focused TFL behaviour is negatively related to intention to share knowledge.

**H1b:** Individual-focused TFL behaviour is positively related to individual innovation.

The three dimensions of Wang and Howell’s (2010) group-focused TFL behaviour are (1) emphasising group identity (EGI); (2) communicating a group vision (CGV); and (3) team building (TB). Emphasising group identity highlights shared characteristics among team members that reinforces the value and commonality of the group membership (Shamir, House and Arthur, 1993). Communicating a group vision gives a clear picture of the future to the team members (Avolio and Bass, 2004). Team building promotes cooperation, resolves disagreement and builds mutual trust among team members (Wang and Howell, 2010).

Research regarding the knowledge transfer through organisational acquisitions (Bresman, Birkinshaw and Nobel, 1999) and the concept of a social community (Durkheim, 1933; Etzioni, 1961) point out that individuals only take part in knowledge exchange when they share a sense of identity and feel belonging with their team members. These three dimensions form a cohesive social group which, in turn, inducing the intention of knowledge sharing among team members. Moreover, group-focused TFL has been found to be positively associated with helping behaviour and team performance (Wang and Howell, 2010). Thus,

**H1c:** Group-focused TFL behaviour is positively related to intention to share knowledge.

### 3.3.2 Intention to share knowledge and interpersonal trust

Affect-based trust (ABT) and cognition-based trust (CBT) are foundations of interpersonal trust. They are closely related but distinct (McAllister, 1995). Cognition-based trust only happens when evidence (track records of reliability and dependable) exists and most relevant to task-related processes (Yang,
Mossholder and Peng, 2009). Affect-based trust is a natural instinctive state of mind. Cognition-based trust is necessarily existed for the development of affect-based trust among colleagues (McAllister, 1995 p. 50). In advance of McAllister’s research finding,

\[ H2a: \text{Cognition-based trust is positively related to affect-based trust.} \]

Altruism, courtesy and peacekeeping are the forms of citizenship which involve particular aspects of helping behaviour (Podsakoff and MacKenzie, 1997, p. 134). Such helping behaviour is supported by affective trust. Trust reduces the urge to protect knowledge from colleagues (Kale et al., 2000). That comes from a willingness of individuals to share their own knowledge which might have acquired or created with great efforts (Gibbert and Krause, 2002). Affect-based trust has positive, direct relationship with colleagues’ affiliative citizenship behaviour (McAllister, 1995, p. 50), and knowledge sharing involves some aspect of helping behaviour. Trust has been found to be the only factor which is capable of facilitating knowledge sharing in Chinese culture (Ma, Qi and Wang, 2008). Moreover, Bock et al.’s (2005) findings show that the greater the anticipated reciprocal relationships among colleagues in Asia context (i.e. Korea) encourages the attitude more towards knowledge sharing, and the more favourable the attitude towards knowledge sharing, the greater the intention to share knowledge in the organisations. This leads to the hypothesis:

\[ H2b: \text{Interpersonal trust is positively related to intention to share knowledge.} \]

### 3.3.3 Intention to share knowledge and task interdependence

Much knowledge can be transferred, exchanged or shared through the interaction between individuals. Individuals’ intention to share knowledge relies on the thoughts, feelings, attitude and behaviour of individuals in organisations and the anticipated reciprocity relationships between the participants in the organisation
(Bock et al., 2005). Share or not-to-share is solely the discretion of the knowledge possessors. Smith, Organ and Near (1983) propose that leader supportiveness and task interdependence are the two environmental dimensions that have direct implications for citizenship behaviour. Task interdependence is reciprocal and highly affects organisational citizenship behaviour regarding the possible consequences generated through the task flow among colleagues since colleagues involve in the work flow can revenge (Smith, Organ and Near, 1983). Furthermore, Smith, Organ and Near (1983) suggested task interdependence as a determinant of colleagues’ citizenship behaviours because of the reciprocal relations between the team members who involve in the process. Therefore,

**H3: Task interdependence is positively related to intention to share knowledge.**

### 3.3.4 Innovation and the dual-level transformational leadership

In accordance with West and Farr’s (1990) definition of individual innovation, it is an intentional introduction and application within a job of ideas, processes, products and procedures that are new to the job and, which are designed to benefit the job. It is not only seen as an active coping strategy but also a problem-focused copying strategy at work (Martín, Salanova and Peiró, 2007). The extent of innovative in organisations has been argued that it depends, to some extent, on the proportion of individuals who tend to be innovative or the proportion of individuals who are capable of doing things in innovative ways. Burningham and West (1995) found that individual propensity to innovation is significant in predicting team level innovation. Collective individual innovation in teams enhances the overall capability of innovation of the teams. Thus,

**H4a: Individual innovation is positively associated with team innovation.**

Bock et al.’s (2005) construct of affiliation is comparable to the idea of Wang and Howell’s (2010) construct of group-focused TFL. Their focal points are the
collaboration and/or cooperation with other members in the department (Wang and Howell, 2010, p. 3 and p. 8) and the development and encouragement of a perception of togetherness (Bock et al., 2005, p. 92). Within organisations, alliance networks can enhance organisational learning and innovation (Ahuja, 2000; Soh, 2003). Moreover, transformational leadership behaviours have been found to be more effective at a group or team level when facing rapid change in an unstable environment (Smith, Montagno and Kuzmenko, 2004). Thus,

**H4b: Group-focused TFL behaviour is positively related to team innovation.**

### 3.3.5 Innovation and interpersonal trust

Leana and Buren (1999) identify two components of organisational social capital: associability and trust. Associability is the willingness and ability of individuals to connect individual goals to collective goals and actions; trust is both the antecedent and subsequent to the successful collective action. One of the potential benefits of organisational social capital is the development of intellectual capital in organisations. Aldrich and Fiol (1994) express that trust is a critical first level determinant for a success of entrepreneur’s foundation. Empirical results have indicated that developing openness and trust in teams is a way to promote team innovation (West and Farr, 1990). Trust sometimes is in a form of risk-reward relationship (Ring and Van de Ven, 1992) between the partners to trust and to be trusted. Creativity and innovation involve new ideas that could be wholly based on imagination and new ideas, and such ideas possibly have not ever been implemented before. The leader decision made to take the risk or give up the opportunity most likely rely on the reliability and reputation of the participants (the members in the group or team) who are in the venture. The stronger the trust between the leader and his/her members could motivate more the intention to innovate in the team. Thus,

**H5: Interpersonal trust is positively related to team innovation.**
3.3.6 Innovation and task interdependence

Task interdependence constructs a coordination mechanism in organisations (Wageman, 1995; Sharma and Yetton, 2003) since task interdependence is positively associated with interpersonal helping and coordination when perceived goal interdependence is high (Van der Vegt and Janssen, 2003). Innovation is a process involving creativity and the integration of information or knowledge. The importance of a strong interpersonal relationship is suggested for innovative behaviour (e.g. Johnson et al., 2001). A high intimacy relationship style among staff members in an organisation of hi-tech industry was found to be efficient at work, in turn, improving innovation in terms of performance in the organisation (Lee and Yu, 2010). Researchers (e.g. Thompson, 1967; Galbraith, 1973) believe innovation is generated through the reciprocal task interdependence between subunits. Jehn et al. (1999) found that the inter-influence between informational and value diversities strongly affects group or team performance when task interdependence is high (p. 754) but found to have no relationship with social category and informational diversity when task interdependence was low. In heterogeneous teams, the strong and positive relationship between perceived task interdependence and individuals’ innovation behaviour was found when the individuals’ perceived goal interdependence was high (Van der Vegt and Janssen, 2003). Also, higher involvement of task interdependence in the work flow was found an increase in the likelihood that the team members are possibly promoted together and to facing the negative consequences of poor performance together (Stanne, Johnson and Johnson, 1999), That, in turn, motivates team in pursuit of improvement because of cooperative interpersonal relationship, which increases the likelihood of innovative behaviour with the high diversity teams (Van der Vegt and Janssen, 2003, p. 746). Thus,

*H6: Task interdependence is positively related to team innovation.*
3.3.7 Dual-level transformational leadership, interpersonal trust and task interdependence

Wang and Howell’s (2010) group-focused TFL behaviour emphasise group identity, shared group values and beliefs, and team building. Team building aims to promote cooperation, resolve conflicts and facilitate mutual trust among followers, and it is necessary for leaders to ensure their followers work effectively as in a team (Wang and Howell, 2010). Followers can be motivated to perform beyond expectations mainly because of the trust and respect of the followers to their leaders (Yukl, 1989). To enhance cooperation and mutual trust among followers, leader engagement in the process of team building is suggested (Yukl, 1999). Transformational leadership indirectly influences team performance through trust (Schaubroeck, Lam and Peng, 2011), and affective and cognitive trust mediate the relations of supervisory procedural justice with help behaviour at work, and performance and job satisfaction respectively (Yang and Mossholder, 2009). Considerable research on the effect of trust in leadership has shown significant impact and their relationship (e.g. House, 1977; Bass, 1985; Shamir, House and Arthur, 1993; Conger and Kanungo, 1998; Bass and Riggo, 2006; Yang and Mossholder, 2010; Schaubroeck, Lam and Peng, 2011). Therefore,

\[ H7a: \text{Group-focused TFL behaviour is positively related to interpersonal trust.} \]

Wang and Howell’s (2010) group-focused TFL behaviour encourage the cohesion of team members. Team members in the team have a strong sense of member identity, common visions and working highly in task interdependence (Hughes, Ginnett and Curphy, 1993). The level of group cooperation and productivity (Shea and Guzzo, 1987) is affected by the level of task interdependence. A routine or procedural task is normally irreversible with minimal communication that involves relative low task interdependence; in reciprocal interdependence, tasks are reversible and; therefore, involving relative high interaction with the predecessor and successor in the work flow (Thompson, 1967). There is relatively less
empirical research that focuses on the relationship between leadership and task interdependence. However, leaders have an important role in initiating structure under uncertain conditions (House and Baetz, 1979), and it is considered as an externally imposed form of control (House, 1971). Furthermore, initiating structure style of leadership is more effective in the Chinese context (Huang et al., 2008). Thus,

H7b: Group-focused TFL behaviour is positively related to task interdependence.

### 3.3.8 Mediating effects of task interdependence

In accordance to Baron and Kenny's (1986, p. 1176) simple path diagram of mediation which involves three variables (the independence, mediating and dependent variables) and three paths (a, b and c), Path a is the direct relationship from the independent variable to the mediator; Path b is a path of the impact from the mediator to the dependent variable; Path c is the direct impact of independent variable to the dependent variable. Three conditions are required to meet in order to identify a mediation event: 1) variations of the independent variable significantly explain the variations in the mediator (i.e. Path a), 2) variations in the mediator significantly explain the variations in the dependent variable (i.e. Path b) and 3) No significant relationship between dependent and independent variables when Paths a and b are controlled. Therefore, the development of the following hypotheses with regard to the mediating relations between the prediction and criterion variables is based on the three conditions depicted above, and that are necessarily met.

Pearce and Gregersen (1991) deem reciprocity to be the key mediating mechanism in Organ’s (1988) model to determine citizenship behaviour. Leader-member exchange (LMX) is positively related to leader's subjective performance ratings when high LMX differentiation is found within groups whereas has minimal impact under low LMX differentiation (Ma and Qu, 2010). Group-focused leadership with high LMX differentiation is likely to have a negative impact
concerning team spirit. However, reciprocal task interdependence induces helping behaviours within team members (Smith, Organ and Near, 1983). In addition to $H3$ and $H7b$,

$H8$: Group-focused TFL behaviour is positively related to intention to share knowledge through the mediating influence of task interdependence.

3.3.9 Mediating effects of interpersonal trust

Competence- and benevolence-based trust mediates the path between strong relationships and receipt of useful knowledge (Levin and Cross, 2004). The concepts of competence- and benevolence-based trust defined by Levin and Cross (2004) are found to be similar to McAllister’s (1995) cognition- and affect-base trust respectively. Affective trust was found to be a mediating role in the relationship between supervisory procedural justice and helping behaviour (Yang, Mossholder and Peng, 2009), furthermore, Podsakoff et al.’s (1990) finding indicates a mediating effect of followers’ trust in their leaders between transformational leader behaviour and citizenship behaviour. Trust plays an important mediating role in the transformational leadership process (Podsakoff, et al., 1990, p. 109). In addition to $H2b$ and $H7a$,

$H9a$: Group-focused TFL behaviour is positively related to intention to share knowledge through the mediating influence of Interpersonal Trust.

The general tendencies of leaders engage in transformational leadership behaviours which inspires followers’ trust, and transformational leadership affects team performance indirectly through cognition-based trust (Schaubroeck, Lam and Peng, 2011). Casimir et al. (2006) investigated the relationship between leaders and their followers in order to find out the effectiveness of trust on performance in a cross-cultural environment within two countries, Australia and China. The result shows that the Australian leaders are trusted by their followers at a higher level
than that of Chinese. Trust was found to be the only mediator in the relationship between both transactional and transformational leadership. The increment of followers’ performance in Australia was found to be significant, but it was insignificant in China. It implies a significant impact of cultural difference in trust on leadership. Nevertheless, in addition to $H_5$ and $H_7a$,

$H_{9b}$: *Group-focused TFL behaviour is positively related to team innovation through the mediating influence of Interpersonal Trust.*

### 3.3.10 Moderating effects of task interdependence

“Moderator is a third variable that affects the zero-order correlation between two other variables.” (Baron and Kenny's 1986, p. 1174), and it can be qualitative or quantitative. Task interdependence was found to be a salient moderator in many organisational research in the past two decades (e.g. Saavedra, Earley and Van Dyne, 1993; Liden, Wayne and Bradway, 1997; Sharma and Yetton, 2003; Langfred, 2005; Bachrach et al., 2006; Burke et al., 2006; Staples and Webster, 2008). It is a quantitative variable in terms of level of interdependence which presumably affects the zero-order correction between group-focused TFL and team innovation. In addition to the previous research findings,

$H_{10}$: *Group-focused TFL is positively related to team innovation when task interdependence is high.*
Chapter 4 Methodology

Introduction

This chapter discusses the methodology used to address the research questions raised in Chapter 3. This chapter consists of three sections. The first section justifies the paradigm and methodology used in this research. The second section includes discussion of the research design; it includes details of the strategies, sample, the instrument and procedures for data collection. The last section outlines the methods of data analysis including the assessment of normality, goodness of data, appropriateness of data aggregation and testing of defined hypotheses in detail.

4.1 Justification for the Paradigm and Methodology

According to Bryman and Bell (2007), quantitative research is deductive: theories are tested through observations or findings from the collected data. The manner of observations or data collection is strictly constructed whereas qualitative research is inductive: theories are created or redefined rather than being tested during the process. Conclusions of qualitative research more or less rely on the interpretation of the researchers based on the information or data extracted through observations or interviews. Sekaran and Bougie (2010) suggest that data can be quantitative or qualitative. The difference is that quantitative data is collected through structured questions, but qualitative data is collected in interviews with broad answers to the specific answers or in questionnaires with open-ended questions or through observation by the interviewers. The responses to the questions are not well-constructed.

Bryman and Bell (2007, p. 155, fig. 6.1) depict eleven steps in the process of conducting quantitative research. The process starts from existing theories. Hypotheses are deduced based on theories and then tested with the data collected. Findings or conclusions are written up according to the meaning
represented by the data collected from respondents. The findings that come up in the process are part of the knowledge that could be used for generating new theories. Hypotheses are necessary before the research takes place, and they usually affect the design structure of the research. Concepts are crucial for consolidating theories; therefore, the measurement of concepts becomes critical to assess whether the evidence supports or rejects the hypotheses. Quantitative research assumes that the research can be objective. Reliability and validity are commonly used in quantitative research, and they are also suggested to be adopted in qualitative research (Golafshani, 2003).

As noted by Bryman and Bell (2007, p. 406, fig. 16.1), qualitative research typically requires general research questions in advance rather than hypotheses. The theories and concepts are induced by an interpretation of the data collected from the relevant sites and subjects. The measurement of concepts is not typically the focus of qualitative research. Rather, new concepts or theories are generated by reconstituting the existing concepts or theories upon the interpretation of the data collected during the research (p. 407). In the course of qualitative research, theories and concepts are generated, developed and refined rather than tested.

The current research starts from the theory of leadership originated by Bass (1985) and further developed by Wang and Howell (2010). Hypotheses are defined in advance. The focus aims to test the theory utilising hypotheses, and the variables are operationalised as measured constructs (e.g. Meyer and Boulton-Lewis, 1999).

The dependent variables in this study are the intention to share knowledge, individual innovation and team innovation. A conclusion is then drawn either accepting or rejecting hypotheses based on the collected data reflecting on the relationships between the predictors or determinants and those dependent variables. Thus, a quantitative approach is appropriate for the research.
4.2 Research design

This is a quantitative study that aims to investigate the relationship between the proposed variables. In order to demonstrate a high degree of consistency and reproducibility of this quantitative research design, the strategy, sampling and procedure of data collection based on quantitative methods for collecting quantitative data are explained in the following sections. The pilot study, the recruitment of participants and the ethical considerations are also included.

4.2.1 Strategy

Many contemporary researchers in the field of knowledge sharing share a similar focus on the design of ontology (e.g. Fonseca et al., 2000; Gruber, 1993). In information science, ontology is a formal representation of a shared conceptualisation. However, this study concentrates on the behaviour of knowledge sharing in an educational setting as relates to the significant influence of leadership behaviour on followers and organisational learning (Bass, 1985; Schein, 1992; Bass and Riggo, 2006; Burke, 2008; Oluremi, 2008). This is a quantitative research project that utilises a survey of dependent and independent variables based on Likert scaling. The survey is cross-sectional by using systemic sampling of a population of employees from a large university in Hong Kong. Systemic sampling is one of the techniques of probability sampling (Sekaran and Bougie, 2010, p. 279). Details of which will be explained in the next section. Furthermore, the respondents (the leader and his or her team members) completed the questionnaires individually at a time convenient to themselves; therefore, causality of data is controlled.
4.2.2 Sample

The sampling is purposive and aims to study the relationship between the proposed variables, the intention to share knowledge and innovation in organisations in the context of educational setting (Friehs, 2003). The elements in the target population are all full-time staff members aged 18 or above excluding those who are employed on temporary or part-time terms in a large university in Hong Kong. The sampling units in the sample are the faculties in the university, the departments/schools/offices under the faculties, teams of staff members in the departments/schools/offices, and the individual staff members in teams. The sample frame is the email contact of all full-time staff members in all faculties of the university except for those whose department heads have rejected joining the survey.

One of the aims of the survey is for generalisability beyond the investigated sample and; therefore, a random sample selection process is adopted. The sampling involves every \( n^{th} \) element in the population starting with a randomly chosen element between 1 and \( n \) (Sekaran and Bougie, 2010). The adoption of this probability sampling is to allow for wider generalisability. Three thousand eight hundred and forty email addresses were collected (the population size, \( N = 3840 \)), and each email address was assigned a number from 0 to 9. Numbers were drawn at random from the pool of elements with an email address corresponding to the randomly-drawn number were collected. These potential participants were invited to join the survey by email. The target sample size in the study followed Hair et al.’s (2006) recommendation based on the ratio of 10 respondents for each variable. In this case, the required sample size is 80 participants since there are eight variables (individual-focused TFL, group-focused TFL, affect-based trust, cognition-based trust, task interdependence, intention to share knowledge, individual innovation and team innovation) proposed in the study. Furthermore, Hair et al.’s (2006) suggests researchers to achieve a power level of .08 at the desired significance level and consider the impact of a particular alpha level on power before selecting the alpha level (the conventional alpha level is either .05
or .01). If the effect size (the actual correlation between the variables) is moderate (.5), and the alpha level is selected at .05, the suggested sample size will be 80, and the power level is .882, but if the selected alpha level is .01, the suggested sample size will be 100 when the power level is .823 (BMDP Statistical Software, Inc., 1991 cited in Hair et al., 2006). Therefore, the proposed sample size in the study, for most hypotheses, should not be less than 80 and be optimal about or more than 100.

4.2.3 Data collection: The instrument

The instrument involves five constructs from five areas: dual-level TFL, interpersonal trust, task interdependence, knowledge sharing and innovation. Team performance can be evaluated through self-reported ratings by individual employees (e.g. West and Anderson, 1996; Jehn, 1999), supervisor-assessed appraisal (e.g. McAllister, 1995; Jehn, 1999; Griffith and Sawyer, 2010; Wang and Howell, 2010) or customer satisfaction reports (e.g. Griffith and Sawyer, 2010). The subjects in the study are the staff members working in an educational institution and; therefore, team performance evaluated by customer satisfaction may not be appropriate. Although perceived performance (employee self-reported) and actual group performance were found to be significantly correlated at the level of .5 (Jehn, 1999, p. 753), supervisor-assessed appraisal on innovation in terms of team performance is relatively objective and; therefore, will be adopted in this research.

Two separate questionnaires were prepared for leaders and their group or team members. The items of innovation were used by leaders to evaluate innovation of individual group or team members and the innovation in groups or teams collectively. The other items were used to collect group or team members’ perspectives of their leaders, trust between their leaders, their knowledge sharing intention and the level of task interdependence at work. All items in the questionnaires were taken from previously validated scales. The quantitative data
was collected by self-completion of an online questionnaire which included items representing the five constructs. Leaders were provided with the leader questionnaire, and group or team members were provided with the team member survey.

In the main study, all email receivers were asked for two questions. 1. Are you the team leader or member in your workplace? 2. What is the team size of your team? If the respondent was a leader, s/he was requested to invite five more group or team members to join the survey as a team; if the respondent was a member, s/he was requested to provide the contact of the leader. A separate invitation email was then sent to the leader to invite him/her and his/her team members to join the survey as a team. The scales regarding the individual and team innovations were collected from the leaders, and the scales with regard to leadership behaviour, trust, task interdependency and intention to share knowledge were collected from their group or team members separately with two separate questionnaires. All data was aggregated according to the questionnaire numbers assigned to each participant and then grouped based on a specific leader. Data from the leader and his/her group or team members were then used for a team level analysis.

All scales were constructed with 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) except the two items of individual innovation and the five items of team innovation which ranging from 1 (Highly stable) to 5 (Highly innovative). The full scales used to measure all variables in the instrument are provided below in Table 4.1.

**Table 4.1 The instrument used in the survey**

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<tr>
<th>Construct</th>
<th>Scale items</th>
<th>References</th>
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<tr>
<td>Independent variables: Dual-level Transformational Leadership</td>
<td>• The Individual-focused TFL Subscale</td>
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<td></td>
<td>2. S/he communicates high performance expectations to me.</td>
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3. S/he shows confidence in my ability to meet performance expectations.
4. S/he demonstrates total confidence in me.
5. S/he encourages me to live up to my potential.

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<td></td>
<td>2. S/he suggests training to improve my ability to carry out my job.</td>
<td>Wang and Howell, 2010</td>
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<td></td>
<td>3. S/he provides me with developmental experiences.</td>
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<td></td>
<td>4. S/he provides feedback to help me develop my abilities.</td>
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<td></td>
<td>5. S/he provides coaching to help me improve my job performance.</td>
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<td></td>
<td>2. S/he challenges me to think about old problems in new ways.</td>
<td>Wang and Howell, 2010</td>
</tr>
<tr>
<td></td>
<td>3. S/he challenges me to be innovative in my approach to work assignments.</td>
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<td></td>
<td>4. S/he encourages me to be an independent thinker.</td>
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<tbody>
<tr>
<td></td>
<td>2. S/he gives me positive feedback when I perform well.</td>
<td></td>
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<tr>
<td></td>
<td>3. S/he gives me special recognition when my work is very good.</td>
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</tr>
<tr>
<td></td>
<td>4. S/he acknowledges improvement in my quality of work.</td>
<td></td>
</tr>
</tbody>
</table>

* The Group-focused TFL Subscale

<table>
<thead>
<tr>
<th>1. Emphasizing group identity</th>
<th>1. S/he encourages team members to take pride in our team.</th>
<th>Wang and Howell, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. S/he says things that make us feel proud to be members of this team.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. S/he says positive things about the team.</td>
<td></td>
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<tr>
<td></td>
<td>4. S/he encourages others to place the interests of the team ahead of their own interests.</td>
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</tr>
<tr>
<td></td>
<td>5. S/he emphasizes the uniqueness of the team.</td>
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</table>

2. *S/he talks optimistically about the future of our team.
3. *S/he talks enthusiastically about what needs to be accomplished by our team.
4. S/he communicates a clear direction of where our team is going.  
   
3. Team building
   1. S/he fosters collaboration among team members.  
   2. S/he encourages group members to be team players.  
   3. S/he develops a team attitude and spirit among team members.  
   4. S/he gets the team to work together for the same goal.  
   5. S/he resolves friction among team members in the interest of teamwork.  
   
**Dependent variables:** Intention to Share Knowledge (Bock et al., 2005)

1. Intention to share explicit knowledge
   1. I will share my work reports and official documents with members of my organisation more frequently in the future.  
   2. I will always provide my manuals, methodologies and models for members of my organisation.  
2. Intention to share implicit knowledge
   1. I intend to share my experience or know-how from work with members of my organisation more frequently in the future.  
   2. I will always provide my know-where or know-whom at the request of members of my organisation.  
   3. I will try to share my expertise from my education or training with members of my organisation in a more effective way.  

**Dependent variables:** Innovation (West and Anderson, 1996)

1. Team innovation
   1. Compared with other similar groups/teams, how innovative do you consider your group/team to be?  
   1. setting work targets/objectives?  
   2. deciding the methods used to achieve targets/objectives?  
   3. initiating new procedures or information systems?  
   4. deciding the order in which different parts of the job are done?  
   5. developing innovative ways of accomplishing
2. Individual innovation

1. The member suggests new working methods to the group/team members who work with. West and Anderson, 1996
2. The member tries to introduce improved methods of doing things at work.

**Mediating variables:** Interpersonal Trust (McAllister, 1995)

<table>
<thead>
<tr>
<th>Affect-based trust</th>
<th>Cognition-based trust</th>
</tr>
</thead>
</table>

1. **Affect-based trust**
   1. We have a sharing relationship. We can both freely share our ideas, feelings, and hope. McAllister, 1995
   2. I can talk freely to him/her about difficulties I am having at work and know that s/he will want to listen.
   3. We would both feel a sense of loss if one of us was transferred and we could no longer work together.
   4. If I shared my problems with him/her, I know s/he would respond constructively and caringly.

2. **Cognition-based trust**
   1. S/he approaches his/her job with professionalism and dedication. McAllister, 1995
   2. Given his/her track record, I see no reason to doubt his/her competence and preparation for the job.
   3. I can rely on him/her not to make my job more difficult by careless work.
   4. Most people, even those who aren’t close friends of him/her, trust and respect him/her as coworker.

**Moderating variables:** Task Interdependence (Pearce and Gregersen, 1991)

<table>
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<tr>
<th>Task interdependence</th>
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</table>

1. I work closely with others in doing my work. Pearce and Gregersen, 1991
2. I frequently must coordinate my efforts with others.
3. My own performance is dependent on receiving accurate information from others.
4. The way I perform my job has a significant impact on others.
5. My work requires me to consult with others fairly frequently.

*One item for follower development and intellectual stimulation, and three items for communicating a group vision originated by Bass and Avolio (1989).*
4.2.4 Data collection: Procedures

Before the survey was undertaken, an application for ethics approval was submitted to the University of Newcastle. The notification of expedited approval was issued on 26 Sep 2011 (reference no.: H-2011-0149). A human subject’s ethics review was also performed at the university in the participating university, and approval was provided on 17 Aug 2011. Individual Faculty Heads were contacted to seek approval for the survey to be undertaken in each relevant faculty.

4.2.4.1 Ethical considerations

The Human Research Ethics Committee (HREC) of the University of Newcastle reviewed the possible risks associated with the study including any potential physical or psychological harm to the participants. This research did not involve any illegal activities or the collection of controversial samples (e.g. human issue or stem cells) or collecting data from sensitive population; nonetheless, a number of ethical issues were taken into account in order to meet the requirements of the University’s Ethics Committee. First of all, regarding the physical location for data collection, no participants were located at an unsafe location for the survey; instead, all data was collected online via electronic questionnaires. Secondly, a participant information sheet was developed and included as part of the ethics application. In the information sheet, the following information was included: the purpose of the research, the storage and use of the collected data, the requirements associated with participation, the right to choose to participate (it is voluntary without incentive, e.g. coupon or gift), procedure for data protection and the risks and benefits of the participation. No personal or identifying data was collected to ensure the anonymity of the participants; participants have the right to quit from the survey at any time prior to the submission of the survey. All collected data was saved in password-protected computers or digital disk which was stored and locked in the researcher’s office. At the end of the project, the data will be disposed according to the policy and procedures for disposal of confidential materials of the University. Telephone and email contacts of both the project
supervisor and the doctoral candidate were provided on the information sheet to allow for any further enquiries. If any concerns or complaints regarding the research arose, participants could also contact the researchers or an independent person from the Human Ethics Office. Since the URL to access to the questionnaire is provided in the information sheet, the actions of the participant to click on the link, complete the questionnaire and then submit the form are explicitly identified as consent for participation.

4.2.4.2 Prerequisite – A pilot study

The two questionnaires (for leader and team member) were proofread by an English teacher to make sure they were free of errors before the main study was started. A pilot test was undertaken in one of the departments at the university after the approval was granted by both the University of Newcastle and the subject university. Two teams were invited, and the data was collected separately from the leaders and their team members through the online questionnaires. The pilot test was mainly used for checking the wording in the questionnaires and the work flow of the data collection method. The word ‘NOT’ in each negative worded item for the ‘member’ questionnaire were capitalised to draw attention to participants. No major issues emerged in this stage.

4.2.4.3 Recruitment of participants

A list of email addresses extracted from the departments/schools/offices in the university was collected and a random sample generated. Each email address was assigned a number sequentially. The random sample was generated based on this sequential numbering and was invited to participate in the survey by email. The email included participant information sheets (one for the leader and five for the five group or team members in the group or team) and a hot link to direct the participants to the corresponding electronic questionnaire.
An electronic survey was chosen for the collection of primary data because of its convenience and cost effectiveness. Through this electronic means, the researcher saved resources and maximised response completeness (Truell, Bartlett and Alexander, 2002), which in turn, improved the validity of the collected data. The data was automatically aggregated. No data entry was needed and; therefore, no typographical or clerical errors possibly happened.

Participants were required to read the participant information statement (appendix I) and instructed to click onto an Internet site where they responded to an anonymous online questionnaire of 58 items excluding 7 demographic questions for group or team members, and 15 items at most excluding 8 demographic questions for leaders if they agreed to continue. It took approximately 20 minutes for group or team members and 15 minutes for leaders to complete.

Participants were informed that the researcher had obtained permission to conduct the survey by the authority of the University of the Ethics Committee and the Deans of faculties in their university. Nevertheless, the final decision to participate or not is completely voluntary. They could withdraw at any time prior to the submission of their questionnaires. Participants were also informed that their participation was anonymous and would be kept confidential.

Participants were also given a way to withdraw their email addresses from the mailing list by simply replying to the invitation email with a subject title appended with ‘rejected’. This particular subject would then be removed from the contact list and would not receive any follow-up email messages. In order to moderate the non-response error, a reminder was sent to all subjects in the sample every two weeks after the first invitation email was sent and periodically to the agreed-to-join parties who had already received the participant information statement and the link to the questionnaire.
4.3 Data Analysis

Only the complete form of the questionnaire was submitted to the system; thus, no errors in data entry would be found in the data set for individual items. Nevertheless, descriptive statistics were performed for screening abnormal data. The data from the ‘other’ fields for each demographic question were categorised. Before an attempt for assessing the normality of the collected data, data transformation was performed for the negative worded items. Parts of the data from leader’s questionnaire (e.g. team size and the variable of individual innovation) were combined with the data provided by the team members.

4.3.1 Assessment of normality

Mean and median were checked for central tendency. Range, standard deviation and variance were checked for variability. For the interval variables, histograms, stem-and-leaf plots, boxplots, normal probability plots and detrended normal plots were used to check the shape of the distribution. Skewness and kurtosis were assessed and assumed to reflect a normal distribution when the values were zero or close to zero. If the distributions vary from normal, the non-normal distributions should be transformed (Coakes, 2010, p. 42-46), and if outliers are identified, the deletion of the outliers from the scale should be taken where necessary (Cho and Pucik, 2005, p. 562). These processes made sure that the distributions of the variables were normally distributed and suitable for further analysis. The testing for the goodness of data was performed after all distributions of variables were found to be normal.

4.3.2 Testing goodness of data

Regarding the reliability and validity

Reliability is the accuracy level of the instrument in terms of its consistency and stability. Cronbach’s alpha is the most common reliability coefficient to test the average correlations of the items in a set (Sekaran and Bougie, 2010, p. 162). In
the current study, the acceptable alpha value was set to .70 or above (Sekaran and Bougie, 2010, p. 325), and factor analysis was used to establish the construct validity (Sekaran and Bougie, 2010, p. 161).

Regarding the common method variation (CMV)

There is potential for common method variance (CMV) when a measure on more than one concept is collected by Likert scale from a single source at one time (Podsakoff et al., 2003). Since the data used in the study were collected from two different sources, the leaders and their group or team members, the systematic error variance associated with using the same source for predictor and dependent measures (Richardson, Simmering and Sturman, 2009) was addressed.

Regarding the assessment of the measurement model

Factor analysis was used to investigate the underlying factors represented in the data (Coakes, Steed and Ong, 2010, p. 133). Since factor analysis was undertaken to assess whether predicted dimensions were tapped by relevant scale items rather than summarising or exploring the structure of a set of variables, confirmatory factor analysis (CFA) was adopted (DeCoster, 1998; Coakes, Steed and Ong, 2010). Principal component analysis (PCA) was used for data reduction that tested the model with the preset factors to see if it fitted to the observed set of data (DeCoster, 1998).

4.3.3 Aggregation test – Within-group agreement, intraclass correlations

All data collected in the study was individual level data except the item scale for team innovation. In order to justify an aggregation of individual data to team level date, ICC(1) and ICC(2) were calculated with a one-way ANOVA to generate a F statistic for ICC(1).

A measure of within-group agreement

In order to confirm the interrater similarity to support the appropriateness of data aggregation into group level, within-group agreement (IRA, e.g. \(r_{WG(J)}\)) was used to test whether the ratings given by individual members in a team was
interchangeable or equivalent in terms of the absolute consensus between the raters in a team (Bliese, 2000; LeBreton and Senter, 2008). $r_{WG(J)}$ was used for multi-item in the study. The interval of value of $r_{WG(J)}$ is from 0.0 to 1.0. Greater agreement between raters leads the value to approach 1.0. When the values of $r_{WG(J)}$ are equal to or higher than 0.7, that is an indication of acceptable agreement (Dixon and Cunningham, 2006; LeBreton and Senter, 2008) within raters that reflects the homogeneity for the appropriateness to aggregate individual data into team data.

A measure of Intraclass correlations

Since there was more than one variable to be assessed, IRR + IRA (e.g. ICCs) indices were adopted as well to justify the aggregation (LeBreton and Senter, 2008). ICC(1) and ICC(2) were used to access the consistency of responses from the raters in groups. ICC(1) is the reliability of a single assessment of the group mean, ICC(2) is the reliability of all assessments within a group against the group mean. When the value of ICC(1) is large, it means that a single assessment is sufficient for a reliable estimate of a group mean (James, 1982 cited in LeBreton and Senter, 2008).

4.3.4 Hypotheses testing

Regression analysis

Linear regression analysis was used for testing the linear relationships of the predictors (the components of group- and individual-focused TFL, affect- and cognition-based trust, and task interdependence) and the criteria (the components of intention to share knowledge, individual innovation and team innovation) in the model. In order to perform the regression analysis by individual proposed concepts, new variables were created by averaging the value of each item. SPSS > Analyse > Regression > Linear Regression was used to test the linear relationship among variables.

Mediation analysis
A mediator variable explains or provides a mechanism through which a relationship occurs. It is used to explain the relationship between the two variables (Baron and Kenny, 1986). The effect of an independent variable on a dependent variable is significantly reduced by controlling for the mediator (Goodman, 1960). Causal steps’ modelling was used to assess mediation (Baron and Kenny, 1986). Three models of regression were run to test the proposed mediating variables in the current study, task interdependence and interpersonal trust (affect- and cognition-based trust). Model 1 tested the relationship between the independent variable and the mediating variable. Model 2 would reveal the significant prediction of the dependent variable by the independent variable without the existence of the mediator. Model 3 investigated the impact of the predictor variable on the dependent variable when the mediator was included in the regression equation. Full mediation is supported if the effect of the independent variable is insignificant when the mediator is added to the model (Baron and Kenny, 1986). Team size was added in the regression of these three models as a control variable.

**Moderation analysis**

A moderator is a variable which influences the direction and/or strength of the relationship between an independent (predictor) variable and a dependent (criterion) variable (Baron and Kenny, 1986, p. 1174). It affects the zero-order correction between these two variables. A moderation relationship between dependent and independent variables was suggested in the literature review. For testing the moderation relationship, all independent variables and the control variable (team size) were mean centred ((raw score - mean) / standard deviation). The mean-centred scores for each variable were multiplied with each other in pairs (Dugard, Todman and Staines, 2010, chapter 6 moderation, p. 2-3) to form the interaction variables. Two models were used in the analysis. In Model 1, all variables were put in the regression; in Model 2, the resulting variable was added in the regression. The R squared change was used as the indicator for the significance of change after the resulting variables were added in the regression.
Chapter 5 Analysis of Data

Introduction

This chapter is based on the methodologies outlined in Chapter 4 to test the hypotheses defined in Chapter 3. This chapter is composed of six sections. The first section focuses on the subjects recruited as participants. Response rate and characteristics of the subjects including team size, characteristics of the leaders and members in the sample are reported. The second section outlines data characteristics, and the assessment of data includes evaluation of normality, correlation and common method variance. The third section confirms the goodness of data. Principal component analysis and the reliability coefficient are used to confirm the validity and reliability of data. The fourth section confirms the appropriateness of using group level data for analysis. The fifth section outlines the hypotheses which are tested for the results. The last section is a summary of the results discovered in the analysis through the methods suggested in Chapter 4.

5.1 Subjects

The population was the staff members of a local university in Hong Kong. Participants were aged 18 or over and full-time current employees of the organisation. Participants were recruited as a team of members including the team leader. The ‘leader’ in this survey was an immediate manager, supervisor or team leader in a team or group work; the ‘member’ was a team or group member who worked with the immediate manager, supervisor or team leader in the workplace.

5.1.1 Response rate

The email addresses of the staff members were prepared as the sampling frame; a total of 3840 email addresses were collected. In the first batch, 764 email addresses were randomly selected, and an invitation email was sent. A second batch of email addresses were drawn about four weeks later and 767 invitations
64

were sent. Since the questionnaires ought to be filled by both the leader and his/her team or group members, six team responses were withdrawn from the scale for either the leader or his/her team members did not fill in their part of questionnaires. In two team responses, multivariate outliers were found (Mahalanobis distance values higher than the critical chi-square value of 13.8 at the alpha level of .001); therefore, they were removed accordingly. In the end, 41 valid team responses and in total 143 individuals responses were collected. The response rate was 14.5%, 12% of respondents rejected joining the survey, and about 2.5% of respondents (19 team representatives) accepted to join the survey in the first batch of respondents. The response rate was 22.9% resulting in a rate of 20.1% for rejection and 2.9% for acceptance (22 team representatives) in the second batch of respondents.

5.1.2 Subjects characteristics

Team size

Forty-one teams including 41 leaders and 143 team members responded to the survey. Approximately 10% of teams had 2 team members (the leader and one team member); 29.3% of teams had three to four team members; 31.7% of teams had five to seven members; 17.1% of teams had eight to twelve members; and 12.2% of teams had over twelve team members (appendix II). The team size used in the study varied from the actual team size because of two reasons, 1) team members were randomly selected from the team if the team size was larger than six including the team leader; thus, not all team members would join the survey; and 2) the invited team members might refuse to join the survey; therefore, the actual team size should be larger or only equal to the team size (actually it was the number of respondents of the invited teams) used for the analysis. As a result, the average team size used in the analysis including the team leaders was 4.06 on average (SD = 1.17).
Leaders’ characteristics

Regarding the statistic data of leaders, 51.2% were female and 48.8% were male, 43.9% of them were aged between 52-61; 36.6% were aged between 42-51; 17.1% of them were aged between 32-41; 2.4% were aged between 22-31. Thirty-four percent of leaders had been working for the organisation for a period of five to ten years; 31.7% of them had been working for a period of ten to twenty years; 19.5% for a period of two to five years; and only 4.9% and 2.4% had been working for a period of one to two years and twenty to thirty years respectively. In a large proportion of the leaders (43.9%) had supervised their teams for two to five years; the majority of them (48.8%) were academic staff; 29.3% were administrative/executive staff; 19.5% were professional/specialist and only 2.4% were technical staff (appendix II).

Members’ characteristics

The following section describes key characteristics of the respondents. Firstly, 60.8% were female and 39.2% were male (SD = .49), 37.8% of the members were aged between 32-41; 33.6% were aged between 42-51; while only 14.7% and 14% were aged between 22-31 and 52-61 respectively (SD = 9.101). The median of the number of years working in the organisation (31.5%) was ‘2 years to less than 5 years’ (SD = 6.608) and the median of the length of time supervised by the leader (32.2%) was also ‘2 years to less than 5 years’ (SD = 3.776). Approximately 43% were academic staff; 17.5% were clerical staff; 15.4% were technical staff; 11.9% were administrative/executive staff; while professional/specialist and clinical staff were only 5.6% and 6.3% respectively, 81.8% were from Hong Kong; 8.4% were British; 4.9% were from Mainland China and 4.9% were from other countries. The demographic data of the subjects mentioned above are provided in appendix II.
5.2 Basic Information, Correlation Matrix, Common Method Variance

5.2.1 Assessing normality

The assumption of normality is a prerequisite for the inferential statistical techniques. As reflected in the descriptive statistics (appendix III, table 1), the third item of communicating high expectations (CH3) was found to be negatively skewed (-1.083). The positive kurtosis statistics showed that the first, third and fourth items of communicating high expectations (CHE1 (1.048), CH3 (3.364), CH4 (1.595)), the first and second items of personal recognition (PR1 (1.485) and PR2 (2.569)), the fourth item of team building (TB4 (1.367)) and the second item of task interdependence (TI2 (1.760)) were more peaked and had heavier tails than a normal distribution. Nevertheless, a test of normality by referring to Kolmogorov-Smirnov and Shapiro-Wilk for each variable showed that the items from the scale did not significantly deviate from normal (appendix III, table 2). Moreover, the skewness and kurtosis did not inflate the standard deviation seriously (the standard deviation of these seven items appeared normal and ranged between .635-.760 (appendix III, table 1)); the original scale of these seven items was kept intact for the following analysis.

5.2.2 Assessing correlation

Correlation is used to test the relationship between two variables in a linear fashion. The average score of all items for each variable was used to test the correlation relationship between the dependent and independent variables, including the team size a control, in related pairs. Pearson Correlation (2-tailed) was used. The linearity and homoscedasticity were tested accordingly. The scatterdots of paired variables (independent and dependent variables including the intention to share knowledge (ISK) and individual innovation (IIN)) were found to be linear. In the correlation table (table 5.1), the correlation coefficients for each pair of variables in the correlation matrix are all significant at the level of .01 (2-tailed) except individual innovation (IIN) with personal recognition (PR) (r = .213, p
< .05) and individual innovation (IIN) with communicating group vision (CGV) (r = .179, p < .05) which are only significant at the level of .05. The r of the dependent variable, intention to share knowledge (ISK), ranged from .324 to .528; another dependent variable, individual innovation (IIN), ranged from .179 and .311. The correlation of the two dependent variables, intention to share knowledge (ISK) and individual innovation (IIN) is (r = .290, p < .01).

Table 5.1 Correlations (N=143)

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<th></th>
<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td>1</td>
<td>Team size</td>
<td>4.06</td>
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<td>2</td>
<td>CHE</td>
<td>3.63</td>
<td>0.51</td>
<td>0.08</td>
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<tr>
<td>3</td>
<td>FD</td>
<td>3.46</td>
<td>0.57</td>
<td>0.11</td>
<td>.694**</td>
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<td>4</td>
<td>IS</td>
<td>3.47</td>
<td>0.6</td>
<td>0.12</td>
<td>.568** , .740</td>
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<tr>
<td>5</td>
<td>PR</td>
<td>3.63</td>
<td>0.57</td>
<td>0.04</td>
<td>.665**, .673**, .646**</td>
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<tr>
<td>6</td>
<td>EGI</td>
<td>3.53</td>
<td>0.62</td>
<td>0.07</td>
<td>.664**, .617**, .554**, .590**</td>
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<tr>
<td>7</td>
<td>CGV</td>
<td>3.56</td>
<td>0.68</td>
<td>0.15</td>
<td>.600**, .536**, .540**, .476**, .791**</td>
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<tr>
<td>8</td>
<td>TB</td>
<td>3.61</td>
<td>0.67</td>
<td>0.08</td>
<td>.678**, .679**, .557**, .601**, .770**, .758**</td>
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<tr>
<td>10</td>
<td>CBT</td>
<td>3.76</td>
<td>0.61</td>
<td>0.01</td>
<td>.466**, .356**, .277**, .360**, .407**, .469**, .558**, .597**</td>
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<tr>
<td>11</td>
<td>TI</td>
<td>3.61</td>
<td>0.61</td>
<td>0.05</td>
<td>.466**, .480**, .372**, .341**, .425**, .380**, .530**, .454**, .454**</td>
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**. Correlation is significant at the .01 level (2-tailed).
*. Correlation is significant at the .05 level (2-tailed).

5.2.3 Assessing common Method Variance

Individual team members first rated the following aspects: their leader’s group- and individual-focused TFL behaviours; the affect- and cognition-based trust between them and their leader; their knowledge sharing intention with team members or colleagues; and the level of task interdependence in their workplace. Then the leader rated the individual innovation for each of his or her team members and the team innovation collectively including him or herself. Since the data (Likert scale) was collected from two different sources (leaders and members), the potential for
bias associated with common method variance (CMV) was addressed (Podsakoff et al., 2003).

5.3 The Goodness of Data

5.3.1 Factor analyses - Principal component analysis (PCA)

The factor analysis for each variable with its items was conducted using principal component analysis with varimax rotation method, and the eigenvalue was set to be greater than 1. In the correlation matrix, the coefficients for most of the items were in excess of .3. The anti-image correlation matrix showed that the measures of sampling adequacy for each variable was above the acceptable level of .5. The highest item was IS1 (.953), and the lowest was TI5 (.524). The Bartlett’s test of sphericity was significant to the composite items with all individual variables, and the Kaiser-Meyer-Olkin (KMO) measure for all individual variables were higher than .6 except the 2-item dependent variable, individual innovation (KMO = .5) (table 5.2). The KMO of individual-focused TFL (IF_TFL) with four variables ranged from .748 to .815, and that of group-focused TFL (GF_TFL) with three variables ranged from .788 to .843. The KMO of affect-based (ABT) and cognition-based trust (CBT) were .773 and .771 respectively and that of task interdependence (TI) was .627. The KMO of intention to share knowledge (ISK) and individual innovation (IIN) were .807 and .5 respectively as shown in table 5.2.

Table 5.2 KMO and percentage of variance explained

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. of Items</th>
<th>KMO</th>
<th>% of Variance Explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicating High Expectations</td>
<td>CHE</td>
<td>5</td>
<td>.748</td>
</tr>
<tr>
<td>Follower development</td>
<td>FD</td>
<td>5</td>
<td>.768</td>
</tr>
<tr>
<td>Intellectual Stimulation</td>
<td>IS</td>
<td>4</td>
<td>.815</td>
</tr>
<tr>
<td>Personal Recognition</td>
<td>PR</td>
<td>4</td>
<td>.758</td>
</tr>
<tr>
<td>Emphasising Group Identity</td>
<td>EGI</td>
<td>5</td>
<td>.843</td>
</tr>
<tr>
<td>Communicating Group Vision</td>
<td>CGV</td>
<td>4</td>
<td>.788</td>
</tr>
</tbody>
</table>
In the component matrix for each of the individual variables (appendix IV), all items were loaded on one component with the eigenvalues over 1 and the items loaded on the component has the values over .7 except FD4 (.655) from the variable of follower development (FD) and TI5 (.423) from the variable of task interdependence (TI). Since the estimate of the variance accounted for in FD4 and TI5 of their components were lower than the expected value (.7), FD4 and TI5 were considered to be removed from individual-focused TFL (IF_TFL) and task interdependence (TI) respectively.

5.3.2 Confirmative items for individual-focused TFL

The 18-item of individual-focused TFL (IF_TFL) was run with extracting fixed number of factors set to be 1. CHE3, CHE4, FD4 and FD5 were found to be below .6 from the composite variable of individual-focused TFL in the component matrix. The 4 items (below .6 in the component) from individual-focused TFL were considered significantly low and; therefore, the analysis was run again by removing these 4 items from the component. All items in individual-focused TFL were then found over .6 (table 5.3). It resulted in a 14-item individual-focused TFL. The KMO was .915 and 53.612% of variance was explained.

Table 5.3 Component matrix of factor analysis – individual-focused TFL

<table>
<thead>
<tr>
<th>Items</th>
<th>1</th>
</tr>
</thead>
</table>
5.3.3 Confirmative items for group-focused TFL

The 14-item of group-focused TFL (GF_TFL) was run for extracting a fixed number of factors set to be 1. All items in group-focused TFL were over .6 (table 5.4) and its KMO was .916 as 56.917% of the variance was explained.

Table 5.4 Component matrix of factor analysis – group-focused TFL

<table>
<thead>
<tr>
<th>Group-focused transformational leadership Items</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGI1 S/he encourages me to set high goals for myself.</td>
<td>.816</td>
</tr>
<tr>
<td>EGI2 S/he communicates high performance expectations to me.</td>
<td>.709</td>
</tr>
<tr>
<td>EGI3 S/he encourages me to live up to my potential.</td>
<td>.748</td>
</tr>
<tr>
<td>EGI4 *S/he helps me develop my strengths.</td>
<td>.65</td>
</tr>
</tbody>
</table>
EGI5  S/he suggests training to improve my ability to carry out my job.  .757
CGV1  S/he provides me with developmental experiences.            .765
CGV2  *S/he gets me to look at problems from many different angles. .749
CGV3  S/he challenges me to think about old problems in new ways.  .802
CGV4  S/he challenges me to be innovative in my approach to work assignments.  .758
TB1   S/he encourages me to be an independent thinker.                .832
TB2   S/he commends me when I achieve my goals.                     .827
TB3   S/he gives me positive feedback when I perform well.           .702
TB4   S/he gives me special recognition when my work is very good.  .744
TB5   S/he acknowledges improvement in my quality of work.          .678


In the correlation matrix of the 14-item individual-focused TFL and the 14-item group-focused TFL, all items were over .3. The anti-image correlation matrix confirmed the sampling adequacy of each variable by observing the diagonal values against each item, and they were all over .5. Furthermore, both the Bartlett’s test of sphericity and KMO indicated large and significant values for the two transformational leadership variables; therefore, factorability was assumed (Coakes, Steed and Ong, 2010).

5.3.4 Confirmative items for affect- and cognition-based trust

Items of affect- (ABT1 to ABT4) and cognition-based trust (CBT1 to CBT4), eight items in total, were run together with the extracting eigenvalues to be set greater than 1, the four items of cognition-based trust were loaded on component 1, and the four items of affect-based trust were loaded on component 2 (table 5.5). The KMO was .847 and these eight items explained totally 71.762% of the variance.
Table 5.5 Component matrix of factor analysis – affect- and cognition-based trust

<table>
<thead>
<tr>
<th>Affect-based and cognition-based trust</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ABT1 We have a sharing relationship. We can both freely share our ideas, feelings, and hope.</td>
<td>.208</td>
<td>.832</td>
</tr>
<tr>
<td>ABT2 I can talk freely to him/her about difficulties I am having at work and know that s/he will want to listen.</td>
<td>.396</td>
<td>.796</td>
</tr>
<tr>
<td>ABT3 We would both feel a sense of loss if one of us was transferred and we could no longer work together.</td>
<td>.125</td>
<td>.776</td>
</tr>
<tr>
<td>ABT4 If I shared my problems with him/her, I know s/he would respond constructively and caringly.</td>
<td>.518</td>
<td>.634</td>
</tr>
<tr>
<td>CBT1 S/he approaches his/her job with professionalism and dedication.</td>
<td>.806</td>
<td>.41</td>
</tr>
<tr>
<td>CBT2 Given his/her track record, I see no reason to doubt his/her competence and preparation for the job.</td>
<td>.845</td>
<td>.331</td>
</tr>
<tr>
<td>CBT3 I can rely on him/her not to make my job more difficult by careless work.</td>
<td>.749</td>
<td>.281</td>
</tr>
<tr>
<td>CBT4 Most people, even those who aren’t close friends of him/her, trust and respect him/her as coworker.</td>
<td>.800</td>
<td>.074</td>
</tr>
</tbody>
</table>

5.3.5 Confirmative items for task interdependence

Factor analysis was rerun after the removal of TI5 from task interdependence. The four items of task interdependence (TI1 to TI4) shown in the component matrix were all over .6 (table 5.6). The percentage of variance explained in this 4-item task interdependence was raised to 58.635, KMO = .606.

Table 5.6 Component matrix of factor analysis – task interdependence

<table>
<thead>
<tr>
<th>Task interdependence</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>1</td>
</tr>
</tbody>
</table>
TI1 I work closely with others in doing my work. .691
TI2 I frequently must coordinate my efforts with others. .860
TI3 My own performance is dependent on receiving accurate information from others. .749
TI4 The way I perform my job has a significant impact on others. .752

5.3.6 Confirmative items for intention to share knowledge
The five items of intention to share knowledge including two items of intention to share explicit knowledge (ISEK1 and ISEK2) and three items of intention to share implicit knowledge (ISIK1 to ISIK3) were run together with the extracting eigenvalues set to be greater than 1. All items were loaded on one component (as shown in table 5.7) with KMO of .807, and 68.248% of the total variance was explained.

Table 5.7 Component matrix of factor analysis – intention to share knowledge

<table>
<thead>
<tr>
<th>Intention to share knowledge</th>
<th>Items</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISEK1</td>
<td>I will share my work reports and official documents with members of my organisation more frequently in the future</td>
<td>.831</td>
</tr>
<tr>
<td>ISEK2</td>
<td>I will always provide my manuals, methodologies and models for members of my organisation.</td>
<td>.874</td>
</tr>
<tr>
<td>ISIK1</td>
<td>I intend to share my experience or know-how from work with members of my organisation more frequently in the future.</td>
<td>.862</td>
</tr>
<tr>
<td>ISIK2</td>
<td>I will always provide my know-where or know-whom at the request of members of my organisation.</td>
<td>.745</td>
</tr>
<tr>
<td>ISIK3</td>
<td>I will try to share my expertise from my education or training with members of my organisation in a more effective way.</td>
<td>.812</td>
</tr>
</tbody>
</table>
5.3.7 Confirmative items for individual innovation

The two items (IIN1 and IIN2) for measuring individuals’ innovation as rated by the immediate managers or team leaders were loaded on one component (table 5.8). Its KMO was .500, and total variance was 91.528%.

Table 5.8 Component matrix of factor analysis – individual innovation

<table>
<thead>
<tr>
<th>Individual innovation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>1</td>
</tr>
<tr>
<td>IIN1</td>
<td></td>
</tr>
<tr>
<td>The member suggests new working methods to the group/team members who work with.</td>
<td>.957</td>
</tr>
<tr>
<td>IIN2</td>
<td></td>
</tr>
<tr>
<td>The member tries to introduce improved methods of doing things at work.</td>
<td>.957</td>
</tr>
</tbody>
</table>

5.3.8 Confirmative items for team innovation

In the same way as the scale items of individual innovation, these five items of team innovation (TIN1 to TIN5) were also rated by the immediate managers or team leaders. It was the only scale which was measured at a team level. All items were loaded on one component (table 5.9) with KMO of .773 and 68.807% of the total variance to be explained. Reliability and factor analysis are complementary procedures in scale construction. The next step was to assess the internal consistency of the items comprising the factors so that the reliability of the scales can be ensured.

Table 5.9 Component matrix of factor analysis – team innovation

<table>
<thead>
<tr>
<th>Team innovation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>1</td>
</tr>
<tr>
<td>TIN1</td>
<td></td>
</tr>
<tr>
<td>Compared with other similar groups/teams, how innovative do you consider your group/team to be setting work targets/objectives?</td>
<td>.815</td>
</tr>
<tr>
<td>TIN2</td>
<td></td>
</tr>
<tr>
<td>Compared with other similar groups/teams, how innovative do you consider your group/team to be deciding the methods used to</td>
<td>.817</td>
</tr>
</tbody>
</table>
achieve targets/objectives?

Compared with other similar groups/teams, how innovative do you consider your group/team to be initiating new procedures or information systems?

Compared with other similar groups/teams, how innovative do you consider your group/team to be deciding the order in which different parts of the job are done?

Compared with other similar groups/teams, how innovative do you consider your group/team to be developing innovative ways of accomplishing targets/objectives?

### 5.3.9 Reliability

The reliability coefficient for each variable indicated that the items in a set were satisfactory correlated to one another (over .7) (Bland and Altman, 1997). Item ACT3 from affect-based trust and item CBT4 from cognition-based trust were found that the alpha value could be increased from .843 to .847 and from .873 to .875 respectively by removing them from the variables. Since the alpha values for both variables were sufficiently high to be considered as high internal consistence within the variables, the deletion of the items from their variables seemed not necessary; therefore, the two items were kept for the following analysis. The alpha values of the 14-item individual-focused TFL and the 14-item group-focused TFL were .933 and .941 respectively. This was considered as a extremely high internal consistency of the variables (table 5.10).

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. of Items</th>
<th>KMO</th>
<th>% of Variance Explained</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual-focused TFL</td>
<td>IF_TFL</td>
<td>14</td>
<td>.900</td>
<td>.933</td>
</tr>
<tr>
<td>Group-focused TFL</td>
<td>GF_TFL</td>
<td>14</td>
<td>.916</td>
<td>.941</td>
</tr>
</tbody>
</table>
5.4 Data Aggregation - $r_{WG}$, ICC(1) and ICC(2)

In order to justify the appropriateness of the data aggregation of the dependent and independent variables into the group level, within-group interrater agreement ($r_{WG}(j)$) and intraclass correlations (ICC(1) and ICC(2)) were calculated. Within-group interrater agreement ($r_{WG}$) was used to determine if the ratings given by individual team members within a group were similar and intraclass correlations (ICC(1) and ICC(2)) were used to estimate the relationship between variables of each common factor. Since the seven variables (group- and individual-focused TFL, affect- and cognition-based trust, task interdependence, intention to share knowledge and individual innovation) were found to be slightly negative skewed, the slight skew 5-point scale of random expected variance of $\sigma_{E}^2$ (1.34) was used in the calculation (LeBreton and Senter, 2008). The $r_{WG}(j)$ values for all variables were inclined to 1.0, which ranged from .77 to .99 (table 5.11). It indicated a strong agreement with the ratings within the team members in individual teams. In other words, about 23% or less of the observed variance among the team members' ratings was credited to error variance, so that the aggregation of the individual level data was appropriate.

The ICC(1) and ICC(2) were checked to ensure justification for aggregation to team level data, and the F test was also performed. George (1990, p. 110) argued that large differences are less likely to be found when investigating teams within the same organisation and in these instances an F ratio over 1.00 was sufficient to justify an aggregation (Hays, 1981 cited in George, 1990). Given that the F ratio
was over 1.00 and \( r_{WG(j)} \) results were satisfactory, all the variables were aggregated to group level.

### Table 5.11 \( r_{WG(j)} \), ICC(1), ICC(2) and F statistic

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. of Items</th>
<th>( r_{WG(j)} )</th>
<th>ICC(1)</th>
<th>ICC(2)</th>
<th>F(40,102)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual-focused TFL</td>
<td>IF_TFL</td>
<td>14</td>
<td>.84</td>
<td>.10</td>
<td>.29</td>
<td>1.407</td>
</tr>
<tr>
<td>Group-focused TFL</td>
<td>GF_TFL</td>
<td>14</td>
<td>.99</td>
<td>.22</td>
<td>.50</td>
<td>2.074</td>
</tr>
<tr>
<td>Affect-based trust</td>
<td>ABT</td>
<td>4</td>
<td>.86</td>
<td>.24</td>
<td>.53</td>
<td>2.122</td>
</tr>
<tr>
<td>Cognition-based trust</td>
<td>CBT</td>
<td>4</td>
<td>.92</td>
<td>.42</td>
<td>.72</td>
<td>3.571</td>
</tr>
<tr>
<td>Task Interdependence</td>
<td>TI</td>
<td>4</td>
<td>.90</td>
<td>.13</td>
<td>.34</td>
<td>1.506</td>
</tr>
<tr>
<td>Intention to share knowledge</td>
<td>ISK</td>
<td>5</td>
<td>.97</td>
<td>.17</td>
<td>.40</td>
<td>1.698</td>
</tr>
<tr>
<td>Individual Innovation</td>
<td>IIN</td>
<td>2</td>
<td>.77</td>
<td>.46</td>
<td>.75</td>
<td>3.968</td>
</tr>
</tbody>
</table>

### 5.5 Ordinary Least Squares (OLS)

The figures of \( r_{WG(j)} \), ICC1 and ICC2 suggested a further analysis with Ordinary Least Squares (OLS) with the group data \((N = 41)\). Team size (the team size used in the analysis, in fact, was the average number of respondents in teams, as has been clarified in section 5.1.2 of this chapter) was added as a control variable when the regression was undertaken. The following six sections explain the results of regression with regard to intention to share knowledge, individual and team innovation, the dual-level TFL, the mediation relationships defined in the study and the moderating role of task interdependence.
5.5.1 Linear regression – intention to share knowledge

This section explains the results of regression with regard to intention to share knowledge. The conceptual model with hypotheses is provided below.

![Conceptual Model](image)

*Figure 5.1 Model 1 - the hypotheses for intention to share knowledge*

**Intention to share knowledge and all variables**

All variables, including the two dependent variables, individual innovation (IIN) and team innovation (TIN), and the control variable, team size, together explained 45.7% of the variance ($R^2$) in the dependent variable, intention to share knowledge (ISK) ($F = 3.369, p < .05$). The t-value indicated that task interdependence (TI) ($\beta = .485, t = 2.451, p = .020$) contributed to the prediction of knowledge sharing intention among colleagues. Normal P-P plot of regression standardised residuals for the dependent variable, intention to share knowledge, indicated a normal distribution. The scatterplot of residuals against predicted values showed no relationship.
between the residuals and the predicted values. Assumption of linearity was ensured. The results showed a positive implication of task Interdependence for knowledge sharing intention among colleagues, F(8,32) = 3.369, p = .007. This supports hypothesis 3.

**Intention to share knowledge and dual-level transformational leadership**

Individual-focused TFL (IF_TFL) and team size explained 24.7% of the variance in intention to share knowledge (F = 6.237, p < .05). The t-value showed that individual-focused TFL (β = .538, t = 3.013, p = .005) has a positive implication for intention to share knowledge, F(2, 38) = 6.237, p = .005. No support was found for hypothesis 1a.

Group-focused TFL (GF_TFL) and team size explained 34.4% of the variance in intention to share knowledge (F = 9.964, p < .05). The t-value also showed that group-focused TFL (β = .540, t = 4.004, p = .000) has a positive implication for intention to share knowledge, F(2, 38) = 9.964, p = .000. This supports hypothesis 1c.

Group- and individual-focused TFL, and team size together explained 34.4% of the variance in intention to share knowledge (F = 6.480, p < .05). The t-value showed that individual-focused TFL (β = .042, t = .155, p = .878) was no longer related to intention to share knowledge. However, group-focused TFL (β = .514, t = 2.343, p = .025) was still a significant predictor to intention to share knowledge, F(3, 37) = 6.480, p = .001.

Individual-focused TFL and team size were regressed on group-focused TFL, and 62.8% of the variance was explained in group-focused TFL. The t-value showed that individual-focused TFL (β = .966, t = 7.730, p = .000) is positively related to group-focused TFL, F(2, 38) = 32.027, p = .000.
Intention to share knowledge and interpersonal trust

Affect- and cognition-based trust and team size explained 23% of the variance in intention to share knowledge. The t-value showed that affect- (β = .336, t = 1.957, p = .058) and cognition-based trust (β = .046, t = .286, p = .777) have no relationship with the intention to share knowledge, F(3, 37) = 3.677, p = .021. No support was found for hypothesis 2b.

5.5.2 Linear regression – team innovation

This section explains the results of regression with regard to team innovation. The conceptual model with hypotheses is provided below.

![Figure 5.2 Model 2 - the hypotheses for innovation](image-url)
Team innovation and all variables

All variables were included in the regression including the two dependent variables, intention to share knowledge (ISK), individual innovation (IIN) and the control variable, team size. About 55% of the variance ($R^2$) was explained in the dependent variable, team innovation ($F = 4.846, p < .05$) by the variables in the regression.

This indicated that affect-base trust (ABT) ($\beta = .957, t = 2.523, p = .017$), cognition-based trust (CBT) ($\beta = .871, t = -3.186, p = .003$) and individual innovation (IIN) ($\beta = .424, t = 2.806, p = .008$) were the predictors of team innovation (TIN). The results indicated that both affect-based trust and individual innovation were the positive predictors to team innovation whereas cognition-based trust contributed a negative effect to team innovation, $F(8, 32) = 4.846, p = .001$). This supports hypothesis 4a but only supports hypothesis 5 conditionally.

Team innovation and dual-level transformational leadership

Individual-focused TFL and team size explained 23.8% of the variance in team innovation ($F = 5.944, p < .05$). The t-value showed that individual-focused TFL ($\beta = 1.076, t = 3.040, p = .004$) has a positive implication for team innovation, $F(2, 38) = 5.944, p = .006$.

Group-focused TFL (GF_TFL) and team size explained 22.2% of the variance in team innovation ($F = 5.415, p < .05$). The t-value also showed that group-focused TFL ($\beta = .831, t = 2.871, p = .007$) has a positive implication for team innovation, $F(2, 38) = 5.415, p = .009$. This supports hypothesis 4b.

Group- and individual-focused TFL and team size together explained 25.3% of the variance in team innovation ($F = 4.166, p < .05$). The t-value showed that both individual-focused TFL ($\beta = .7.2, t = 1.233, p = .225$) and group-focused TFL ($\beta = .383, t = .838, p = .407$) were no longer related to team innovation, $F(3, 37) = 4.166, p = .012$. 
Team innovation and task interdependence

Task interdependence and team size explained 13% of the variance in team innovation, and the F-test indicated the insignificance of the model, $F(2, 38) = 2.834, p = .71$. Task interdependence was found to have no relationship with team innovation. No support was found for hypothesis 6.

Team innovation and individual innovation

Individual innovation and team size explained 28.9% of the variance in team innovation. The t-value showed that individual innovation ($\beta = .559, t = 3.550, p = .001$) is positively related to team innovation, $F(2, 38) = 7.717, p = .002$. This supports hypothesis 4a.

Team innovation and team size explained 25.2% of the variance in individual innovation. The t-value showed that team innovation ($\beta = .446, t = 3.550, p = .001$) is positively related to individual innovation, $F(2, 38) = 6.390, p = .002$. Individual innovation was found to be a positive predictor of team innovation.

5.5.3 Linear regression – individual innovation

This section explains the results of regression with regard to individual innovation. The conceptual model with hypotheses is represented in figure 5.2 (p. 80).

Individual innovation and all variables

The regression was performed in the similar way as for team innovation (TIN) and included intention to share knowledge (ISK), team innovation (TIN) and team size in the regression. There was only a 34.4% of the variance in the dependent variable, individual innovation (IIN); $F = 2.094, p = .066$. No significant prediction was found in the dependent variable, individual innovation, and the F-test indicated that the model did not significantly fit the data.
Individual innovation and dual-level transformational leadership

Individual-focused TFL and team size explained 14.7% of the variance in individual innovation ($F = 3.284$, $p < .05$). The t-value showed that individual-focused TFL ($\beta = .825$, $t = 2.532$, $p = .016$) has a positive implication for individual innovation, $F(2, 38) = 3.284$, $p = .048$. This supports hypothesis 1b.

Group-focused TFL (GF_TFL) and team size explained 9.1% of the variance in individual innovation, and the F-test indicated the insignificance of the model, $F(2, 38) = 1.905$, $p < .163$. Group-focused TFL was found to have no relationship with individual innovation.

Group- and individual-focused TFL, and team size together explained 14.7% of the variance in individual innovation; again, the F-test indicated the insignificance of the model, $F(3, 37) = 2.132$, $p < .113$.

Individual innovation, interpersonal trust and task interdependence

Affect- and cognition-based trust and team size explained 10.6% of the variance in individual innovation, and the F-test showed the insignificance of the model, $F(3, 37) = 1.465$, $p = .240$. Similar to the result for task interdependence, task interdependence and team size explained 8.9% of the variance in individual innovation, and the F-test showed the insignificance of the model, $F(2, 38) = 1.859$, $p = .170$.

5.5.4 Linear regression – dual-level transformational leadership

This section explains the results of regression with regard to dual-level transformational leadership. The conceptual model with hypotheses can be referred to in either in figure 5.1 (p. 78) or figure 5.2 (p. 80).
Dual-level transformational leadership and, affect- and cognition-based trust

Group- and individual-focused TFL and team size explained 60.9% of the variance in affect-based trust. The t-value showed that only group-focused TFL ($\beta = .824, t = 4.344, p = .000$) is significantly related to affect-based trust, $F(3, 37) = 19.192, p = .000$. This supports hypothesis 7a. When group-focused TFL was removed from the regression, individual-focused TFL ($\beta = .853, t = 4.815, p = .000$) was also found to be significantly predicting affect-based trust, $F(2, 38) = 13.162, p = .000$.

The relationship was tested on cognition-based trust that group- and individual-focused TFL and team size explained 20.4% of the variance in cognition-based trust. The t-value showed that only group-focused TFL ($\beta = .719, t = 2.628, p = .012$) is significantly related to cognition-based trust, $F(3, 37) = 4.410, p = .009$. When group-focused TFL was removed from the regression, however, the F-test indicated the insignificance of the model, $F(2, 38) = 2.737, p = .078$.

Affect-based trust and team size explained 41.1% of the variance in cognition-based trust. The t-value showed that affect-based trust ($\beta = .685, t = 5.105, p = .000$) is positively related to cognition-based trust, $F(2, 38) = 13.262, p = .000$.

Cognition-based trust and team size explained 43.6% of the variance in affect-based trust. The t-value showed that cognition-based trust ($\beta = .594, t = 5.105, p = .000$) is positively associated with affect-based trust, $F(2, 38) = 14.674, p = .000$. Cognition-based trust was found to be a positive predictor to affect-based trust as with the relationship between individual and team innovation. This supports hypothesis 2a.

Dual-level transformational leadership and task interdependence

Group- and individual-focused TFL and team size explained 42.1% of the variance in task interdependence. The t-value showed that only group-focused TFL ($\beta = .479, t = 2.522, p = .016$) is significantly related to task interdependence, $F(3, 37) = 8.984, p = .000$. This supports hypothesis 7b. When group-focused TFL was removed from the regression, individual-focused TFL ($\beta = .640, t = 4.096 p = .000$)
was found to be significantly predicting task interdependence, $F(2, 38) = 9.024, p = .001$.

5.5.5 Mediation relationship
The results were found more interpretable when individual-focused TFL and group-focused TFL were run separately from the regression; therefore the following regressions were performed twice every time with the two variables individually. Sobel tests were performed via the functions provided by this site [http://quantpsy.org/sobel/sobel.htm](http://quantpsy.org/sobel/sobel.htm) in addition to the regression for double confirmation of the results. Sobel test is assumed to work well in large samples; it however, could still be a reference for the current study with a relative small sample. The notations used in the site are provided below:

| $a$ | raw (unstandardised) regression coefficient for the association between IV and mediator. |
| $s_a$ | standard error of $a$. |
| $b$ | raw coefficient for the association between the mediator and the DV (when the IV is also a predictor of the DV). |
| $s_b$ | standard error of $b$. |

5.5.5.1 Mediation analysis for task interdependence
In Model 1 (table 5.12), task interdependence (TI) was regressed on the independent variable, group-focused TFL (GF_TFL) ($\beta = .591, t = 5.022, p = .000$) and the control variable, team size. Task interdependence (TI) was found to be significantly and positively related to group-focused TFL (GF_TFL) ($F(2, 38) = 13.341, p = .000$).

In Model 2, intention to share knowledge (ISK) was regressed on all variables including the two dependent variables, individual innovation (IIN) and team innovation (TIN), and the control variable, team size, but excluding task interdependence (TI). Intention to share knowledge (ISK) was found to be
positively associated with group-focused TFL (GF_TFL) (β = .529, t = 2.369, p = .024) in the absence of task interdependence (TI) at (F(6, 34) = 3.110, p = .015).

In Model 3, all variables were included in the regression equation including task interdependence (TI), which was excluded in Model 2. The significant relationship between group-focused TFL (GF_TFL) and intention to share knowledge (ISK) was no longer valid when task interdependence (TI) existed in the regression. Intention to share knowledge (ISK) was found to be positively associated with task interdependence (TI) (β = .483, t = 2.499, p = .018) in the presence of group-focused TFL (GF_TFL) at (F(3, 33) = 3.969, p = .003).

A summary of statistics of these three models regarding the mediating variable, task interdependence (TI), shows significant mediation relationship between group-focused TFL (GF_TFL) and intention to share knowledge (ISK). The Sobel tests using the unstandardised regression coefficient and standard error (table 5.13) as shown below also illustrate the significant relationship between them. This supports hypothesis 8.

Table 5.12 Mediation analysis - task interdependence

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1: Task Interdependence</th>
<th>Model 2: Intention to Share Knowledge</th>
<th>Model 3: Intention to Share Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team size</td>
<td>β = .005</td>
<td>β = .040</td>
<td>β = .038</td>
</tr>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group-focused TFL</td>
<td>β = .591**</td>
<td>β = .529*</td>
<td>β = .329</td>
</tr>
<tr>
<td>Task Interdependence</td>
<td></td>
<td>β = .483*</td>
<td></td>
</tr>
<tr>
<td>ΔR2</td>
<td>.413**</td>
<td>.354*</td>
<td>.457**</td>
</tr>
</tbody>
</table>

*p < .05. ** p < .01.

The following table (table 5.13) shows the results of Sobel test conducted with unstandardised regression coefficient and standard error for the mediation
relationship of task interdependence between group-focused TFL (GF_TFL) and intention to share knowledge (ISK).

Table 5.13 Sobel test for task interdependence by unstandardised regression coefficient and standard error

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sobel test</td>
<td>2.239</td>
<td>.128</td>
</tr>
<tr>
<td>Aroian test</td>
<td>2.204</td>
<td>.130</td>
</tr>
<tr>
<td>Goodman test</td>
<td>2.275</td>
<td>.125</td>
</tr>
</tbody>
</table>

5.5.5.2 Mediation analysis for affect-based trust

The regression was run to test the mediating role of affect-based trust (ABT) between group-focused TFL (GF_TFL) and team innovation (TIN). The results regarding the three models are provided below. In Model 1 (table 5.14), affect-based trust (ABT) was regressed on the independent variable, group-focused TFL (GF_TFL) (β = .860, t = 7.365, p = .000) with team size as a control. Affect-based trust (ABT) was found to be significantly and positively related to group-focused TFL (GF_TFL) (F(2, 38) = 29.489, p = .000) as was task interdependence (TI).

In Model 2, team innovation (TIN) was regressed on all variables including the two dependent variables, intention to share knowledge (ISK) and individual innovation (IIN), with team size as a control but excluding affect-based trust (ABT). Team innovation (TIN) was found to be positively associated with group-focused TFL (GF_TFL) (β = .800, t = 2.213, p = .034) without the existence of affect-based trust (ABT) (F(6, 34) = 4.747, p = .001). The association was also found in cognition-based trust (CBT) and individual innovation (IIN) with team innovation (TIN). Cognition-based trust (CBT) was negatively associated with team innovation (TIN) (β = -588, t = -2.262, p = .030) whereas individual innovation (IIN) was positively related to team innovation (TIN) (β = .481, t = 3.101, p = .004).

In Model 3, team innovation (TIN) was regressed on all variables including affect-based trust (ABT). The significant relationship between group-focused TFL
(GF_TFL) and team innovation (TIN) was eliminated as was due to the existence of affect-based trust (ABT) in the regression. Team innovation (TIN) was found to be positively related to affect-based trust (ABT) ($\beta = .962$, $t = 2.578$, $p = .015$) and individual innovation ($\beta = .432$, $t = 2.984$, $p = .005$) but negatively associated with cognition-based trust ($\beta = -.882$, $t = -3.310$, $p = .002$). This supports hypothesis 9b conditionally.

Table 5.14 Mediating role of affect-based Trust on team innovation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1: Team Innovation</th>
<th>Model 2: Team Innovation</th>
<th>Model 3: Team Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team size</td>
<td>$\beta = .021$</td>
<td>$\beta = .073$</td>
<td>$\beta = .050$</td>
</tr>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group-focused TFL</td>
<td>$\beta = .860^{**}$</td>
<td>$\beta = .800^{*}$</td>
<td>$\beta = .177$</td>
</tr>
<tr>
<td>Affect-based Trust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>$.608^{**}$</td>
<td>$.456^{**}$</td>
<td>$.547^{**}$</td>
</tr>
</tbody>
</table>

*p < .05. ** p < .01.

Table 5.15 shows the results of Sobel test conducted with unstandardised regression coefficient and standard error for the mediation relationship of affect-based trust (ABT) between group-focused TFL (GF_TFL) and team innovation (TIN).

Table 5.15 Sobel test for affect-based trust by unstandardised regression coefficient and standard error

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>Test statistic</th>
<th>Std. Error</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sobel test</td>
<td>2.434</td>
<td>.340</td>
<td>.340</td>
<td>.015</td>
</tr>
<tr>
<td>Aroian test</td>
<td>2.414</td>
<td>.343</td>
<td>.343</td>
<td>.016</td>
</tr>
<tr>
<td>Goodman test</td>
<td>2.254</td>
<td>.337</td>
<td>.337</td>
<td>.014</td>
</tr>
</tbody>
</table>
A similar regression was run to test affect-based trust (ABT) as the mediating variable between group-focused TFL (GF_TFL) and intention to share knowledge (ISK). With reference to Model 1 in Table 5.16 regarding the relationship between affect-based trust (ABT) and group-focused TFL (GF_TFL), group-focused TFL is significant to the prediction of affect-based trust.

In Model 2, intention to share knowledge (ISK) was regressed on all variables including the two dependent variables, individual innovation (IIN) and team innovation (TIN), with team size as a control, however, excluding affect-based trust (ABT). There was found to be no relationship with group-focused TFL.

In Model 3, intention to share knowledge (ISK) was regressed on all variables including affect-based trust (ABT). Same as the result found in Model 2, no relationship was identified in the regression; therefore, no support was found for hypothesis 9a.

Table 5.16 Mediating role of affect-based Trust on Intention to share knowledge

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1: Affect-based Trust</th>
<th>Model 2: Intention to Share Knowledge</th>
<th>Model 3: Intention to Share Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team size</td>
<td>$\beta = .021$</td>
<td>$\beta = .038$</td>
<td>$\beta = .038$</td>
</tr>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group-focused TFL</td>
<td>$\beta = .860^{**}$</td>
<td>$\beta = .293$</td>
<td>$\beta = .329$</td>
</tr>
<tr>
<td>Affect-based Trust</td>
<td></td>
<td></td>
<td>$\beta = -.071$</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>$.608^{**}$</td>
<td>$.455^{**}$</td>
<td>$.457^{**}$</td>
</tr>
</tbody>
</table>

* $p < .05$. ** $p < .01$.

5.5.6 Moderation relationship

The two models proposed in Chapter 4 were used to test the moderating effect between the dependent and independent variables. All the mean centred variables were included in the regression in model 2; the value of $R$ squared change
showed no significant change in the regression. It indicated no underlying moderation relationship within the independent variables. No support was found for hypothesis 10.

Figure 5.3 Model 3 - the hypothesis for the moderating role task interdependence

5.6 Conclusion
The results indicated a significant impact of group-focused TFL (GF_TFL) on intention to share knowledge (ISK); H1c was supported, whereas individual-focused TFL (IF_TFL) was found to have no negative relationship with the intention to share knowledge (ISK). Instead, it is a positive predictor of intention to share knowledge as well as a positive determinant to individual innovation (IIN). Thus, H1a was not supported, but H1b was supported.

Cognition-based trust (CBT) was found to have a positive relationship with affect-based trust (ABT); the result confirmed previous research findings from McAllister (1995). No impact was found in the two forms of interpersonal trust, affect- (ABT) and cognition-based trust (CBT), on the intention to share knowledge (ISK) among colleagues in this sample. Instead, task interdependence (TI) was found to be a significant predictor of the targeted variable. H2a and H3 were supported but not for H2b.

The 2-item criterion variable, individual innovation (IIN), predicted another criterion variable, team innovation (TIN), positively. Moreover, team innovation (TIN) was
found to be predicted by group-focused TFL (GF_TFL) and individual-focused TFL (IF_TFL) individually. H4a and H4b were then supported. Affect-based trust (ABT) contributed a positive effect to team innovation (TIN), but cognition-based trust (CBT) affected team innovation (TIN) in the opposite way. H5 was supported conditionally. Task interdependence (TI) was found not to be a determinant to team innovation (TIN). H6 were not supported accordingly.

Group-focused TFL (GF_TFL) was found to have a positive association with both affect-based trust (ABT) and task interdependence (TI) individually. Both H7a and H7b were supported, but H7a was supported only conditionally.

Task interdependence significantly mediated group-focused TFL and intention to share knowledge, H8 was supported. Affect-based trust was found to have a significant mediating relationship between group-focused TFL and team innovation but did not mediate the relationship between group-focused TFL and intention to share knowledge. H9b was supported, but H9a was not.

Finally, no moderation relationship was identified since task interdependence could neither strengthen nor weaken the relationship between group-focused TFL and team innovation. H10 was not supported with the data from this sample. A summary of the results for the hypotheses defined in the study is given in the table below.

Table 5.17 Results of the hypotheses

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Supported (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a Individual-focused TFL behaviour is negatively related to intention to share knowledge.</td>
<td>No</td>
</tr>
<tr>
<td>H1b Individual-focused TFL behaviour is positively related to individual innovation.</td>
<td>Yes</td>
</tr>
<tr>
<td>H1c Group-focused TFL behaviour is positively related to intention</td>
<td>Yes</td>
</tr>
</tbody>
</table>
to share knowledge.

H2a Cognition-based trust is positively related to affect-based trust. Yes

H2b Interpersonal trust is positively related to intention to share knowledge. No

H3 Task interdependence is positively related to intention to share knowledge. Yes

H4a Individual innovation is positively associated with team innovation. Yes

H4b Group-focused TFL behaviour is positively related to team innovation. Yes

H5 Interpersonal trust is positively related to team innovation. Yes*

H6 Task interdependence is positively related to team innovation. No

H7a Group-focused TFL behaviour is positively related to interpersonal trust. Yes*

H7b Group-focused TFL behaviour is positively related to task interdependence. Yes

H8 Group-focused TFL behaviour is positively related to intention to share knowledge through the mediating influence of task interdependence. Yes

H9a Group-focused TFL behaviour is positively related to intention to share knowledge through the mediating influence of interpersonal trust. No

H9b Group-focused TFL behaviour is positively related to team innovation through the mediating influence of interpersonal trust. Yes*

H10 Group-focused TFL is positively related to team innovation when task interdependence is high. No

* Affect-based trust only
Chapter 6 Conclusions and implications

Introduction
This chapter discusses the findings presented in Chapter 5, first, to highlight the significant relationships among the concepts used in the study. Secondly, this chapter discusses theoretical implications and thirdly, it outlines limitations and finally makes suggestions for future research.

6.1 Conclusions
In this research, the effects of group- and individual-focused TFL behaviours, affect- and cognition-based trust, and task interdependence on intention to share knowledge, individual and team innovation were analysed. The regression results revealed that task interdependence is a positive predictor of intention to share knowledge. Although affect- and cognition-based trust are positively related, team innovation is positively predicted by affect-based trust whereas it is negatively predicted by cognition-based trust, and Individual innovation is positively associated with team innovation. Two mediating relationships were found. Affect-based trust mediates the relationship between the effect of group-focused TFL and team innovation; task interdependence mediates the relationship between the effect of group-focused TFL and intention to share knowledge among colleagues. Diagrams regarding the hypotheses defined in the three models, in Chapter 3, are provided below. The supported relationships are in bold; for those relationships which are faint this indicated the relationships were not supported in the study. The relationships among variables with regard to the hypotheses are discussed in the following sections.
Figure 6.1 Model 1 - the results of the hypotheses for intention to share knowledge

Figure 6.2 Model 2 - the results of the hypotheses for innovation
6.1.1 The relationship between intention to share knowledge and the dual-level transformational leadership

No inverse relationship was found between individual-focused TFL and intention to share knowledge, which suggests that personal recognition is not a factor constraining the intention of knowledge sharing. Instead, individual-focused TFL is a determinant of intention to share knowledge as well as group-focused TFL that acts as a positive factor for the intention of team members to share their knowledge.

In accordance to the concepts of Wang and Howell’s (2010) dual-level TFL, leaders’ behaviours are classified into two different focuses: individual and collective. Individual-focused TFL behaviour was hypothesised as negatively associated with knowledge sharing intention among colleagues because of its emphasis on personal recognition, the empowerment and encouragement of individual members’ achievement that was argued to motivate information-withholding rather than knowledge sharing as individuals compete against other members and do not wish to share valuable information. Group-focused TFL was argued to promote team spirit, and build team identity and team goals that, on the one hand, encourage colleagues to share what they know, while on the other hand, abate their individual ambition for personal recognition. Individual capabilities have
been found to be essential for a contribution to team performance or productivity (e.g. Steiner, 1972; Bass, 1980; Kozlowski and Bell, 2003). A balance between group and individual development is a key tactic for effective team leadership (Chen et al., 2007).

The results do not support a negative effect of individual-focused TFL on intention to share knowledge. Conversely, both group- and individual-focused TFL were found to induce knowledge sharing intention in the workplace. The result for individual-focused TFL might be influenced by the respondent profile. As reported on page 65 in Chapter 5, nearly half of the respondents were academic staff. Past research has shown that one of the primary roles of teachers is to share knowledge, and that is also a key motivation in their work (Darling-Hammond, 2008, p. 96). In relation to group-focused TFL, the result confirmed the significance of group focused leadership behaviour on knowledge sharing. This was argued as consequent to strong group identity, common group visions and team building which motivates members to share their knowledge. The data, therefore, confirmed the findings of Wang and Howell (2010). In summary, hypotheses H1a was not supported, but H1c was supported.

6.1.2 The relationship between intention to share knowledge and interpersonal trust

The factor analysis performed in the study (table 5.5, p. 72 in Chapter 5) confirmed the proposition of some previous scholars, e.g. Johnson-George and Swap (1982), Rempel et al., (1985), McAllister, (1995), and Ng and Chua (2006) that affect- and cognition-based trust are two distinct forms of interpersonal trust. The analysis also indicated a positive relationship between these two forms of interpersonal trust. Affect- and cognition-based trust are accurately conceptualised as two different forms of trust but interrelated as argued by McAllister (1995). Therefore, the hypothesis H2a was supported.
The data did not support the hypothesis of a positive impact for interpersonal trust on intention to share knowledge. This finding contradicted findings from some previous research in this area, e.g. McAllister, 1995; Gibbert and Krause, 2002; Bock et al, 2005; Ma, Qi and Wang, 2008, Staples and Webster, 2008. The lack of support for the effect of interpersonal trust on intention to share knowledge may be explained with reference to the study sample. Subjects in the sample may have been engaged in highly structured situations since trust is more critical in weak structural situations (Staples and Webster, 2008). Hypothesis H2b was not supported. The results of the hypotheses H1a, H1c and H2b suggest that team leaders should pay attention at both the individual and group level leadership behaviour when knowledge sharing is a critical factor to succeed at work.

6.1.3 The relationship between intention to share knowledge and task interdependence

The findings show that knowledge sharing intention among colleagues is closely related to the level of task interdependence in the workplace. Thus, the hypothesis H3 was supported. Thompson’s (1967) model of reciprocal interdependence demonstrates substantial ineffectiveness with the colleagues in the work flow if they do not communicate and collaborate with each other. Task interdependence promotes the intention to share useful information or knowledge within the predecessor and successor in order to avoid any foreseeable reciprocal disadvantages. Higher task interdependence in the work flow induces a higher intention of sharing knowledge of the colleagues that they work in a group or team. Reciprocal interdependence requires more coordination (Bass, 1980, p. 476). That might lead to a group of colleagues who closely work with each other feeling more responsible to one another. Furthermore, Staples and Webster (2008) found a strong positive relationship between knowledge sharing and trust in all types of teams. However, the relationship was stronger when task interdependence is low, which implies the relationship could be weakened when task interdependence is high. This study found no significant relationship between intention to share
knowledge and interpersonal trust that might be caused by the existence of significantly high task interdependence residing in the organisation. The result confirmed Bock et al.’s (2005) research finding of the effect of organisational climate which is the environment in which the colleagues interact with the anticipated reciprocal relationship on the intention and attitudes of knowledge sharing, by the similar token. It also confirmed Smith, Organ and Near’s (1983) finding of the positive relationship between task interdependence and citizenship behaviours. Upon the suggestion made in section 6.1.2, team leaders are also suggested to highlight task interdependence in teams so that team members are more attuned to this dimension of their work.

6.1.4 The relationship between innovation and dual-level transformational leadership

Individual innovation was found to be a positive predictor to team innovation. This finding further confirmed Burningham and West’s (1995) research results on the positive relationship of ‘individual propensity to innovation’ in predicting team innovation. The hypothesis H4a was supported.

Group-focused TFL was found to be a positive predictor to team innovation. The hypothesis H4b was supported. Team members develop a common understanding of the best approach based on the guidance from their team leader. The organisation’s ability to create and implement new concepts is accelerated when responsibilities are shared (Nonaka, 1994, p. 29). Group-focused TFL shares a common goal vision and concentrates on the importance of team building that forms an alliance network of the team members within the organisation. Innovation can then be enhanced. The result confirmed a similar concept from a number of researchers, e.g. Ahuja, 2000; Soh, 2003; Smith, Montagno and Kuzmenko, 2004; Bock et al., 2005; Wang and Howell’s, 2010. Since group-focused TFL behaviour of leaders does not only have a positive impact on promoting knowledge sharing intention but also on stimulating team innovation, team leaders focusing on the
development of team identity, communicating common goals and team building are strongly recommended.

6.1.5 The relationship between innovation and interpersonal trust

Relatively little theoretical or empirical research is currently conducted regarding the impact of interpersonal trust on organisational innovation. In the study, interpersonal trust was found to be positively related to team innovation. The hypothesis H5 was supported conditionally since the positive relationship was only significant in affect-based trust but not in cognition-based trust. Cognition-based trust was found to have a negative effect on team innovation. Apart from the two dimensions of interpersonal trust, affect- and cognition-based trust, interpersonal trust also has two directions, lateral and vertical. Lateral trust refers to the trust within colleagues (peers); vertical trust is the trust between leaders and their staff members (Costigan, Ilter and Berman, 1998). Since the ratings collected from the respondents in the study were their impression of trust between their immediate managers, supervisors or team leaders and the respondents themselves, the statement could be made clearer as the ‘vertical form of interpersonal trust, affect-based trust, that is found to have a strong relationship in determining team innovation’. Therefore, the hypothesis H5 was conditionally supported.

Controversially, cognition-based trust was found to have a negative impact on team innovation. That could happen when team members have high levels of cognition-based trust with team leaders, so the members do not question each others’ ideas or positions, which leads to premature consensus and lack of debate. Research on innovation suggests that it relies on actively challenging others positions, or processes of elaboration. When there is high cognition-based trust in leaders that may be insufficient questioning, challenging and debate for innovation within the members (Simons, Pelled and Smith, 1999; Mitchell, Nicholas and Boyle, 2009). That could also be influenced by the individualist and collectivist cultures since members in a collectivist culture (in teams) are more likely to share opinions
and beliefs. The value of affect-based trust becomes more prominent when
cognition-based trust is less valued in collectivist cultures than in individualist
cultures (Kim, 2005). Team innovation refers to collective activities among
colleagues in the team; it is likely to be influenced by affect-based trust positively
but cognition-based trust negatively in a collectivist culture. The result could also
be influenced statistically by the relative small sample size since a proper sample
size is required for reasonably precise generalisations with confidence (Sekaran
and Bougie, 2010, p. 287). Sample size is a trade-off between confidence and
precision in estimation. A higher precision or confidence may call for an increase
in the sample size accordingly (Sekaran and Bougie, 2010, p. 290). In other words,
a relative small sample size implies a relative lower precision or confidence in the
estimation. Future research with a larger sample size might find support for the
role of cognition-based trust.

6.1.6 The relationship between innovation and task interdependence
Task interdependence did not predict team innovation, and the hypothesis H6 was
then rejected. It could be that the types of tasks and activities undertaken at
educational institutions may not have provided sufficient variety in task
interdependence for any relationship to be detected.

6.1.7 The relationship between dual-level transformational leadership
and interpersonal trust
Trust is crucial in terms of leadership effectiveness, and it enhances organisational
cooperation and collaboration (Tyler, 2003). The finding in the study indicated
consistent results with much past research (e.g. House, 1977; Bass, 1985; Shamir,
House and Arthur, 1993; Conger and Kanungo, 1998; Bass and Riggo, 2006;
Yang and Mossholder, 2010; Schaubroeck, Lam and Peng, 2011) on the role of
trust in leadership conditionally. Group-focused TFL was found to have a positive
association with affect-based trust but not with cognition-based trust. The hypothesis H7a was supported with affect-based trust only.

6.1.8 The relationship between dual-level transformational leadership and task interdependence

Pooled interdependence involves less individual learning (less variation across jobs) Pearce and Gregersen (1991); however, team training (referred to as a team building activity in Bass, 1980, p. 480) may be necessary when reciprocal interdependence is required (Bass, 1980). Hughes, Ginnett and Curphy (1993) states that team members work highly in task interdependence and develop a strong team identity. The three components of group-focused TFL (team building, team identity and communicating a common goal) as a whole were found to be significantly associated with task interdependence in the study. The hypothesis H7b was then supported.

6.1.9 The mediating relationship of task interdependence

Prior to making an assertion of the mediation relationship, the three conditions delineated by Baron and Kenny (1986) have to be fulfilled. First, group-focused TFL was found to have a positive prediction of task interdependence (H7b was supported in the regression) so leaders should focus on promoting group identity (‘We’ instead of ‘You’ or ‘I’), team work and team goals so as to encourage collaboration and cooperation between the members in teams, resulting in high cooperative behaviours of the team members in task interdependence. Variations of the interdependent variable, group-focused TFL, significantly explained the variations in the mediator, task interdependence (Model 1 in table 5.12 of Chapter 5, p. 86). The first condition of Baron and Kenny (1986) was met.

Secondly, task interdependence was found to have a positive association with the intention to share knowledge (H3 was supported). Task interdependence
somewhat induces the team members in the work flow to share useful information or knowledge in order to avoid reciprocal consequences. Variations in the mediator, task interdependence, significantly explained the variations in the dependent variable, intention to share knowledge (Model 3 in table 5.12, p. 86). The second condition of Baron and Kenny (1986) was then met.

Lastly, no significant relationship between dependent (intention to share knowledge) and independent variables (group-focused TFL) was found when paths a and b were controlled. Path a reflected the relationship between group-focused TFL and task interdependence; path b is the relationship between task interdependence and intention to share knowledge. Group-focused TFL was found to be significantly related to colleagues’ intention to share knowledge when the mediator, task interdependence, was absent from the regression (Model 2 in table 5.12, p. 86). It suggests that the effect of group-focused TFL on intention to share knowledge was significantly reduced by the existence of task interdependence. The third condition of Baron and Kenny (1986) was also met. Therefore, an assumption of the mediating effect of task interdependence between group-focused TFL and intention to share knowledge was supported based on the three conditions of Baron and Kenny (1986) that were met simultaneously.

6.1.10 The mediating relationship of trust

The following two sections explain the findings with regard to the mediating effects of trust between group-focused TFL and intention to share knowledge, and between group-focused TFL and team innovation.

Intention to share knowledge

Many research findings show the mediating effect of trust between the relationship of leadership behaviour and helping behaviour of their members (e.g. Podsakoff et al., 1990; Yang, Mossholder and Peng. 2009). However, this study data supported no mediating effect in the relationship between group-focused TFL and
interpersonal trust (both affect- and cognition-based trust) on intention to share knowledge. Only the first condition of Baron and Kenny (1986) was met in that variations of the independent variable, group-focused TFL, significantly explained variations in the mediator, affect-based trust (Model 1 in table 5.16 of Chapter 5, p. 89). H7a was supported in the survey.

Interpersonal trust (both affect- and cognition-based trust) was found to have no positive association with the intention to share knowledge (H2b was not supported). Variations in the mediator, interpersonal trust (both affect- and cognition-based trust), did not significantly explain variations in the dependent variable, intention to share knowledge. The second condition of Baron and Kenny (1986) was not met (Model 2 in table 5.16, p. 89) as well as insignificance found in Model 3 in table 5.16. It indicates that only the first condition was met while the models failed to meet the second and the third conditions.

For an assumption of the mediating effect of interpersonal trust between group-focused TFL and intention to share knowledge to be supported, the three conditions of Baron and Kenny (1986) have to be met simultaneously. Therefore, task interdependence is the only mediator, found in the survey, to explain the reason of the occurrence of intention to share knowledge in teams with the leadership focused on team elements.

Team innovation

The data did not support the mediating influence of interpersonal trust in the relationship between group-focused TFL and intention to share knowledge. However, the data in the study revealed the mediating influence of affect-based trust between group-focused TFL and team innovation.

In line with previous sections, the first condition was confirmed. Group-focused TFL was found to be positively related to interpersonal trust (H7a was supported). Secondly, affect-based trust was found to have a positive association with team innovation (H5 was supported). Variations in the mediator, affect-based trust,
significantly explained the variations in the dependent variable, team innovation (Model 3 in table 5.14 of Chapter 5, p. 88). The second condition of Baron and Kenny (1986) was met.

Finally, no significant relationship has found between team innovation and group-focused TFL when Paths a and b were controlled. Path a was the relationship between group-focused TFL and affect-based trust; Path b was the relationship between affect-based trust and team innovation. Group-focused TFL was found statistically to be significantly associated with team innovation with the absence of the mediator, affect-based trust (Model 2 in table 5.14, p. 88). The reduction of the effect of group-focused TFL on team innovation caused by affect-based trust was explained. The third condition of Baron and Kenny (1986) was also met. Since the three conditions of Baron and Kenny (1986) were met simultaneously, an assumption of the mediating effect of affect-based trust between group-focused TFL and team innovation was supported.

6.2 Implications for theory

The following sections discuss the implications for theories based on the 3-tier (antecedents, mediators and outcomes) conceptual framework defined in Chapter 3. The first tier is the antecedent concerning the implication of transformational leadership; the second tier is the mediators with regard to the effect of mediation relationships in between; the third tier is the outcomes of the models. The last section delineates the relationship between the two outcomes, intention to share knowledge and innovation.

The antecedents of the conceptual framework – the dual-level transformational leadership

Wang and Howell (2010) argue that investigations on the effects of transformational leadership either on individual or group levels limit the understanding in the integration of the two levels processes which are influenced
by team leadership. Based on the argument from Wang and Howell (2010), the current study investigated the effects of transformational leadership on both individual and group levels simultaneously. The findings revealed significant effects for both group- and individual-focused TFL on the two target variables, intention to share knowledge and team innovation. The finding also showed the impact of individual-focused TFL on the stimulation of individual innovation. It implies that both the group- and individual-focused TFL are important factors in the promotion of colleagues’ intention to share knowledge and team innovation in an educational setting in Hong Kong.

The mediators of the conceptual framework - task interdependence and trust

The significant impact of group-focused TFL was supported in the current study. According to Blake and Mouton’s (1964) managerial grid model, a team style leader has both high concerns for people and production. In the current study, with regard to the high concern of people and production at a managerial level, leaders are recommended to focus on the interpersonal interaction through trust building between leaders and their team members, and task interdependence regarding the job design as managerial tactics for organisational learning and innovation. Leaders of high performing groups were also more task-oriented than leaders of low performing groups. Leaders allow more freedom and flexibility for team members in their work when they are focused on the needs and feelings of the members, trust them and have confidence in them (Bass, 1990, p. 476).

With the existence of affect-based trust regarding interpersonal relation (people oriented) and task interdependence regarding production (task oriented), team style leader behaviours (group-focused TFL) are shown to be critical to the effectiveness of team innovation and intention to share knowledge among colleagues. The findings of the study raise awareness of leaders in higher education institutions or universities of the importance of affect-based trust to promoting team innovation. Simultaneously, innovation needs useful and relevant knowledge, which requires information or knowledge to be shared among team
members in teams in order to achieve the common organisational goals. The reciprocal task interdependence is the reason or motive for inducing the intention to share knowledge among colleagues involved in the work flow. A managerial tactic suggested in the study is to re-design job procedures to allow task interdependence.

The outcomes of the conceptual framework - Intention to share knowledge and team innovation

Intention to share knowledge was found to be significantly influenced by the both levels of transformational leadership and task interdependence. The reciprocal interaction with the existence of interdependence between the predecessor and successor, and/or between the team members promotes cooperation and collaboration in teams. The findings suggest that task interdependence elicits a willingness among team members to share their useful information or knowledge surpassing the effect of another prominent factor, interpersonal trust, which has been identified as a key factor for knowledge sharing or helping behaviour (e.g. McAllister, 1995; Bock et al., 2005; Ma, Qi and Wang, 2008). Overall, the results supported Wang and Howell’s (2010) empirical study on the role of group level leadership behaviour in the effectiveness for helping behaviour.

Many research findings indicate a salient effect of trust on knowledge sharing in organisations; very few empirical findings have identified the significant impact of leaders’ affect-based trust on team innovation. In the current study, interpersonal trust was found not to be as significant as task interdependence in the prediction of colleagues’ intention to share knowledge; instead, it has great implication for team innovation. The result supported Wang and Howell’s (2010) research findings with regard to the impact of individual-focused TFL on task performance, and group-focused TFL on team performance in terms of individual and team innovation. The research finding also extends existing research on the impact of McAllister’s (1995) affect-based and cognition-based trust on knowledge sharing intention among colleagues.
The missing perspective highlighted on intention to share knowledge and innovation

The model (figure 2.1, p. 23) devised in Chapter 2 shows how knowledge has to be explored, exploited, shared and then re-explored, re-exploited and shared again for organisational competitiveness. Absorptive capacity originated by Cohen and Levinthal (1990) seems to be the missing piece that completes the puzzle which was constructed in the literature review and so, could be a potential factor for knowledge retention in order to facilitate a chain of processes: the retentive knowledge is being shared; the shared knowledge is then used for knowledge creation; the new created knowledge resides in human resources through the absorptive capacity of individuals in teams; and the retentive knowledge in organisations is then shared again. Such repetitive process runs as a cycle for a continuous development of organisational innovation.

The proposition is constructed in accordance to the findings from two past research studies. Firstly, fairness, affiliation and innovativeness were found significantly to affect the organisational climate, and in turn, influence the intention of knowledge sharing (Bock et al., 2005). Bock et al.’s innovativeness is a climate that reflects a perception of encouraging or rewarding creativity and emphasising learning, open information flow and tolerant of failure. The path from innovation to knowledge sharing is confirmed.

Secondly, knowledge sharing and innovation have no apparent direct relationship logically. The relationship between them has been tested in the study anyway with the lack of support from any theoretical or empirical studies. Without a doubt, no significant relationship was found between them. On the other hand, absorptive capacity was found to have a mediation relationship between knowledge sharing and innovation capability in the context of Taiwan’s knowledge intensive industries (Liao, Fei and Chen, 2006). This finding delineates a significant impact of absorptive capacity between knowledge sharing and innovation, and possibly completes the missing part of the current study. Therefore, the reverse path (from
knowledge sharing to innovation capability through absorptive capacity in terms of knowledge retention) could be confirmed.

In conclusion, this research study contributes an idea for leaders in organisations with educational setting in Hong Kong to focus attention at both individual and team level. Using the tactic of task interdependence through job redesign induces the intention to share knowledge among team members. The increase in intention of knowledge sharing potentially enhances knowledge retention in the organisation, particularly with colleagues with high absorptive capacity. This group of high knowledge absorbers might be the potential human resources for organisational innovation that the leaders should pay attention to. Leaders are also suggested to pay attention to interpersonal care and concern (affect-based trust) with members in teams in order to promote, and stimulate creativity or innovation collectively.

6.3 Limitations
The empirical results of the study have some limitations. First, the data applied in the study was collected from one university in Hong Kong only. Since the sample was predominantly academic, the findings may not be relevant to the organisations other than educational institutions or universities. It implies a possible limitation of generalisation (Ellonen, Blomqvist and Puimalainen, 2008); furthermore, the results can only explain the phenomenon in such a typical type of teams with high level of similarity of job nature and nationality. With regard to the job nature of the sample, 18 out of 41 teams of the members including the team leaders were in the same type of job (e.g. 100% academic staff or 100% clerical staff), as a result, 44% (18/41*100) of teams were 100% working in the same type of job; regarding the demographic factor, nationality, 22 out of 41 teams of members including the team leaders were from Hong Kong resulting in 54% of teams were 100% homogeneity geographically. Nine teams (22%) were found to be 100% homogeneous in both job nature and nationality. This suggests limitations to generalisability.
Second, the data used in the study was cross-sectional; longitudinal investigation is needed for testing causal direction (Fliaster and Schloderer, 2010; Wang and Howell, 2010) and future study should be directed towards this type of investigation.

Third, the relatively small sample size possibly may be seen as a limitation, particularly with regard to generalisability (Fliaster and Schloderer, 2010). However, the majority of hypotheses were supported.

Fourth, the measures of intention to share knowledge and task interdependence in the members’ questionnaire were collected by means of self-report. As these constructs were measured using the same questionnaire, analysis involving paths between these variables gives rise to concerns related to common method bias (Pearce and Gregersen, 1991). However, the dependent variables, individual and team innovation, were measured using leader survey, which minimises the risk of bias associated with common source.

Fifth, the significance level used in the study was set to 0.5. Even though it is a common assumption for Type-1 error rate; it is possible a true null hypothesis is incorrectly rejected. Future research can address this concern through, for example use of the Holm-Bonferroni method.

Sixth, the study used aggregated individual level data as the group data tested by Ordinary Least Squares only. While several methods were used to justify aggregation of individual data to team-level, the possible relationships within nested data (individual data nested with team data) has not been investigated. Future research may utilise multi-level modelling to address this limitation.

Finally, the full model has not been tested in this study; future research using structural equation modelling to test the paths in the models simultaneously is recommended.
6.4 Further research

Longitudinal study on the distinction of affect- and cognition-based trust effecting on team innovation is worth further investigation. For instance, cognition-based trust is conceptualised as a positive predictor of affect-based trust. However, cognition-based trust presented in the sample is a negative indicator of team innovation (affect- and cognition-based trusts demonstrate opposing effects when regressed with team innovation). The findings regarding the relationship between affect-based trust and team innovation, and cognition-based trust and team innovation suggest the merit of further investigation. It could be an issue of a relative small sample size collected in the study or other moderating latent factor(s).

A considerable high degree of homogeneity (job nature and nationality) exists in the sample. While the impact of group composition on innovation was not investigated in the current study, given that previous research has found a link between diversity and innovation, researchers are strongly encouraged to examine the relationships investigated in the study across different industries and national cultures.

With regard to common method variance, researchers are advised to include a marker variable in the questionnaire, and then conduct the eight steps suggested by Lindell and Whitney (2001, p. 118) in the data analysis to generate evidence that the relationships being tested are free from this issue.

Lastly, researchers studying areas of the relationship between knowledge and innovation are urged to further investigate the reciprocal relationship of knowledge sharing and innovation, in terms of organisational learning by extending the research model to include absorptive capacity. Absorptive capacity could be a potential index for knowledge retention in organisations.
References


Appendices

Appendix I – Participant Information Statement

Information Statement for the Research Project (for member):
Organisational Learning: Implication of Dual-level Leadership, Trust, Task Interdependence on Intention to Share Knowledge and innovation

You are invited to participate in the research project identified above. The research is part of Miss Voyce Li’s (Doctoral candidate) Doctor of Business Administration studies at the University of Newcastle, supervised by Dr Rebecca Mitchell (Project supervisor) from the Newcastle Business School.

Why is the research being done?
The purpose of the research is to understand the individual and group level effects of Transformational Leadership (TFL) on participants’ sharing of knowledge. Previous research has shown that knowledge sharing makes an essential contribution to educational institutions, it is important that the factors encouraging knowledge sharing among team members are well understood.

Who can participate in the research?
If you are currently a full-time staff member in Hong Kong and aged 18+, you are eligible to participate in this research.

What choice do you have?
Although the researcher has been allowed access by the faculty or the authorised committee to invite you to participate in this research, participation in this research is completely voluntary and anonymous. Whether or not you decide to participate, your decision will not disadvantage you. You may withdraw from the research at any time, without giving a reason, before the questionnaire has been submitted. Completing and submitting this questionnaire will be taken as your implied consent to participate.

What would you be asked to do?
If you agree to participate, you will be asked to fill an online questionnaire about your experience of leadership and teamwork. You will be requested to rate both of your immediate
manager/supervisor/team leader and yourself on selected scales regarding leadership behaviour, trust, task interdependence and intention to share knowledge.

How much time will it take?
The questionnaire should take approximately 30 minutes to complete.

What are the risks and benefits of participating?
There are neither risks nor direct benefits for any individual participant. However, your contribution may help to understand the factors that contribute to knowledge sharing intention in your workplace.

How will your privacy be protected?
As the data collected in this research is anonymous (the questionnaire numbers are used rather than the name of participants), no individual respondent or survey is able to be identified. Access to the survey will be via the hotlink in this Information Statement and thus no link can be established between you and your completed survey. The data will be stored in password-protected computers accessible only to the researchers and will be disposed of in accordance with the University of Newcastle’s policy and procedures for the disposal of confidential material.

How will the information collected be used?
The results from this research will be analysed as the conclusion of a DBA dissertation and may also be published in academic research journals.

What do you need to do to participate?
1. Read this Participant Information Statement and be sure you understand its contents
2. If there is anything you do not understand, please contact Voyce Li at voyce.li@inet.polyu.edu.hk before you start the questionnaire.
3. Once you have read and understood the statement and wish to proceed, please click https://mydoc.polyu.edu.hk/mysurvey/public/survey.php?name=ecvoyce_??? and complete the questionnaire.

Further information
If you would like further information please contact Miss Voyce Li at voyce.li@polyu.edu.hk or Dr Rebecca Mitchell at Rebecca.mitchell@newcastle.edu.au

Thank you for considering this invitation.
Complaints about this research

This project has been approved by the University of Newcastle’s Human Research Ethics Committee, Approval No.: H-2011-0149 and the Hong Kong Polytechnic University’s Ethical Review of Research Project Involving Human Subjects (ELC). Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, please contact Miss Voyce Li at voyce.li@polyu.edu.hk or (852) 2766 7528.
Appendix II – Demographic data

Team size

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Team leaders’ data

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## Appendix III – Descriptive Statistics

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a. Lilliefors Significance Correction
### Table 1  Factor Analysis – Component Matrix

#### Individual-focused TFL

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Extraction Method: Principal Component Analysis.

a. 1 components extracted.

#### Group-focused TFL

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Extraction Method: Principal Component Analysis.

a. 1 components extracted.
### Component Matrix for Interpersonal Trust

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Extraction Method: Principal Component Analysis.

A. 1 components extracted.

### Component Matrix for Task Interdependence

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Extraction Method: Principal Component Analysis.

A. 1 components extracted.

### Component Matrix for Intention to Share Knowledge

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### Component Matrix for Individual Innovation

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Extraction Method: Principal Component Analysis.

A. 1 components extracted.
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Extraction Method: Principal Component Analysis.

a. 1 components extracted.

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Extraction Method: Principal Component Analysis.

a. 1 components extracted.