

THE UNIVERSITY OF HULL

**Managerial Tacit Knowledge Transfer and the Mediating Role of
Leader-Member-Exchange and Cognitive Style**

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By

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Abstract

The ability of an organisation to transfer knowledge is one of the key sources of competitive advantage for many of today's organisations (Argote, 2000). New knowledge is created through interactions between explicit and tacit knowledge (Nonaka and Takeuchi, 1995). From the distinction between explicit and tacit knowledge made by Polanyi's (1966), it is clear that the former can be transferred with relative ease, particularly using recent advances in information technology. Transfer of tacit knowledge on the other hand, requires social interactions with peers, colleagues, mentors and supervisor (Lahti et al, 2002; Cavusgil et al, 2003). Difficulties associated with this have been referred to as 'internal stickiness' (Szulanski, 1996) and is believed to be due to several factors.

This study examines difficulties associated with the transfer of managerial tacit knowledge in the relationships involving supervisor and subordinates who work as managers in the Malaysian public sector. After examining previous literature in the field it is hypothesised that the stickiness of knowledge transfer may be associated with the quality of leader member exchange relationships, especially between leaders and their 'in-group' versus 'out-group' members. For example, in-group relationships are associated with higher levels of trust, respect and obligation compared with out-group relations. Another construct known to be associated with the quality of dyadic relationships is cognitive style (Armstrong, 1999). Cognitive style refers to individual differences in ways of perceiving, organising and processing information and differences in ways in which individuals solve problems, take decisions and relate to others.

The research employed a quantitative approach using survey methods. Instruments used in the study included a measure of knowledge transfer stickiness (Szulanski, 1996), Leader Member Exchange (LMX7) (Graen and Uhl-Bien, 1995), Tacit Knowledge Inventory for Managers (TKIM) (Wagner and Sternberg, 1989) and the Cognitive Style Index (CSI) (Allinson and Hayes, 1996). The survey was administered to 1200 managers in the Malaysian Public Sector and 344 completed surveys were returned representing a response rate of 28.7%.

Results from a final sample size of 300 managers comprising supervisors and their immediate subordinates are reported. The study successfully determined the relationship between knowledge transfer stickiness, LMX, cognitive style and managerial tacit knowledge. As expected, high-quality LMX leads to higher quality exchanges and concomitant improvements in the transfer of managerial tacit knowledge. Moreover, as hypothesised, individual differences and similarities in cognitive style also influence the transfer of tacit knowledge between supervisor and subordinate. Practical implications are given and recommendation made for future research.

Dedication

To my late father,

For everlasting inspiration

To my dear husband and mum

*For unconditional love and tremendous encouragement.... I can't thank them both
enough*

To my beloved children, Muhammad Firdaus, Muhammad Fathi, Muhammad Farihin
and Muhammad Furqan

I am truly blessed with all of my great sons

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1 RESEARCH OVERVIEW: JUSTIFYING THE STUDY

1.1 Introduction

Understanding organisational competitive advantage and its creation is increasingly important in influencing organisational behaviour. A particular focus in this research is the role of interpersonal relationships and individual differences in a range of employees, and organisational outcomes. The interest of this study is the examination of knowledge transfer, and its effects on how individuals manage relationships at work and the implications for their managerial tacit knowledge. The study proposes to examine the role of leaders as mediators in managerial tacit knowledge transfer stickiness among managers in Malaysian public organisations. As organisational leaders, managers are responsible for initiating and driving knowledge transfer activities. In this particular study, the underlying roles of managers are examined in the context of the relationship between supervisors and subordinates using a theory known as Leader Member Exchange (LMX) (Dansereau et al, 1973; Graen et al, 1982a). The study also investigates managers' cognitive styles and their effect on knowledge transfer.

This chapter introduces the rationale for the thesis. First, four variables are identified as being of central importance to the development of this research project: knowledge transfer stickiness, leader member exchange, cognitive style and managerial tacit knowledge. Secondly, the research develops a theoretical model of the relationships between the variables, linking knowledge transfer stickiness, leader member exchange and cognitive style in the development of relationships in achieving organisational outcomes particularly managerial tacit knowledge. Finally, the contribution and significance of this research is considered.

As far as the researcher is aware, this study is the first to examine the relationship between knowledge transfer stickiness, leader member exchange, cognitive style and managerial tacit knowledge. Moreover, it will be the first to relate these to a Malaysian public sector setting. A sample of Administration and Diplomatic Service managers from the Malaysian public sector within various ministries is used to validate the model proposed. This is thought to be of considerable significance, as the managers working in the public sector may display a specific set of characteristics and behaviours in their working lives, which are explained and informed by the research model proposed in this thesis. In particular, the public sector in Malaysia is plagued with change and bureaucracy. This context creates an idiosyncratic setting, with distinctive implications for research.

The background to the literature search for this investigation is now examined, to justify the selection and rejection of various theoretical options for the development of the hypothesised model. This also demonstrates the areas in which the study contributes to theoretical and empirical understanding of tacit knowledge transfer, leadership and cognitive style.

1.2 Background

In the current globally competitive world economy many companies and organisations are becoming aware that knowledge is a critical success factor in the drive to remain relevant and effective. Knowledge is recognised as the most valuable asset to both organisations and individuals. Knowledge is a powerful tool for initiating changes to the world and it makes innovation possible (Sanchez et al, 2000). Nonaka (1998) points out that *'In an economy where the only certainty is uncertainty the one sure source of lasting competitive advantage is knowledge'* (p. 21). As a result, current organisational

leaders must be effective in navigating the organisation through a constantly evolving environment. Leaders are accountable for ensuring that the organisation will thrive in the world of change (Leuci, 2005).

1.2.1 Types of Knowledge

Knowledge can be categorised into two types: explicit knowledge and tacit knowledge (Nonaka, 1994). Explicit knowledge is defined as formally transferable knowledge that is systematically learned through formal learning. Conversely, tacit knowledge has a personal quality that is difficult to transfer as it is deeply embedded in action, involvement and commitment in specific contextual conditions. Tacit knowledge comprises cognitive and technical dimensions. The cognitive dimension includes schemata, paradigms, beliefs and viewpoints that help individuals to interpret the world, while the technical dimension includes technical 'know-how', skills and crafts that are specifically contextual (Nonaka, 1994).

1.2.2 Knowledge in the Organisation

Many countries have recognised that human resource development (HRD) is an important factor for ensuring sustainable growth in a new global knowledge-based economy (K-economy) and for coping with rapid changes in technology. In order to meet the demands of this global environment, Malaysia is one of the countries that have adopted knowledge-based economic policies (Government of Malaysian, 2002a).

This new paradigm requires Malaysia to develop an adequate supply of skilled workers who are equipped with updated knowledge and relevant skills. Another research domain that is related to knowledge is the 'learning organisation'. This concept suggests that organisational leaders should seek to encourage and value continual improvement

through knowledge acquisition (Senge, 1990). This is consistent with the Malaysian Vision 2020, which calls for an economy with access to a wealth of information: an economy equipped with knowledge of what to do and how to do it (Mohamed, 2000).

In response to the K-economy, the Malaysian government encourages the public sector to promote the concept of the knowledge organisation, particularly when managing resources and enhancing service delivery to the public (Syed Ikhsan and Rowland, 2004). The Malaysian Government acknowledged that the implementation of knowledge management would improve the performance, efficiency and effectiveness of the public sector. Consequently they introduced the Malaysia Remunerative System (MRS) on 1 November 2002, which strongly emphasised the knowledge aspect of public service as a key to enhanced performance and efficiency (Kassim, 2008).

1.2.3 Knowledge, Organisational Change and Social Relationships

Organisations are increasingly confronted by discontinuities as they enter a global knowledge era that is characterised by overwhelming ambiguity, complexity and danger (Grant, 2000). One significant change in contemporary organization is that knowledge is now seen as an important driver compared with labour, machine or money (Grant, 2000). Additionally, the application of change (particularly new knowledge) always meets with resistance from individuals (Snowden and Stanbridge, 2004).

Therefore the main role of leaders is to lead the organisation in facing the challenges (Graen, 2008), particularly of knowledge acquisition. Graen (2008) stated that '*Lack of knowledge is weakness and knowledge is power; therefore get knowledge*' (p. 3). He suggests that knowledge acquisition requires the construction of networks and the enhancement of new relationships at all levels (Graen, 2007).

The building of networks and relationships in the organisation will develop through the *big 3* at each step: the big 3 is defined as '*respect for competence, trust in motivation, and commitment to common values*' (Graen, 2008, p: 5). This is also known as LMX (Dansereau et al, 1973; Graen et al, 1982). As the big 3 successively build strong links, knowledge flows openly (Graen, 2008). In line with this idea, Majchrzak et al (2007) who assert that building relationship links involves three stages: respect is the first stage, trust is the second and coordination is the third. The social relationship amongst individuals involves formal and informal networks (Graen, 2008). Formal networks are related to official relationships whilst informal networks involve all social relationships between individuals, without reference to bureaucracy (Graen, 2008).

In informal networks, the question of who should solve personal matters, and who should have strong relationships with whom are examples of the situation. For the formal network, the vision of the company that is initiated by its top-level management team will flow down interactively and spread to the entire organisation (Graen, 2008). In other words a knowledge organisation is a network of people who think and coordinate knowledge in order to achieve performance goals that involve knowledge transfer (Graen, 2008).

Tacit knowledge is particularly important in organisations because it is an asset to the performance of the organisation (Reed and DeFillippi, 1990; Conner, 1994; Lubit, 2001). As a complement to this notion, Argote et al, (2000) noted that knowledge transfer is significant in the drive to remain competitive. This process of tacit knowledge transfer requires leaders to facilitate and initiate the activity (Nonaka and Takeuchi, 1995; Bryant, 2003; Ceresa, 2005). As a result, managerial tacit knowledge transfer is essential in order for organisations to remain competitive and superior to their

competitors. Developing a deeper understanding of managerial tacit knowledge transfer stickiness and the leadership role will allow new insights into leading knowledge transfer activities within organisations.

1.2.4 Relevance of Leadership to Effective Knowledge Transfer

Previous research indicates that leadership is a driver for effective knowledge management (KM) in organisations (Bryant, 2003; Morales et al, 2008). Similarly, Nonaka and Takeuchi (1995) indicate the significant role played by top and middle managers in creating vibrant knowledge. They suggest three major roles of top management in KM. Firstly it is necessary to generate a grand theory about the future direction of the company. Secondly, top managers must produce a KM vision. Thirdly, they must create and recognise knowledge assets by setting benchmarks to indicate the value of knowledge, and to reward hard work in order to sustain and expand the KM.

Lin and Tseng (2005) also support this point of view. DeTienne et al (2004) sum up the role of KM managers by stating that they must catch the attention of employees and motivate them. Davenport and Prusak (1998), Choi and Lee (2002) and Du Plessis (2007), add that the role of managers is to build KM strategy.

The leader can influence a group towards the achievement of a common goal because the leadership role is often associated with knowledge and information which translates into power (Politis, 2001). As we become clearer about the various theories of leadership, one school of thought to be considered in the next discussion is leader member exchange (LMX). LMX focuses on relationships and it is relevant to this particular study.

1.2.5 Leader Member Exchange (LMX)

LMX theory will be used to investigate the mediating role of leadership in knowledge transfer stickiness as it focuses on the interaction between supervisors and subordinates. This study will investigate the interaction between the supervisors and subordinates and therefore this approach to leadership is most relevant. LMX theory refers to leadership as a process that centres on the dyadic interaction between supervisors and subordinates, where supervisors treat different subordinates differently (Dansereau et al, 1973; Graen et al, 1982a). The supervisor and the subordinates form unique relationships called ‘in-group’ and ‘out-group’.

According to Graen and Uhl-Bien (1995) the essential features of LMX include mutual respect for the capabilities of others; the anticipation of deepening reciprocal trust with others and the expectation that interacting obligations will grow over time as career-oriented social exchange blossoms into a partnership. Drawing on previous discussions, it is reasonable to assume that leadership is highly important in knowledge transfer (Bryant, 2003; DeTienne et al, 2004; Cenusu, 2005; Morales et al, 2008).

Therefore, this study is relevant in examining the vital role of managers in knowledge transfer activities. LMX is important because this theory focuses on the relationship between supervisors and subordinates and it differentiates between the influence of in-group and out-group members in the work context.

The assumption is that high-quality LMX will develop in the context of in-group teams where managerial tacit knowledge transfer will flow extensively, contrary to the out-group team. The in-group team will generate high levels of trust, respect and obligation between supervisor and subordinates (Graen and Uhl-Bien, 1995).

With this close relationship, it is assumed that tacit knowledge that is naturally hard to transmit can be transferred easily with the existence of high levels of trust, respect and obligation in the relationship. Both studies, LMX (Graen and Uhl-Bien, 1995) and knowledge transfer stickiness (Szulanski, 1996) examine the exchange process and in this particular study, the research will be confined to the knowledge exchange among managers.

1.2.6 Cognitive Style

Cognitive style has been perceived as an approach individuals use in acquiring, storing and using knowledge (Hayes and Allinson, 1994). Cognitive style is regarded as corresponding to individual differences (Allport and Vernon, 1933), where it can influence the way individuals think, acquire and use knowledge. In this present study, cognitive style will be investigated in the relationship among managers and between supervisors and subordinates.

Differences in styles are expected to influence the way people interact in managerial tacit knowledge transfer; for example, analytical individuals might be more affected by ambiguity in tacit knowledge while their intuitive colleagues are not affected. This expectation is drawn on the premise that analytical individuals are concerned with a systematic approach and intuitive individuals are more concerned about general views and immediate judgements (Hayes and Allinson, 1998).

Several studies have revealed that intuitive supervisors are well respected by subordinates and this will lead to greater interaction and communication (Allinson et al, 2001; Suazo et al, 2008). Since the study emphasises the relationships and interaction in managerial tacit knowledge transfer, it is reasonable to integrate the framework with the

aspect of cognitive style in order to investigate its influence on this particular relationship. It is anticipated that differences and similarities in cognitive styles of people involved in the knowledge transfer process are likely to mediate that process. This possibility will be explored further in a detailed review of literature that follows later.

1.3 Research Problem

Although extensive research has been carried out on knowledge transfer and leadership, there exists only a handful of empirical studies that examine the role of leaders in knowledge transfer. For instance, Bryant (2003) conducted a study on transformational, transactional leadership style and knowledge transfers. In addition, Nonaka and Toyama (2005) argue that we know relatively little about the mechanism by which leadership may facilitate employee knowledge sharing.

There is general agreement among researchers that knowledge management requires more research, particularly in the area of intangible assets or tacit knowledge. For instance, Teece (1998) suggested that further research was required in the imitation and replication of intangible assets to ensure that the ‘stock’ of the company is utilised in the long run and tacit elements of knowledge can only be replicated internally. He points out that *‘Value thus flows from a profitable business model under girded by intangible assets and supported by business processes with a high tacit component’* (Teece, 1998, p: 291). In agreement with this perspective, Holtshouse (1998) stated that studies on how tacit knowledge can be utilised, how to maximize knowledge flow between source and recipient and how to ensure the relevance and usefulness of knowledge in the firm will contribute to creating strong links between tacit knowledge and good business practices.

Furthermore, it was suggested that studies of factors facilitating managerial tacit knowledge acquisition are required (Tan and Libby, 1997). In this study, the leadership factor is regarded as a facilitating factor in the acquisition of tacit knowledge. Moreover, as Peteraf and Barney (2003) and Zollo and Winter (2002) suggest, although research on knowledge creation has been carried out extensively over the last decade, the relationship between leadership and knowledge creation has not been explicit or fully established.

Apart from this, Allinson et al (2001) also suggest that there is a requirement to study the effect of different combinations of cognitive style on work performance. As far as this researcher is aware, no research has been conducted to investigate the relationship between LMX theory, cognitive style and managerial tacit knowledge transfer stickiness.

With regard to cognitive style, it was suggested that further research was required in order to identify the effect of a combination of different cognitive styles on work performance (Allinson et al, 2001; Armstrong et al, 2011a). In this study, managerial tacit knowledge is considered to be an important component related to work performance. Allison et al (2001) asserted that the effect of matches and mismatches between individuals with different cognitive styles in dyadic relationships has never been clear despite the efforts of a generation of researchers. They found that incongruence between combinations of cognitive styles might be favourable, but this finding was contrary to previous studies on 'similarity-attraction'. The similarity-attraction paradigm argues that similarity between individuals increases attraction, while dissimilarity causes repulsion (Byrne, 1971). On the other hand, Winch's theory of complementary needs suggests that reciprocal gratification of needs produces successful relationships (Winch et al, 1954). In line with this notion, Garlinger and Frank (1986),

Armstrong et al (1997) and Cheng et al (1998) found that dissimilarity in individual cognitive styles may yield positive outcomes. Thus, these ambiguous results warrant further research.

Moreover, this study will also address the gap identified in the literature concerning the theoretical and empirical links between leadership and knowledge transfer (Teece, 1998; Holthouse, 1998; Bryant, 2003). This is particularly important in Malaysia where KM has been recognised as a key element in achieving organisation performance levels. Previous Malaysian studies have stressed the significant benefits to local government but no adequate guidelines have emerged to move this agenda forward (Gan et al, 2006).

The vision created by the government of Malaysia inculcates a view of the knowledgeable society (Government of Malaysian, 2002a). Hence it is crucial to enhance our understanding of the nature of knowledge embedded in the organisation. Since the Malaysian government has decided to shift to a knowledge-based economy (Government of Malaysian, 2002a) managers should play an effective role as knowledge generators in organisations.

This study aims to develop a model that explains the relationship between knowledge transfer stickiness, leader member exchange, managerial tacit knowledge and cognitive style. Secondly, it also examines the mediating role of leader member exchange in managerial tacit knowledge transfer. Further, the study aims to assess the effect of cognitive styles on tacit knowledge transfer, which was suggested for further research (Allinson et al, 2001). There is a requirement to go deeper into this field in order to be aware of how the organisation can gain from these areas. Consequently, this study is

relevant in the current circumstances, and it is expected that it will bring new insights to the existing body of theoretical and practical knowledge.

1.4 Significance of the Study

The significance of this study lies in its ability to address issues of national policy conservation, k-economy implementation and knowledge-based civil servants. Apart from these, it is also concerned with the inadequacies of research on leadership in knowledge transfer, the importance of knowledge transfer in global competition and requirement further to understand cognitive styles in the organisation.

Current Malaysian National Policy, particularly Vision 2020 is highlighting an economy with access to a wealth of information, an economy equipped with knowledge of *what to do* and *how to do it*. For example, in a speech given at the Second World Knowledge Conference in Kuala Lumpur on March 8, 2000, The Honorable Tun Dr Mahathir Mohamed pointed out that *'In our Vision 2020, we set the goal of becoming a fully developed nation by 2020, the end of our second generation as an independent country'* (Mohamed, 2000). By setting the target of becoming a developed nation, it is crucial for the country to remain competitive in the face of global challenges and one of the methods to accomplish this is through the knowledge-based economy.

In 2002 the Malaysian government published the Knowledge-based Economy Strategic Master Plan (KESMP). The target of the plan is to change Malaysia from a production-based economy (P-economy) to a knowledge-based economy (K-economy). The KESMP outlined seven strategic trusts for the alteration process: one of these is to *'develop a knowledge-based civil service'* (Government of Malaysian, 2002a). This

study's concern is on this particular strategic trust which stresses the importance of the knowledge worker.

Developing knowledge-based civil servants requires good knowledge management, an important aspect of which is knowledge transfer among workers, be it top-to-bottom transfer, from supervisor to subordinate or vertical transfer from peer to peer. However, good knowledge management needs a supportive leader in the organisation. With regard to the survival of an organisation in a competitive global market, leaders need to be highly effective at leading the development of a knowledge-based civil service (Government of Malaysian, 2002a).

A review of the mainstream literature on leadership, particularly in the area of knowledge transfer, concluded that research in this area is still significantly lacking (Byrant, 2003). Furthermore, research in the area of knowledge creation and knowledge dissemination through the process of knowledge transfer is inadequate. Additionally, there is a dearth of research on the role of leaders in knowledge transfer, although it was reported that knowledge transfer will enhance an organisation's capacity to survive global competition (Argote, 2000).

1.5 Research Objectives

The main purpose of this study is to develop a model that explains the relationships between knowledge transfer stickiness, leader member exchange and outcomes variables of which managerial tacit knowledge was of particular interest. The second objective is to further understand the role leaders play in effective managerial tacit knowledge transfer in organisations and specifically to examine the mediating effect of leader member exchange in the managerial tacit knowledge transfer stickiness

relationship. The intention of the third objective is to expand our understanding of the influence of individual cognitive style on managerial tacit knowledge transfer stickiness. Based on these objectives, a theoretical model will be developed for empirical testing following a detailed review of appropriate literature.

The connections that will be explored between the concepts described are presented in several relationships. The first category of association relates to the direct effects of knowledge transfer stickiness on managerial tacit knowledge, leader member exchange and cognitive style. It is expected that these constructs will be affected by knowledge transfer stickiness on the basis that it represents high and low levels of stickiness which determine individual differences in their ability to conduct interpersonal relationships and influence their managerial tacit knowledge. This association also consists of the relationship on the direct effect of LMX predicting managerial tacit knowledge. LMX is presented as a model of leadership that differentiates relationships with the subordinates on the basis of exchanged commodities. These commodities are valued as they are expected to predict outcomes related to managerial tacit knowledge. The linkage on the direct effect of cognitive style and managerial tacit knowledge is also included in the first category. The differences in individual cognitive style are expected to explain the level of accumulated managerial tacit knowledge in the individual.

The second category of association is concerned with explaining the relationships between knowledge transfer stickiness, leader member exchange and managerial tacit knowledge. Leader member exchange is hypothesised as a mediator in the relationship between knowledge transfer stickiness and managerial tacit knowledge. LMX may explain why knowledge transfer stickiness results in a high level of accumulated managerial tacit knowledge, through the utilisation of high quality relationships. In

addition, cognitive style is also predicted as a mediator in managerial tacit knowledge transfer stickiness. Cognitive style might explain how individual differences in cognitive style affect relationships. Finally, the analyses are concerned with describing similarities in cognitive style and its influence on knowledge transfer stickiness and managerial tacit knowledge.

1.6 Research Questions

Research questions can serve several purposes (Punch, 1998). They can keep the researcher focused on the original aim of the research, particularly when confronted by unexpected issues, and they can also delineate the research boundaries. Moreover, research questions assist the researcher in organising the research and maintaining the coherence of his/her report. Research questions can also be a foundation for research report writing and identifying data required for the study.

This study's research questions were outlined on the basis of fulfilling the research objectives. To fulfil the first research objective, research questions 1 to 5 are outlined. By integrating all five of these research questions, the model of this research is created. Research question six is designed to answer the second research objective and research question seven aims to meet the third research objective. The broad research questions to be addressed are as follows.

1.6.1 Research Question 1

Is there a relationship between the 'stickiness' of knowledge transfer and managerial tacit knowledge accumulated by individuals? Firstly, research question one is built on the premise that knowledge transfer requires further research especially on the way it

flows from one individual to another, particularly on tacit knowledge (Teece; 1998 and Holthouse; 1998).

1.6.2 Research Question 2

Is there a link between the ‘stickiness’ of knowledge transfer and the quality of the leader member exchange relationship? Secondly, research question two is drawn in consideration of the scarcity of the research on the leadership role in knowledge transfer (Bryant, 2003); hence it is expected that the importance of the leader’s role will be revealed (Nonaka and Takeuchi, 1995; Davenport and Prusak, 1998; Choi and Lee, 2002).

1.6.3 Research Question 3

Is there a link between the ‘stickiness’ of knowledge transfer in organisations and differences in cognitive style of the people involved in the knowledge transfer process? Research question three is guided by the finding stating that individuals’ cognitive styles are influenced by their approaches to information processing, particularly in acquiring, absorbing and using new knowledge that is transferred, and that intuitive individuals tend to be comfortable with soft data while their analytic counterparts are more systematic (Hayes and Allinson, 1998).

1.6.4 Research Question 4

Is there an association between the quality of the leader member exchange relationship and managerial tacit knowledge? On the premise that leadership was found to be related to tacit knowledge (Tan and Libby, 1997; Hedlund et al, 2003; Tan and Libby; 1997), research question four was developed.

1.6.5 Research Question 5

Is there an association between cognitive style and managerial tacit knowledge? The fifth research question was developed on the basis that cognitive style is related to tacit knowledge (Kim, 1993; Hayes and Allinson, 1998). Moreover, this research question was also inspired by the gap in the knowledge about the effect of dissimilar cognitive styles on work performance (Allinson et al, 2001).

1.6.6 Research Question 6

To what extent do high quality leader member exchange relationships influence the successful transfer of managerial tacit knowledge in organisations? The second research objective attempts to gain a better understanding of the role of LMX in managerial tacit knowledge transfer relationships; in other words, the influence of LMX in mediating the relationship. As a result, research question six was developed based on the finding that knowledge transfer was related to leadership (Bryant, 2003) and that as leadership was also found to be related to tacit knowledge (Tan and Libby, 1997; Hedlund et al, 2003), then leader member exchange may be assumed to influence the relationship.

1.6.7 Research Question 7

To what extent do cognitive styles influence the successful transfer of managerial tacit knowledge in the organisation? Finally, the study aims to examine the effect of cognitive style on managerial tacit knowledge transfer relationships. Prior studies found that individual cognitive styles were influenced by their information processing (Hayes and Allinson, 1998) and cognitive style was also found to be related to tacit knowledge (Kim, 1993; Hayes and Allinson, 1998); hence, the study assumes that cognitive style is likely to influence the relationship.

1.7 Research Contribution

Theoretical contributions to the literature are expected to be made in establishing the linkages between knowledge transfer stickiness and managerial tacit knowledge, LMX and cognitive style. It is expected that interpersonal relationships will be shown to be important in facilitating managerial tacit knowledge transfer. A good interpersonal relationship, specifically a high quality leader member exchange is expected to further enhance the transfer process by decreasing the level of transfer stickiness.

This particular study also seeks to fill a gap in the area of leadership studies by investigating the role of leader member exchange in influencing the relationship as an extension of Bryant (2003) and Nonaka and Toyama's (2005) studies. It was conveyed that interpersonal relationships, particularly leader member exchange theory in knowledge transfer is important in facilitating managerial tacit knowledge transfer. In this study, high quality leader member exchange is expected to further enhance the transfer process by decreasing the level of transfer stickiness. The study also seeks to contribute to the literature of knowledge transfer by advancing the understanding of a specific mediating mechanism, specifically leader member exchange, within the framework developed.

The other contribution of the study is methodological. Previous research in leader-member exchange is far less common than that on individually-rated relationships. In such research, researchers have commonly measured the perspective of either a leader or a member, without considering dyad as a level of analysis (Schriesheim et al, 1999). This approach to relationship measurement is not as reliable, as it is not consistent with theory.

LMX is a theory of differentiated relationships, and in order to assess the ability of knowledge transfer stickiness to predict this differentiation, the measurement should assess perspectives of a leader and a member (or supervisor and subordinate in this study). This is more reliable in establishing the effects of knowledge transfer stickiness on the differentiation of LMX quality, as the rating of knowledge transfer stickiness will be different in each subordinate. The use of multi-source data is a significant strength of this study's research design.

1.8 Conclusion

The author will now consider in some detail the Malaysian public sector context as well as Malaysian economic development in order to justify the requirements of the study. Further, the discussion related to the Malaysian context will assist in setting the study context, which will lead to a better understanding of the circumstances of the Malaysian public sector.

2 BACKGROUND OF MALAYSIA AND MALAYSIAN PUBLIC SECTOR

2.1 Introduction

This chapter will explain the background of Malaysia and the Malaysian public sector. The explanations will involve population, Malaysian economic development, the knowledge-driven phase, Malaysian public sector reform, the Malaysian public sector and the Administrative and Diplomatic Service. It is essential to understand the Malaysian population in order to gain an understanding of the multi-racial population in Malaysia so that the context of Malaysian Economic Development and public sector reform are explicitly stated. From these circumstances, the challenges faced by the Malaysian public sector, particularly the Malaysian Administrative and Diplomatic Services can be understood.

2.2 Population

Malaysia is a multi-racial country. The main ethnic groups are the Malays, the Chinese and the Indians, who collectively make up 79.51 percent of the entire population. The majority of the population are Malays, who have been settled the area for at least 2,500 years (Baker, 1999). The other key ethnicities are the Chinese and the Indians, who came to Malaysia predominantly in the 19th and 20th century. Other groups are the Dayaks, Kadazans, Bajaus, Melanaus and Muruts (indigenous ethnic groups of Sarawak and Sabah), the inhabitants of in Peninsular Malaysia; Europeans and Eurasians (Malaysia Official Year Book, 1996). The population statistics by ethnic groups as reported on September 2011 are shown in Table 1.

Table 1: Populations Estimates by Ethnic Group

	2001	2008	2010	2011
	(‘000)	(‘000)	(‘000)	(‘000)
TOTAL	23,795.3	28,018.6	28,402.6	28,628.7
Malaysian Citizens	22,258.9	26,003.4	25,954.1	26,218.4
Bumiputera	14,885.8	17,342.2	17,177.5	17,380.5
Malay	12,340.8	14,247.5	14,127.9	14,296.8
Other Bumiputera*	2,545.0	3,094.7	3,049.6	3,083.7
Chinese	5,720.4	6,399.2	6,478.7	6,518.9
Indian	1,670.6	1,925.1	1,934.2	1,948.1
Others	252.1	337.0	363.8	370.9
Non-Malaysian Citizen	1,266.4	2,015.2	2,448.4	2,410.3

(Monthly Statistical Bulletin September 2011, p.5 and August 2001, p.7) ; Bumiputera = indigenous people

2.3 Malaysia's Economic and Development Programme

In the early stages after independence in 1957, Malaysia's primary sources of revenue were agriculture and natural resources. It was known as the key producer of rubber and tin ore in the world at that time. Malaysia changed considerably in the 1970s, moving from agriculture to import-substitution and export-oriented industrialisation. Assembly-type manufacturing factories became more prominent. In the 1980s, the investment made in medium-tech manufacturing and services raised these sectors to become the main sources of economic growth.

This concentration was followed by upgrading the economy through high-tech manufacturing and services in the 1990s, fulfilling the demand for higher productivity.

Through reviewing the overall development strategy, in the new millennium, Malaysia has moved from a productivity-driven growth phase to a knowledge-based and technology-driven phase.

The plan to build up the Bumiputera (sons of the soil, or the indigenous people) took place in 1969, immediately after the racial riots on May 13, 1969. An Emergency was declared then, and the government launched the First Outline Perspective Plan and the New Economic Policy (NEP), of which the main aim was to reinforce national unity by integrating the three major ethnic groups, the Malays, Chinese and Indians, who have basically nothing in common in terms of language, culture, or religion. The major intention of the NEP was to eliminate poverty and to reform society through a more impartial allocation of welfare, education, employment and corporate wealth ownership. The Plan was also to encourage the Bumiputera to elevate their possession of the corporate sector to 30 percent.

Table 2: Economic Achievement of the NEP

Activity	1970(%)	1988(%)
Poverty	49.3	16
Export	12	60
Manufacturing Sector	29	41.6
Trade	36.7	75.4
Corporate ownership by Malaysian	36.7	75.4

The NEP's success was mainly in its economic achievements. From Table 2, it was reported that poverty was reduced, while export, manufacturing, trade and corporate ownership showed a tremendous increase from 1970 to 1988. This elevated rate of

economic growth is likely to have been a key factor in quelling the tensions among the principal ethnic groups (Ahmad et al, 2001). Conversely, an opposing argument noted that this achievement was more likely the result of an “active public sector” (Kuhonta, 2002, p.35). This active public sector role was shown by the strong interventionist stance adopted by the government (Boo Teck, 2000) to warrant the implementation of the NEP.

The NEP was then followed by the New Development Policy (NDP) in 1991 with comparable objectives to the NEP, i.e. to *"eradicate poverty and restructuring society so as to correct social and economic imbalances and thereby contribute towards national unity"* (Malaysian Official Year Book 1990/91, p. 4). The NDP also aimed *"to establish a more united and just society, and the realisation of the ultimate objective that Malaysia will become a fully developed nation by the year 2020, not only economically but also in all other aspects"* (Hamzah and Ho 1994, p. 27). Simultaneously with the NDP, the government launched Vision 2020. The main agenda of Vision 2020 is to attain fully developed nation status by the year 2020 (Mid-Term Review 1993, p. 3). The Vision 2020 framework, suggests that there are nine central strategies that should be implemented in order to accomplish the vision. The nine strategies are as follows:

“To establish a united Malaysian nation with a sense of common and shared destiny; to create a psychologically liberated, secure, and developed Malaysian society with faith and confidence in itself; to foster and develop a mature democratic society; to establish a fully moral and ethical society; to establish a scientific and progressive society; To establish a mature, liberal and tolerant society; to establish a fully caring society and a caring culture; to ensure an economically just society; to establish a prosperous society”.

2.4 Knowledge-driven Phase

Just before the mid-1990s Malaysia geared itself up to confront the challenges of a new era in Information Technology. The National Information Technology Agenda (NITA) was then created, with the aspiration of transforming Malaysia into a knowledge society by the end of the first quarter of the new century.

Subsequently, the Government of Malaysia has made one more radical modification by launching the Electronic Government (EG), with the aspiration of employing multimedia technologies to reinvent the mode by which the government operates and to ensure the growth of the Multimedia Super Corridor (MSC). E-government calls for the application of information and multimedia technology to advance the productivity of the public service. It was intended to strengthen the collaborative atmosphere between the government and private sector and to promote the quality of public sector service delivery.

An extra project, the Malaysian Civil Service Link (MCSL), previously formed as a computer-based repository of information on the Civil Service and its administration, was upgraded through registration of its website with several key Internet search engines (ISIS, 2002). This project requires government agencies to devise, enlarge, maintain and uphold their own websites according to the current situation and latest information.

Under the EG, the government has implemented seven pilot applications, which are (Maarof 1998, pp. 17-23, Government of Malaysia 2000, pp. 3-81, Johare 2001, p. 98) Prime Minister's Office - Generic Office Environment (GEO) to create a fully integrated, distributed, manageable and scalable office environment; Project Monitoring System

(PMS) for monitoring the implementation of government projects in the public sector; Human Resource Management Information Systems (HRMIS) as a single interface for government employees to perform the human resource management function and; Electronic Procurement (eP) to automate, reengineer and transform the current procurement systems. The remaining three application are Electronic Delivery of Driver and Vehicle Registration, Licensing and Summons Services, Utility Bill Payment and Ministry of Health Online Information (eService) to enable the public to have a better service access to all related government agencies, Electronic Labour Exchange (ELX) to enhance workers' mobilisation through the matching electronically of work seekers with job vacancies electronically and EG-AG Integration to integrate all the pilot applications under the EG with the legalisation system at the Accountant General Department.

As a result, the World Bank reported that Malaysia is one of the developing countries that have made the important use of information technologies a key driver of national development strategies (World Development Report, 1999).

It further stresses that:

"Malaysia, for example, has defined its information technology objectives and included them in its development strategy. The objectives include enhancing awareness of the new technologies among the population, ensuring widespread diffusion and application of information technology training, and revisiting laws and regulations to facilitate and protect transactions that use electronic rather than paper-based modes of exchanging information" (1999, p. 61)

The concept of accepting knowledge as a precious asset started several years ago. During officiating a K-Economy Conference on October 17, 2000, the then Prime Minister of Malaysia, the Honourable Dato' Seri Dr. Mahathir bin Mohamed, emphasised that knowledge is real. He showed on a graph *"that productivity growth doubled in knowledge-rich economies"* (Mohamed 2000). He further stressed:

"Knowledge of course has always played a role in the progress of nations. Knowledge of the stars and the geography of continents had enabled the early civilisations to trade with distant places and exploit distant lands. Knowledge of the sciences had contributed to the industrial age. But today knowledge refers more to the speed of communication and the speed of information and data. Everything that anyone needs to know in order to make decisions is at everyone's fingertips literally" (Mohamed 2000).

In the 2001 Budget Speech presented on October 27, 2000, the Finance Minister of Malaysia, Daim Zainuddin (Zainuddin, 2000), urged the Malaysian nation to be well equipped for the emergence of the K-economy. He further stressed:

"We must accept the realities of the K-economy. We have no other alternative. We shall all become citizens of the K-economy. Survival in a borderless global economy based on knowledge requires everyone to be equipped with new skills and assimilate the culture of high technology and dynamic entrepreneurship".

At the end of 2002, the government of Malaysia published the K-based Economy Master Plan (KEMP) which aimed to propel Malaysia from a Production-based economy (P-economy) to a Knowledge-based economy (K-economy). The KEMP has proposed seven strategic thrusts for the transition that are (K-based Economy Master Plan 2002, p. viii):

To cultivate and secure the necessary human resources

To establish the institutions necessary to champion, mobilise and drive the transition to a K-based economy

To ensure the incentives, infrastructure and info-structure necessary to prosper the optimal application of knowledge in all sectors of the economy

To increase the capacity for the acquisition and application of science technology

To ensure that the private sectors spearhead the K-based economy development

To develop a knowledge-based Civil Service

To bridge the knowledge and digital divides

The Master Plan's strategic drives complement each other, and all drives are equally important for enhancing the Malaysian economy in the future.

2.5 Malaysian Public Service Administrative Reforms

Administrative reform commenced in the late 1960s with strong demands for the public service to embark on the government's development agenda. This reform was initiated in order to promote public sector efficiency and competence for expansion and administration. Hence, the government realised local public servants lacked of training and experienced, particularly in managing large-scale activities. Therefore, a team of consultants from the Ford Foundation was engaged in 1965. Guided by two American public administration experts John Montgomery and Milton J. Esman, the team reviewed the entire public administration of Malaysia, searching for ways to boost efficiency and surmount managerial leadership in the public service (Montgomery and Esman, 1966).

Besides strengthening managerial or policy-making and planning capacities, the administrative reforms also had to enhance the state's capacity for administration and resolution collective conflict in the country (Esman, 1972). The team recommended a number of broad areas for improvement principally in reducing government expenses, raising the service quality of government agencies and reducing the time spent in government processes.

Based on the report, a proposal for reformation of the Malaysian public service was put forwards. A most imperative governmental action recommended was for the formation of a Development Administration Unit (Ahmad, 1998). This unit, staffed by proficient management analysts, would map and direct the chief inconvenience of administrative

improvement for the entire government. The Development Administration Unit (DAU) was consequently established in November 1966. The roles of the Malaysian administrative scheme under the New Economic Plan (NEP) were introduced to permit the government to play a 'developmentalist' role with the implementation actions from the federal to the local district levels in a top-down style (Sri Tharan, 2001).

In the NDP policy phase, the government's shifting stance over economic development from a leading to a facilitating role (Jabroun and Balakrishnan, 2000) was accelerated through its policy of privatisation. This forced the public service to espouse drastic reform measures to assume its new role. The government's launching of the Excellent Work Culture Movement in November, 1989 (Osman et al, 1998) was declared as the turning point to a new rigorous reform effort for the public service. It attempted to encourage the values of professionalism, accountability, integrity, quality, productivity, and innovation into the public service. These values constitute what is termed a managerialist reform approach (Haque, 2001) and took the Malaysian public service into a business-like transformation.

In contrast to the shift in paradigm entailed during the transition from the NEP phase to the NDP phase, the broad reform movement towards the NVP (the National Vision Policy) phase was less drastic. It was merely an extension of the efforts initiated under the previous development plans. The endeavour was to contribute in transforming Malaysia into a wholly developed nation status with a value-based society as envisaged under the ambitious Vision 2020. In its proposal to achieve this aspiration, the government positioned much hope on the application of Information and Communication Technology (ICT) as the means to accomplish its goal (RIAP, 2001; Tipton, 2002). The Multimedia Super Corridor (MSC) project launched in 1996 became

the main vehicle to leverage the nation's status into the ranks of high-technology countries at the cutting edge of social, economic, and technological development.

The reform plan can only be attained through an attempt to furnish the public service personnel with the necessary knowledge, attitudes and skills. Leading the reform in all the government agencies are its public service managers.

2.6 The Mode of Operation of the Malaysian Administrative Machinery

The three essential levels of Malaysian administrative machinery are: the federal government, the state government and the local government. At every level, management is by two kinds of public officers, who embrace either the political posts or the conventional public services posts (Malaysia Official Year Book 1992, p. 44). All officers are accountable to the Prime Minister or the relevant 'Menteri Besars' or Chief Ministers of the states. Nonetheless, the public service officers are typically directly answerable to the Chief Secretary General. The Chief Secretary General also acts as the Secretary General to the Prime Minister's Department. At the state level, the State Secretary of the respective states acts as the principal of public service.

At Federal level, the Ministries are the highest bodies of the administration. They are setup to perform the responsibilities entrusted to the government. These 27 Ministries plays a significant role in directing, planning, coordinating, enforcing and implementing (Malaysia Year Book, 1992) government policies. Each Ministry is headed by a political Minister, and is facilitated by a Secretary General. The Secretary General acts as the advisor to the Minister, especially in matters concerning government policies. At the same time, he is also responsible for implementing all government policies and directives. The Ministries encompass under them different departments and statutory

bodies. Each department and statutory body is headed by a Director General and acts as the implementing agency to carry out their respective functions.

Essentially, the underlying establishment of the Ministries are to produce policies related to their institutionalisation, control and supervision of all Government Departments that have the same responsibility. As an example, in case of rules and regulations for the financial aspects, it is the Ministry of Finance that will formulate policies, and provide supervision to the other agencies, such as the Accountant General's Department, the Inland Revenue Board and the Employee Providence Fund.

Every Government Department and Agency is obliged to follow every rule and regulation as laid down by the Government. Other than the Federal Constitution and related Acts, each is required to follow the General Order, the Treasury Instruction, Development Administration Circular, Service Circular and Service Circular Letter, Treasury Circular and Treasury Circular Letter, and the Public Officers (Conduct and Discipline).

2.6.1 The Public Sector

The highest position in the public service structure is the Chief Secretary to the government. The Secretary-Generals who are answerable to the Chief Secretary, on the other hand, are the top civil servants at the Ministries and for the most part both are professionals from the Administrative and Diplomatic Service (ADS). The Malaysian Public Service is very well established and is capable of assisting the Government in developing the nation. In addition to the central agencies, the public service is also sustained by Ministries, Federal Departments, Statutory Bodies, Public Enterprises and, Local Authorities.

In terms of structure, each of the central agencies, such as the Public Services Department (PSD), Malaysian Administrative Modernization and Management Planning Unit (MAMPU), Implementation and Coordination Unit (ICU), and Economic Planning Unit (EPU) have been positioned within the Prime Minister's Department. Each of these outfits has the responsibility for creating policy initiatives and preparing guiding principles for every Government Office. They are also accountable for determining the administration and management of all other government agencies consistent with the Government's overall vision.

The Public Service Department major role is to create and implement the policies related to personnel management for the entire of the public service. PSD needs to determine the organisational structure and staff personnel of all Government offices including Central Agencies, the Ministries, and Federal Departments, Statutory Bodies, State Development Offices, District Offices and local authorities. What is more, PSD issues procedure, rules and regulations for the recruitment, appointment, promotion, discipline, termination of service, pensions, etc., for all the public sector organisations.

Another key player in the government establishment is the Malaysian Administrative Modernization and Management Planning Unit (MAMPU). MAMPU is responsible for reformation initiatives in the public sector and creates new guidelines as required. The emphasis is on the creation of values, especially quality matters, productivity, accountability, discipline, responsiveness, integrity, moral and ethical judgment and transparency. MAMPU also play a role as an advisor to the government in management and information technology and as a consultant in organisational development.

The Treasury and EPU are authorised to consider and approve requests for projects and funds from relevant Ministries. It has the task of introducing management improvements in the 10 public sectors. It focuses much of its attention on developing and implementing information and communications technology and office automation. Finally, the ICU monitors and coordinates all developmental policy implementation (United Nations, 2003).

The Malaysian public service is a "career service" (Puthuchery, 1978). Entry is at lower levels, and the skills necessary for higher-level work are extended from within the service. Recruitment to different levels is identified on the premise of educational qualifications at entry. Advancement within the service is through annual salary increments and promotion to a superior position is highly dependent on seniority. It is claimed that the system moulds the public service into a very resilient and insulate organisation (Painter, 2004).

In term of service classifications, the Malaysian public sector is made up of nineteen types of service including medical, education, police and military. These services are specific for particular professions, such as engineering or medical. However, a special service exists to execute management and administrative functions within the Malaysian Public Sector at all levels. This group dominates most managerial functions, and is known as the Administrative and Diplomatic Service (ADS). This nature of the public service has also attracted negative comments. The public service is believed to be extremely resistant to change, despite hard work made to reform it (Sri Tharan, 2001) and it is complicated to set up newer instrument that can boost performance enhancement and efficiency such as lateral recruitment, performance or merit pay, and contract employment into the service (RIAP, 2001).

2.6.2 The Administrative and Diplomatic Service (ADS)

The cornerstone of Malaysia's development as a Malaysian nation has been reliant on the efficiency and capability of the public service (Sri Tharan, 2001). The Malaysian public service has been entrusted with the implementation of the government's policy, geared to develop the nation towards prosperity and harmony for its plural society. Since independence, the government has been decisive its efforts in eradicating poverty particularly in the rural population. The entire public service from the federal down to the district level was pooled to generate these objectives and the ADS was entrusted with the responsibility of most managerial work in these efforts.

The ADS was formed under Federal Constitution (Article 132) and it was categorised as the general public service of the Federation. Formerly known as the Malayan Civil Service (MCS), it was first established by the British administration in 1904 (Allen, 1970). Six years later in 1910, the Malay Administrative Service (MAS), a junior administrative service under the sponsorship of the British colonial administration was established (Chien, 1984). Later, MAS turned into a feeder service for MCS as the first batch of thirty MAS officers was absorbed into the MCS in 1946. Non-Malays began to be admitted into the MCS from 1953.

In 1966, the original MCS was renamed the Malaysian Home and Foreign Service (MHFS) subsequent its merger with the recently created External Affairs Service (Elyas, 1980). Consequently, this conveyed a new role of foreign affairs into the MCS. The MHFS evolved from the existence of the MCS with the expansion of government actions to broaden its capacity and functions. Malaysian independence meant that the the government to meet the demands of the immense task of nation-building.

The Training for Development in West Malaysia Report 1969 detailed the broad spectrum of the role and functions of the ADS (Government of Malaysia, 1969). Every aspect of governmental activities and development efforts was described as closely involving the service. With the spread of government activities, ADS consistently broadened its scope and function. Subsequently, paper work was no longer the regular function of MHFS officers; rather, they became development administrators. Another role of the MHFS, according to the report, was to keep government operations effective at all times by preserving administrative expertise through the provision of leadership in the areas of decision-making, procedure formulation, programme planning and reassess, control and management of assets, programme co-ordination and operation.

The MHFS was renamed the Administrative and Diplomatic Service (ADS) in 1971 (Government of Malaysia, 1971). This step is considered a turning point for the public sector in general and the ADS in particular. Having experienced the ethnic riots, the public service became the key player for the government to implement its policies. Furthermore Tun Abdul Razak, Malaysia's second Prime Minister gave priority to modernising the public service by enhancing efficiency and embarking on greater responsibilities to compensate for the collapse of the market mechanism (Shaikh, 1992). As a consequence, there was a notable expansion in the scale of the public service by 1980, with a rise of 900% (Ahmad, 1998).

The merging of several administrative services was a further critical progress of the government's decision concerning the ADS. Since several administrative services existed at the departmental and state levels, in October 1974 these services were amalgamated by government into two main administrative services: the Administrative and Diplomatic Service (ADS) and the General Administrative Service (GAS)

(Government of Malaysia, 1974). The ADS was to embrace a higher echelon administration and management responsibility, whereas the GAS would be at a subsidiary rank to the ADS. However, Kedah, Kelantan, Terengganu, Johor and the two East Malaysia states of Sabah and Sarawak were left with their own administrative services. This merging of administrative services involved the Malacca and Penang State Administrative Services, the Malay Administrative Service, the Immigration Department Administrative Service, the National Registration Department Administrative Service, the Election Commission Administrative Service, the Road Transport Department Administrative Service and the Labour Department Administrative Service.

The GAS was then merged into the ADS in 1991 when the government decided to have better command over its public service. The merging structured the federal civil service into two core cadres: administrative/management under the ADS and technical/professional under various services such as engineering medical, accountants and education (Shaari, 1980).

There are also lower levels of support services that offer support to these two groups. The merging of the administrative services into one group provides better promotion prospects as well as opening up transfer options for its personnel. It also gives the various Ministries and Departments more choice in picking the appropriate person to meet their requirements.

2.6.3 The Remuneration System

The remuneration system practice by the Malaysian Public Service in order to attain public service goals is revised whenever necessary. The move to a knowledge-based

civil service warrants a revision of the system. Resulting from this, The New Remuneration System (NRS), implemented in 1992, commenced extensive modification to accommodate the directional changes in the national development process. With this reform undertaking business-like transformations (Haque, 2001), a connection between performance and financial reward was introduced into the NRS (RIAP, 2001). The merit-based consideration for placement, training, promotion, salary increments, job performance and contribution to the departmental objectives is now applied in this system (Malek Shah, 2003).

The NRS for the first time incorporated the idea of annual bonus payouts in public service. More importantly, the NRS introduced a "matrix schedule" for salary increments. This matrix schedule offered three types of salary movements; namely, horizontal, vertical and diagonal. A horizontal progression was given to an averagely-performing public servant, vertical movement was for excellent employees and the most outstanding public servants were given diagonal salary movements (RIAP, 2001). Public servants whose performance was unsatisfactory would not receive any special pay in what was termed a "static" progression.

Finally, the NRS also influence the promotions approach. Previous promotions systems considered the posts vacant for promotion and these were usually filled by the most senior person in line. However, the NRS preferred outstanding performers and gave them the opportunity to be promoted ahead of seniors. Following a decade in effect and facing new challenges, the NRS was revisited in juxtaposition with the arrival of the knowledge based economy. The revised scheme resulted in the Malaysia Remuneration System (MRS), launched in 2002. The MRS takes competency as the basis for human resource development and the reward system and is closely interrelated to the plan for a

knowledge-based civil service. The key component was designed to meet the needs of the knowledge-based economy, and was also claimed to be more responsive to the changing environment and more attractive to high-calibre people (Malek Shah, 2003). By placing prominence on knowledge acquisition and skill development the MRS was intended to inspire the culture of continuous learning and build up knowledge workers in the public service.

Apart from the existing annual performance appraisal reports, the MRS introduced competency assessments in the form of examinations that assess the competency levels of public personnel. The government anticipated that such a system would encourage self-development among employees who would need to pass the examinations. The union for public service (CUEPACS) objected considerably to the NRS as it was claimed it generated resentment and frustration among those who missed out on accelerated increments and rapid promotion. Regardless of this being a standard phenomenon in such a system, a criticism of the NRS generally was its lack of transparency in a performance evaluation that was rooted in individual judgments (RIAP, 2001).

2.7 Conclusion

To sum up, it is clear that the Malaysian Public Sector is taking extraordinary steps towards achieving a k-based economy as well as Vision 2020. Most importantly, the public sector has gone through a radical reformation and ADS has been dramatically developed to accommodate the k-based economy. In addition, the implementation of MRS that is consistent with a knowledge-based civil service indicates the strong will of the Malaysian government to achieve its vision. It is from this standpoint that this study argues that knowledge transfer can be applied as an imperative management tool in

public sector organisation. In the following chapters the author will consider in some detail the appropriate bodies of literature surrounding these areas of study interest in order suitably to address the broad research questions outlined in Chapter 1.

3 LITERATURE REVIEW

3.1 Introduction

This chapter aims to provide an in-depth theoretical understanding of the research related to knowledge, tacit knowledge and knowledge transfer. Knowledge was discussed on the premise of its originality which was rooted in the works of Greek philosopher, Plato and its development in recent studies. At the same time, it will present evidence of leader member exchange theory (LMX) literature and how it emerges from leadership discipline and the importance of LMX in building successful interpersonal relationships in the organisation. This chapter also illustrates the study on cognitive style, cognitive similarity and their influence on individual differences which in return affect the individual in workplace. As such, it forms a key part of the theoretical base of this research. From these discussions, a more detailed research framework and research hypotheses will be developed chapter 4.

3.2 Knowledge

3.2.1 The Origin of Knowledge

Knowledge was initially defined by the Greek philosopher, Plato. Plato defined knowledge as '*Awareness of abstract, universal ideas and forms existing independently of a knowing subject*' (Chia, 2009, p: 6). Plato added that all reality is generated by pure fairness, honesty, trust, beauty and justice. Plato's successor Aristotle elaborated that proper knowledge can be obtained through logical reasoning. He states that knowledge can be possessed by showing the ability to determine the reasons for things. Both

Aristotle and Plato agree that knowledge can be derived from logical and rigorous possession of mental representations of external reality.

This legacy led scholars to discuss knowledge from scientific perspectives referred as 'episteme', 'techne', 'phronesis' and 'metis'. Episteme is knowledge that can be '*written, recorded, validated and protected by a firm*' (Baumard, 1999, p: 22). Baumard believes that epistemic knowledge is scientific, overt and common knowledge about things. He states that techne is equivalent to '*capability, capacity to accomplish task*' (Baumard, 1999, p.53). This seems to indicate that epistemic knowledge is an explicit knowledge that the company can benefit from, while techne is 'know how': knowledge that resides in the minds of employees.

According to Baumard (1999), phronesis is the result of experience and social practice: it is personal and hard to share. The process of obtaining phronesis requires immersion, experiential learning, and trial and error. Phronesis assists individuals to act and respond appropriately to certain circumstances. *Metis* is 'conjectural intelligence' (Baumard, 1999) or 'cunning intelligence' (Detienne and Vernant, 1978). It is the ability to apply specific knowledge in certain circumstance (Detienne and Vernant, 1978; Scott, 1998). Further discussion about *metis* was conducted by James Scott. For him, *metis* is '*knowing how and when to apply the rules of thumb in a concrete situation is the essence of metis*' (Scott, 1998, p.317). Scott's explanation emphasize on the issue of timing and timeliness of action. Additionally, Raphals (1992) describe phronesis as '*practical but not inherently oblique, devious or indirect*', metic intelligence operates with a '*peculiar twist; it reflects the ability to attain a surprising reversal of situations*'.

According to the above viewpoint it seems that episteme can be categorized as explicit knowledge, while techne, phronesis and metis fall into the dimension of tacit knowledge (Chia, 2009). Techne can be translated into know-how: ability that requires the technical expertise of an individual. On the other hand phronesis can be obtained through experience and exposure to certain circumstances. Techne and phronesis can be comprehended effectively with metis, which is the practical wisdom of knowing when to apply all the knowledge in an appropriate situation accurately and correctly.

3.2.2 Definition of Knowledge

Recently scholars attempted to describe knowledge by differentiating it from data and information. The intention was to offer further clarification of the distinction between three diverse terms. To simplify the understanding about data, information and knowledge, it would be helpful to adopt the viewpoint of Bierly et al (2000), whose ideas on the continuum of those three terms can be seen in Figure 1. The scholars are consistent in defining data as unsorted, unprocessed, unorganised facts that represent numbers, words, pictures or facts about any events (Applehans et al, 1999; Dixon 2000; Davenport and Prusak, 2000; Awad and Ghaziri, 2003).

Information refers to data that have been sorted organised and analysed to bring meaning and to describe a situation (Nonaka and Takeuchi 1995; Wiig, 1997; Liebowitz 1999; Dixon 2000). Additionally, other scholars describe information as potential data for action that reside in the user (Malhotra, 1998), '*data that makes a differences*' (Davenport and Prusak, 2000), '*a statement of facts about measurement*' (Applehans et al, 1999).

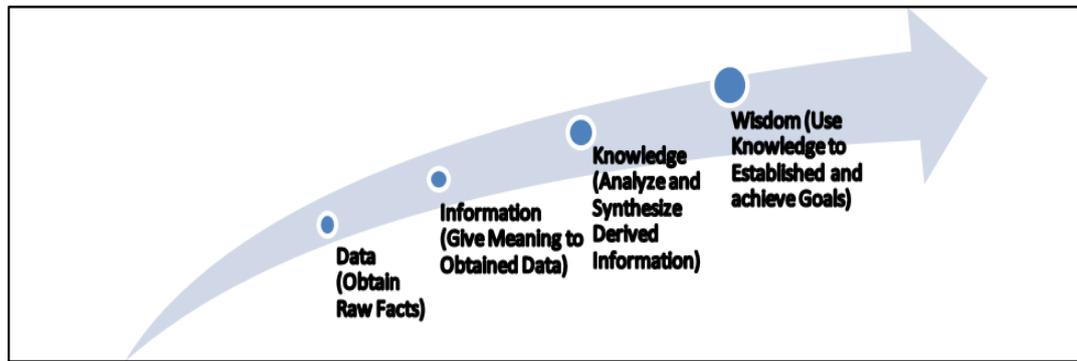


Figure 1: Data, Information, Knowledge and Wisdom Framework
(adapted from Bierly et al, 2000).

Knowledge can be perceived as a meaningful link, beliefs, thought and experience that guide people action and behaviour (Applehans, et al 1999; Liebowitz 1999; Dixon 2000). A more precise definition of knowledge is made by Davenport and Prusak where they noted that knowledge is *'A fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information'* (Davenport and Prusak, 2000, p.5).

Knowledge is defined by Webster (1961) as a clear and certain perception of something; the act, fact, or state of understanding. Knowledge consists of knowing how, also known as tacit knowledge, and knowing about, also called explicit knowledge (Grant, 1996). Bierly et al (2000, pp. 600) defines knowledge as *'clear understanding of information and their associated patterns and learning about knowledge as the process of analysis and synthesis of information'*.

The differentiation between information and knowledge discussion has been further elaborated by Nonaka (1994). With reference to the work of Dretske (1981), Nonaka outlines that information is a flow of message where the knowledge is created by this flow of information. This knowledge creation is very much dependent on the commitment and beliefs of the source and the recipient.

3.2.3 Knowledge Conversion

Knowledge is created through a process of conversion from tacit to explicit (Nonaka, 1991; Nonaka and Takeuchi, 1995; Nonaka et al, 2000). As a result, there are four modes of knowledge conversion, as presented in Figure 2. The nature of work in the organisation requires socialisation, externalisation, combination and internalisation. The relationship between individual, workgroup and organisation exists by means of socialisation. This association essentially occurs through apprenticeship work, observation, imitation and practice (Nonaka and Takeuchi, 1995). Socialisation will assist tacit knowledge transfer from individual to individual, and between group and organisation.

Nonaka and Takeuchi suggest that a fully automated bread-making machine for home use is an interesting metaphor for tacit knowledge (Nonaka and Takeuchi, 1995). The team from Matsushita Electric Industrial Co. learn how to make bread from the bread-maker in the kitchen through socialising with the chef. Hence, they transfer that particular tacit knowledge into explicit knowledge by developing the bread-making machine.

The mode of externalisation facilitates the conversion of tacit knowledge into explicit knowledge. Examples of externalisation activities are metaphors, concepts, hypotheses or models. The Tall Boy case was generated from the “automobile evolution” metaphor: the team of engineers was made to understand something intuitively through the use of imagination and symbols from the metaphors (Nonaka, 1991; Nonaka and Takeuchi, 1995). Thus, they will integrate their existing knowledge to develop a new idea that will ultimately lead to the successful creation of a new car called ‘Honda City’

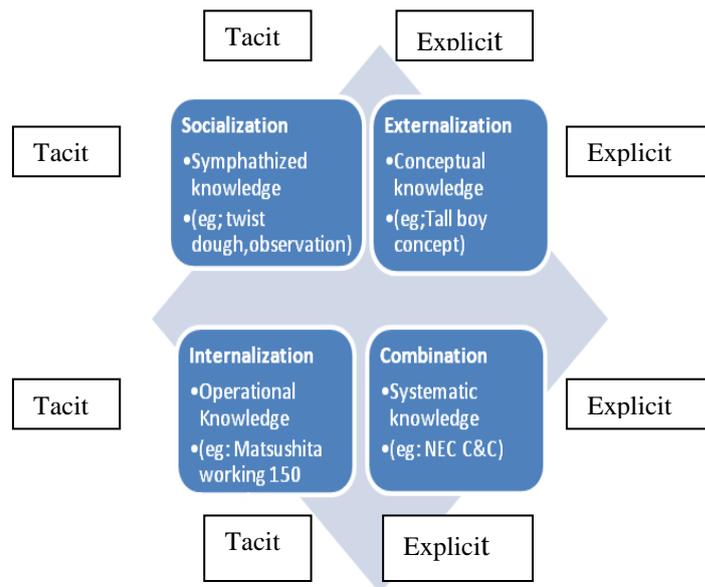


Figure 2: The Four Modes of Knowledge Conversion

(Adopted from Nonaka and Takeuchi, 1995)

Combination will occur in the circumstances where explicit knowledge is integrated with other explicit knowledge. Combination involves individual exchange and combines knowledge such as documents, meetings, telephone conversations or computerized communication networks (Nonaka and Takeuchi, 1995; Nonaka et al, 2000).

Following combination is internalisation. Internalisation involves the conversion of explicit knowledge into tacit knowledge. When experiences gained through socialisation, externalisation, and combination are internalised by individuals as tacit knowledge in the form of shared mental models or technical know-how, they become valuable assets. For example, GE documents its customer complaints and inquiries in a database for other operators reference (Nonaka and Takeuchi, 1995).

3.3 Tacit Knowledge

3.3.1 Conceptual Definition of Tacit Knowledge

Tacit can be explained as something that can be understood without being expressed in a straight forward manner. Tacit knowledge terminology emerged from multi-disciplinary studies such as the philosophy of science by Polanyi (1966), ecological psychology (Neisser, 1976), and organisational behaviour (Schon, 1983). It has been utilised to describe knowledge that is obtained from daily experience which has an implicit, un-codified quality. Generally the work on tacit knowledge is attributed to Polanyi: a philosopher of science who described tacit knowledge thus: '*We can know more than we can tell*' (1966, p: 4). He further illustrates human knowledge through the example of face recognition. People are able to identify a huge number of faces even though they are unable to explain how they make these identifications. Therefore Polanyi claimed that this knowledge cannot be put into words. Polanyi draws out attention to the approach used by police in face recognition, where they make a large collection of facial features. Through this application we observe that even though this knowledge is hard to explain, but we are able to communicate it, provided we are given adequate means for expressing ourselves (Polanyi, 1966).

Sternberg et al (2000) stated that tacit knowledge is a condition-action sequences or action depending on the situation. For example, the teacher who can recognise which is the most relevant way to teach. Wagner further defined tacit knowledge as '*Work-related practical know-how that usually is not openly expressed or stated, and that usually is not directly taught*' (1993, p.19). For the purpose of this study, tacit

knowledge will be defined as work related know-how that is acquired through experience and not directly taught.

3.3.2 Type of Tacit Knowledge

Pertaining to types of tacit knowledge, the scholars point out distinct perspectives. First, Nonaka (1994) and Nonaka and Takeuchi (1995) appear to indicate that tacit knowledge can be separated into two; technical tacit knowledge and cognitive tacit knowledge. Technical tacit knowledge is learned through experience where this learning experience would create technical 'know-how'. Technical 'know-how' essentially explains the skills and crafts acquired in relation to mastery of work (Nonaka, 1994; Collin and Tynjala, 2003). In view of that, Baumard (1999) introduced a dimension of tacit knowledge called expertise that can be associated with technical dimension. Baumard defines expertise as the ability to perform a task without any difficulty, thus making it difficult to express it.

Cognitive tacit knowledge consist of mental models, perspectives and beliefs which are deeply ingrained in the mind at the level of subconscious mind and affect individual perception of the real world (Nonaka, 1991). Additionally, Baumard (1999) stated that this cognitive component will filter the incoming information in order to form unique knowledge in the individual.

The transfer of cognitive tacit knowledge is normally occurring by mean of interaction and socialisation. Beside these two types, Baumard (1999) believed that implicit knowledge is another form of tacit knowledge. Implicit knowledge, according to Baumard, is known and can be explicated, but rarely occurs because knowledge often lies deep in our mind.

The second view from Janik (1988) is slightly different. According to Janik, tacit knowledge is the knowledge that is not ready to be expressed in words or is inexpressible in language. The former is considered as tacit knowledge because it is preserving secrecy and power, and people cannot usually imitate it or it is limited to particular people only, whilst the second type is more a sensational experience, such as smell and taste.

Collins (2001) seems to show that tacit knowledge is more diverse by indicating five types of it. His view determines five types of tacit knowledge; concealed knowledge, mismatched salience, ostensive knowledge, unrecognised knowledge and uncognisable knowledge. Concealed knowledge is referred to knowledge that is obscured either intentionally as a secret or unintentionally when the individual did not notice the existence of it. Mismatched salience refers to group, as it occurs when different group focus into different problems, because the groups are not observing each other's work. Ostensive knowledge is knowledge that inexpressible through verbal language; however it can be articulated through pointing and showing. Unrecognisable knowledge is generated through imitating critical behaviour without noticing the importance. Uncognisable knowledge is typical in language, such as human's ability to speak in their native language without awareness of how they do it.

This study will adopt Wagner's approach to tacit knowledge. Drawing from the concept of practical intelligence, Wagner and Sternberg (1986) access tacit knowledge with different approach. Their research interests are based on practical everyday life and real world or real life settings in their research. Congruent with this approach, Wagner (1987) determines three kind of tacit knowledge that have been practised by successful managers, namely managing oneself, managing others and managing task.

3.3.2.1 Managing Oneself

Firstly there is the tacit knowledge that is required to manage oneself. This type of tacit knowledge concerns self-motivation as well as the self-organisational aspects of managerial performance (Wagner and Sternberg, 1991). For example, what is the best way to handle a problem caused by procrastination? In this case, individuals need time management skills in order to organise, prioritise and complete their workloads. This will minimize the problems caused by procrastination.

Similarly, self-management can be perceived as the ability to increase productivity on a daily basis. For example, acquiring knowledge about the relative importance of the task and knowing the most efficient way to perform that particular task (Wagner and Sternberg, 1986). Effective managing-self individuals are able to set a priority of a numbers of tasks and as a consequence their time is allocated accordingly. Sometimes this means that deadlines for low-priority tasks are missed or that extra responsibility is delegated to subordinates (Sternberg et al, 2000).

3.3.2.2 Managing Others

Secondly, there is the tacit knowledge that is required to manage others. This type of tacit knowledge resides in people management skills: the skills to manage subordinates, co-workers and superiors. An example of this type of knowledge can be seen in the art of persuasion: the power to convince a doubtful superior to accept a good idea. Another example is knowledge about how to assign tasks that will utilise the capabilities of an individual whilst downplaying their weaknesses (Wagner and Sternberg, 1986). Managing others is the key to remaining on the executive fast track because an inability to manage others is the main reason for derailment (Mc Call et al, 1988). Another example of managing others knows how best to reward a given subordinate so as to

maximise productivity as well as job satisfaction (Wagner and Sternberg, 1991). To act openly to the ideas and opinions in a particular task is also considered highly important in managing others (Sternberg et al, 2000).

3.3.2.3 *Managing Task*

Thirdly there is the tacit knowledge that is required to perform specific managerial tasks successfully. An example of managing task is knowing how to communicate to others the main point in a presentation (Wagner, 1987; Wagner and Sternberg, 1991).

3.3.3 The Acquisition of Tacit Knowledge

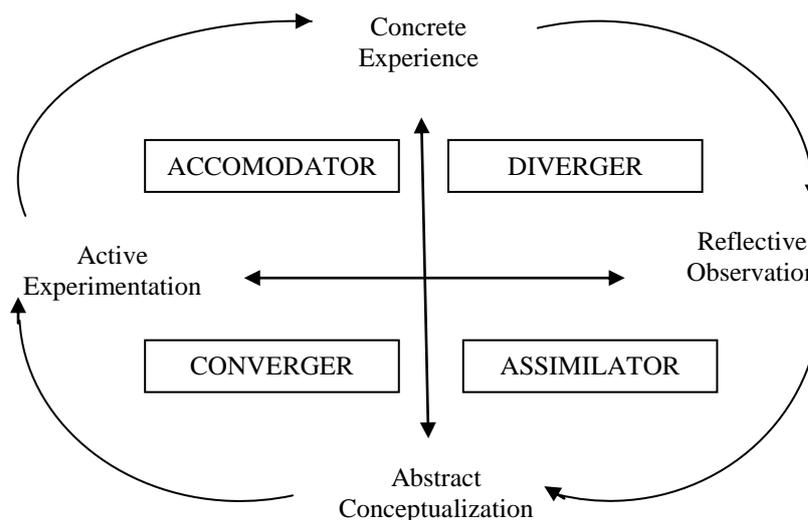
Adopting Wagner and Sternberg's (1986) views, suggesting that tacit knowledge is the product of learning that affect the performance; this study is selecting tacit knowledge as the outcome of knowledge transfer. Thus, it is reasonable to look into the acquisition of tacit knowledge and influential factors related.

The generation and accumulation of tacit knowledge is determined by the individual's experiences, commitment and involvement in the context of situation (Nonaka, 1994). Other scholars assert that people have consistent individual differences in their preferred ways of processing and organising information and experience. This difference is usually called cognitive style (Messick, 1976). Baumard (1999) noted the importance of individual pre-established cognitive patterns that uniquely filter incoming information during new knowledge acquisition. He further adds that managerial tacit knowledge is generated in intimacy of lived experience, such as between peers or between the supervisor and subordinate. This knowledge might lead to a performance advantage for certain individuals and *'it is likely that some individuals will fail to acquire it'* (Sternberg et al, 2000, pp. 117).

In explaining the differences in the level and content of tacit knowledge across individuals who appear to show similar abilities and experiences, Kolb (1984) and Kolb and Kolb (2005) suggest that it is due to the different learning style of individuals. Congruent with this notion, it was suggested that when learners are able to match their learning styles with the learning environments, they obtain higher learning outcomes (Nulty and Barret, 1996; Dunn and Griggs, 2003).

Sadler-Smith (2001) in supporting this asserts that learning style is the interface between cognitive style and external learning environment where it contextualises individual differences in learning style. Kolb's learning theory which draws on notable scholars as such John Dewey, Carl Jung, Kurt Lewin, Jean Piaget, William James, Paolo Freire, Carl Rogers and others explained the theory of human learning (Kolb and Kolb, 2005).

Figure 3: Kolb's Learning Styles.



(Adapted from Kolb et al, 1999)

Figure 3 shows Kolb's four stages model of learning from experience focuses on the polar of extremes of concrete-abstract and active-reflective dimensions of cognitive growth. The concrete-abstract dimension symbolises the way an individual prefers to perceive the environment, whereby, the active-reflective dimension represents on the way individual prefer to process external information and transform experience (Kolb, 1984).

This model illustrates four learning cycle from concrete experience leading to reflective observation on that experience followed by abstract conceptualisation which develops the theory. Subsequently, theory testing will be conducted through active experimentation which finally creates new concrete experiences, and so the cycle is maintained.

Kolb argue that the possession of all four abilities is critical to effective learning from experience; however, not everyone is able to be strong in all four. Most people develop only one or two of these particular strengths based on hereditary equipment, past experiences and demands of their present environment (Kolb, 1984). This led to the different learning styles, diverger, assimilator, converger and accommodator (Kolbs, 1984). Divergers integrate learning stages of concrete experience and reflective observation. Assimilators put together the reflective observation step and abstract conceptualisation. Convergengers combine the steps of abstract conceptualisation and active experimentation, whilst accommodators combine the learning steps of active experimentation and concrete experience.

Individuals with a diveger orientation do extremely well at viewing concrete situation from various perspectives and excel in activities that generate alternative ideas. They

are concerned about people, are imaginative and feeling-oriented. These individuals are normally involved in professional careers that are related to social services, arts and communication. It might be due to their proficiency in establishing personal relationships, communicating effectively, helping other people and sense-making (Armstrong and Mahmud, 2008).

An assimilator is an individual who excels in inductive reasoning and creating theoretical models. Their strength is the ability to understand a variety of information and present it into a concise logical form. They are more interested in ideas and abstracts, not people. This individual fits well in the professions related to science and information. Their proficiency is gathering and analysing information, theory-creating and creating conceptual models (Armstrong and Mahmud, 2008).

Problem solving, decision making and practical application of ideas and theories are the absolute strength of convergers. They prefer to deal with technical tasks and specific problems through hypothetical deductive reasoning rather than social and interpersonal issues. They tend to be involved in technology, economics and environment science fields due to their preference toward engineering that require technical and problem solving skills like quantitative analysis and the use of technology (Armstrong and Mahmud, 2008).

The accommodators are excellent at doing things, carrying out plans and tasks and becoming involved in new experiences. Moreover they like to solve problem in trial-and error approach by depending on their intuition or other people for information, but not their own analytical ability. They normally pursue career in management, public finance, educational administrative, marketing and human resource.

Wagner and Sternberg (1987) state that improvements in experiential learning are likely to increase levels of tacit knowledge. On the contrary, the mismatch between learning styles and learning context will lead into the difficulties in knowledge acquisition; consequently might affect managerial tacit knowledge transfer.

3.3.4 Cognitive Processes Related to the Acquisition of Tacit Knowledge

Selective encoding, selective combination and selective comparison are three cognitive processes believed to be critical to the acquisition of tacit knowledge (Sternberg, 1985). Firstly, selective encoding involves determining relevant information for the goal achievement by separating and arranging various overloads of stimulus inputs. The ability of the individual to filter and identify the usefulness of this information and followed by deciding with what degree of care to attend to the various inputs is known as selective encoding (Wagner and Sternberg, 1991). The individual cannot stop at selective encoding; they have to proceed with selective combination. Selective combination engage in putting together the information selectively encoded in the way required in achieving the purposes. Using this selective combination the individual able to frame an integrated and coherent cognitive structure, consequently decides on how to fit the information together in an appropriate way (Wagner and Sternberg, 1991).

Thirdly is selective comparison. Obviously, it is not enough to just integrate new information without considering pre-existing information. Thus, selective comparison is required in order to compare new information and cognitive structure to old information and cognitive structures to facilitate the integration of new information completely with prior information. Without selective comparison, it would be impractical to identify the implications of new information for individual or organisation except by relating new

information to the needs that lead the acquisition of this new information (Wagner and Sternberg, 1991).

3.3.5 Features of Tacit Knowledge

According to Sternberg and his colleagues (Sternberg et al, 1995; Sternberg, 1997; Sternberg and Horvath, 1999; Sternberg et al, 2000) the concept of tacit knowledge comprises three main features. Firstly, tacit knowledge is procedural. Tacit knowledge is closely connected to action. It takes the form of ‘knowing-how’ as opposed to ‘knowing-that’ (Ryle, 1949).

This kind of ‘knowing how’ is called procedural knowledge: it is knowledge that has a precise application (Winograd, 1975) or it can be stated that it is condition-action pairs of a general form (Nonaka, 1991; Sternberg et al, 1995; Ambrosini and Bowman, 2001). Anderson (1983) appears to believe that tacit knowledge is a subset of life relevant procedures found in individual experience. This type of knowledge provides guidance for individual action and behaviour even though it is hard to transfer. For instance, in the case of managing superiors, individuals must understand the emotion or interests of someone before approaching them.

Secondly, tacit knowledge is practically useful. Tacit knowledge is a ‘vehicle’ that enables people to achieve valued objectives. A highly valued objective requires a higher level of knowledge for it to be successfully achieved; hence this knowledge becomes very valuable (Sternberg et al, 1995). Knowledge that is acquired through individual practical experience is more valuable than knowledge that is passed on by others.

Thirdly, tacit knowledge is generated without direct assistance from others. Basically, tacit knowledge is attained personally by the individual when they are able to sort out the key lessons from their experiential learning and be able to identify crucial knowledge (Sternberg et al, 1995). Conversely, other studies (Lahti et al, 2002; Cavusgil et al, 2003; Stover, 2004; de Alwis and Hartmann, 2008) found that social interaction, networks, personal contacts and proximity are essential in the acquisition and transfer of tacit knowledge.

Normally, individuals accumulate their tacit knowledge by means of personal experience of certain circumstances, or by trial and error and it will gradually become their own unique knowledge that cannot be imitated by others. Individuals who learn knowledge formally do not accumulate levels of knowledge that are equivalent to the levels of knowledge accumulated by individuals who learn through experience or 'experiential learning'.

3.3.6 Tacit Knowledge and Scope

The scope of tacit knowledge refers to the circumstances of tacit knowledge applicable. This scope discusses three different angles; the content, the context and the orientation (Wagner, 1987). The content of a situation fundamentally involves managing oneself, managing others and managing task. Managers on average are tend to be knowledgeable about managing self, managing others and managing task (Wagner and Sternberg, 1991). However, there are a few individuals who appear to be knowledgeable about certain content such as managing tasks, whereas their other content for example, managing others is limited. This phenomenon is termed as *competence-performance distinction* or in other words doing less well than one is able to do. Wagner and Sternberg (1991) identify two common reasons for this circumstance. The first is a motivational factor.

Individuals either do not value doing their best, or their real interest lies elsewhere. The second reason is related to style of thinking. Individuals develop sub-optimal styles of thinking and behaving that fail to capitalise on all of their tacit knowledge. In explaining this condition they bring an example of an individual who can perform any task in front of him without considering the long term consequences of his task selection, even though he is capable of doing so. They further recommend that these discrepancies can be reduced by frequently asking questions that will promote effective application of their tacit knowledge.

The context of tacit knowledge can be discussed from local perspectives or global perspectives. Local context commonly refers to short-term achievement of a specific task. Locally task execution is inconsiderate of future goals, career development or reputation. Conversely, the global context will take into account aspect of long term goals and how present situation can be framed into a bigger picture. Wagner (1987) stressed that to successfully perform in everyday life, one must be able to execute local as well as global tasks and at the same time be capable of fitting the task into the future without forgetting to understand the linkages between them. The missing link between the contexts will create failure in discovering root causes of problems.

Tacit knowledge presented two orientations, idealistic and pragmatic. Idealistic can be defined as a judgement of quality of action without considering the practical aspect of it. Whereas, pragmatic orientation focuses on how workable the solution offer. As a result, Wagner (1987) proposes that effective performance requires both idealistic and pragmatic orientation.

3.3.7 Tacit Knowledge and Practical Intelligence

Practical intelligence can be referred to common sense. It is different from other kinds of intelligence. Practical intelligence involves not just adapting to environments, but also the shaping and selection of environments. The workplace is the best place to see practical intelligence in action. Most of the crucial rules of the workplace are unspoken. Some people learn them, others do not. A few people excel at acquiring this type of knowledge (Sternberg and colleagues, 1985, 1997, 1999).

The concept of practical intelligence emerged from the tests traditionally used to measure intelligence. These measures were essentially related to academic rather than practical ability (Wagner and Sternberg, 1986; Ceci and Roazzi, 1994; Berg, 2000). In other words, we can understand that everyday issues are much more diverse than those issues found in academic environments and traditional intelligence tests.

Practical intelligence refers to the individual ability to identify optimal fit between themselves and needs of environment via adapting to the situation, or choosing a new environment in the quest of personally-valued goal (Sternberg, 1985, 1997, 1999). Practical intelligence is one of the concepts that have been researched as an alternative to traditional views of intelligence. Traditional views (Spearman, 1927; Schmidt and Hunter, 1986; Ree and Earles, 1993; Brand, 1996; Jensen, 1998) suggest that variety of competencies required for achievement can be integrated as general intelligence (*g*).

Spearman suggest that general ability or *g* is required for mental test of kinds and proposed that the appearance of a general factor was due to the working of a multitude of mental bonds, including reflexes, learned associations between stimuli and the like. However, several researchers contend that *g* presents a limited perspective of an

individual's ability to thrive in a successful life. For instance Gardner (1983, 1999), proposed that individual ability is broader than *g*, as it includes concepts such as interpersonal and intrapersonal intelligence. Others, e.g. Goleman (1995) and Mayer et al (2000) introduce emotional intelligence, while Sternberg (1985, 1997, and 1999) indicates a concept of creative and practical intelligence.

As a result, Sternberg and colleagues (Sternberg, 1985, 1997; Wagner and Sternberg, 1986) extended the distinction made by Neisser (1976) in order to determine which attributes would differentiate academic and practical issues. Academic issues were identified by the following attributes: (a) formulated by others, (b) well-defined, (c) providing complete information, (d) characterised by having only one correct answer (e) characterised by having one approach to the correct answer (f) disembodied from ordinary experience (Wagner and Sternberg, 1990; Hedlund et al, 2002) and (g) lacking or without intrinsic interest (Sternberg and Wagner, 1993; Hedlund et al, 2002).

Conversely, practical issues (occurring in office-related problems) were identified by the following attributes: (a) unformulated or required reformulation, (b) inadequate information required for solution, (c) linked to daily experience, (d) weakly defined, (e) characterised by a variety of 'correct' answers, each with liabilities as well as assets, (Wagner and Sternberg, 1990; Hedlund et al, 2002) (f) of personal interest, and (g) characterised by a variety of approaches for choosing problem solutions (Sternberg and Wagner, 1993; Hedlund et al, 2002). It is logical to assume that the differences between academic and practical environments will mean that someone who is proficient in finding solutions to problems in one environment may not be able to transfer these skills to problem solving in the other environment (e.g Cornelius and Caspi, 1987; Denney, 1989). Additionally, Sternberg and Wagner (1993) noted that academic intelligence is

accessed via conventional tests. In other words, a high score is equated with a high level of intelligence and expertise. Conversely, a low score is equated with a lower level of intelligence or with a high level of ‘stupidity’ or ‘ignorance’.

In contrast to this approach, practical intelligence tests look at the relevant norms involved in the process of knowledge acquisition: informal context, commonly tacit, learned through observation and modelling and not necessarily recognised at school. Practical intelligence is usually assessed through simulation: the top scorer is known as ‘shrewd’ or if they utilise their knowledge for the betterment of others as well as themselves, they are termed ‘wise’, whilst those with the lowest scores are termed ‘naive’ or ‘foolish’.

This study focuses on the concept of practical intelligence as it underlies the acquisition and utilisation of tacit knowledge. Tacit knowledge is one of the tools that can be used to measure the ability to learn from experience. (Wagner and Sternberg, 1986; Sternberg et al, 1995; Sternberg and Grigorenko, 1997; Sternberg and Horvath, 1999; Sternberg et al, 2000) note that those who attain and exploit tacit knowledge are normally considered ‘street smart’. Or they may be thought to possess ‘common sense’: an aspect of practical intelligence. Tacit knowledge reveals what individuals need to thrive in everyday life that cannot be formally taught or conveyed. Scores that measure levels of ‘street smartness’ are predictive of an ability to learn to solve practical problems at work; nevertheless, they are less predictive of an ability to solve academic problems at school (Wagner and Sternberg, 1990).

The underlying reason it is called tacit is because that particular knowledge cannot be articulated by individuals or be broadly shared within the performance domain

(Sternberg et al, 2000). The terminology such as professional intuition and professional instinct have been utilised to reflect the tacit quality of knowledge associated with individuals who perform in their domains (Hedlund et al, 2002).

In the business and management domain the difference between academic and practical approaches can be clearly demonstrated. Basically, when trying to solve a problem managers will often use a rational approach to the task. This traditional model of thought fundamentally assumes that a set of problem-solving approaches can be utilised in most situations (Kepner and Tregoe, 1965; Plunkett and Hale, 1982; Isenberg, 1984). However research has revealed that successful managers hardly ever refer to specific rules of thought in their approaches to problem solving (Mintzberg et al, 1976; McCall and Kaplan, 1985; Isenberg, 1986). They substituted this with an action-oriented approach at the initial problem solving stage by utilising analyses and action based on personal experience. Schon (1983) further suggests that a significant amount of competent managerial behaviour appears as action that is almost spontaneous, based on intuition rather than rationality. It is '*ordinarily tacit, implicit in our patterns of action*' (Schon, 1983, p: 49). This view was supported by Wagner and Sternberg (1985), Wagner (1987), Sternberg et al (1995) and Sternberg et al (2000) who stated that individuals solve problem based on wide knowledge obtained by means of formal learning or personal experience.

3.3.8 Tacit Knowledge and Performance

An important criterion for evaluating the validity of tacit knowledge is an ability to explain individual differences in performance. In other words, individuals who learn successfully from experience will be more likely to be excellent at their work.

Furthermore, tacit knowledge as a component of practical intelligence should explain performance (Sternberg et al, 1990; Hedlund et al, 2002).

Tacit knowledge tests have been found to predict performance and utilise a number of criteria in a number of domains. Tacit knowledge scores are significantly associated with salary and merit-based increases (Wagner and Sternberg, 1985; Wagner, 1987), performance ratings of bank managers (Wagner and Sternberg, 1985). Research conducted by auditors on tacit knowledge revealed that senior staff had higher levels of managerial tacit knowledge than the top staff, and the managers with higher levels of tacit knowledge received higher performance evaluations (Tan and Libby, 1997).

In measuring the predictive validity of tacit knowledge test and conventional ability tests, Wagner and Sternberg (1990) found that tacit knowledge scores of business executives explained 32% of the variance in performance on managerial simulation beyond scores on traditional IQ test. In the case of military leaders, tacit knowledge scores accounted for small (4 to 6%) significance variance in leadership effectiveness beyond scores on tests of verbal intelligence. These studies provide evidence that tacit knowledge caters for variance in performance that is not accounted for by traditional tests of abstract, academic intelligence. Similarly, a study conducted by Colonia-Willner (1998) found that tacit knowledge of bank managers significantly predicted an index of managerial skills, whereas psychometric and verbal reasoning did not.

The study conducted by Sternberg and Wagner (1985) provides three samples of evidence regarding tacit knowledge and real world pursuits. Firstly, they stated that there is a difference between experts and novices in the levels of tacit knowledge

acquired for managing self and others and the careers of individuals with diverse experience and formal training pursued in the real world.

Secondly, they also found that there are differences in the levels of tacit knowledge acquired through professional and managerial career pursuits. There is a high indication of tacit knowledge associated with the job performance of academic psychologists. Thirdly, there is no correlation between tacit knowledge and academic intelligence in groups of undergraduate students (Sternberg et al, 1995). Fourthly, they suggest that there might be general factor underpinning tacit knowledge within the domain because tacit knowledge of self, others and task associated with each other. Fifth, researches also show that there are commonalities of tacit knowledge needed to excel in different domains of work setting. In the study conducted by Harlow (2008), it was found that there is a significant association between tacit knowledge and the innovative performance of a firm.

Sternberg and Wagner (1993) outline several major research findings on the role of tacit knowledge in job performance research. Firstly, tacit knowledge will increase when job experience increases provided that the person uses the experience to acquire and use tacit knowledge. Secondly, tacit knowledge is not significantly correlated to IQ. Thirdly, tacit knowledge was the best single predictor in performance simulations. Tacit knowledge moderately predicts job performance as such salary, performance appraisal ratings and number of publication in the research. Other finding show that tacit knowledge also predicts academic performance and it is required to do well in any setting, depending on the stage and level of institution.

3.3.9 Explicability of Tacit Knowledge

There are major disputes between scholars concerning the explicability of tacit knowledge. One perspective is that tacit knowledge cannot be articulated to prevent tacit resources from being lost and that the sensory abilities of individuals will remain in non articulated (Gourlay, 2002). The ability to explicate tacit knowledge is dependent on type. According to Janik (1988) the explicability of tacit knowledge depends on whether or not it can be expressed. While Nonaka and Takechi (1995) and Wagner and Sternberg (1985) share a similar view that tacit knowledge is hard to articulate. Despite the views of sceptics, tacit knowledge actually can be measured. This claim is supported by the work of Sternberg and colleagues (Wagner and Sternberg, 1985; Wagner, 1987; Sternberg et al, 1993), which brings new insights to the study of tacit knowledge by developing an instrument to measure tacit knowledge in multiple professions.

3.3.10 Tacit Knowledge, Profession and Expertise

Tacit knowledge has been investigated in various professions. For example, research conducted in nursing (Benner and Tanner, 1987; Eraut, 1994; Herbig et al, 2001), education (Almeida, 1994; Neston-Baker and Hoy, 2001), medicine (Patel et al, 1999), law and accounting (Tan and Libby, 1997). Moreover studies conducted on expertise such as Bereiter and Scardamalis (1992) and Leithwood et al (1995) contribute valuable insights, particularly concerning tacit knowledge and the professions. Hedlund et al (2003) found that among military leaders, scores from tacit knowledge were associated with leadership behaviour. In other words, the results show that tacit knowledge is capable of explaining individual differences in leadership effectiveness. They suggest that leadership development initiatives should be considered in facilitating tacit knowledge efforts.

The understanding of tacit knowledge in the professions became more systematic through the efforts of Sternberg and his colleagues who offered a framework and methodological basis for conducting tacit knowledge studies (Wagner and Sternberg, 1985; Wagner and Sternberg, 1986; Wagner and Sternberg, 1987; Sternberg and Wagner, 1993; Sternberg et al, 1993; Sternberg et al, 2000; Sternberg and Grigorenko, 2001). Their studies led to the development of an instrument designed to further the understanding of tacit knowledge in multiple professions.

3.3.11 Measurement of Tacit Knowledge

There are several approaches that can be applied to measuring tacit knowledge at work: motivational, critical incidents, simulation and assessment centre (Wagner and Sternberg, 1985). In their study of practical intelligence and tacit knowledge, Wagner and Sternberg (1985) were influenced by these approaches and they added the expert-novice differences, an element adopted from cognitive psychology studies.

The approach of Wagner and Sternberg uses aspects of the motivational approach by adding a motivation element. Individuals should motivate themselves to achieve goals and maximise productivity (Wagner and Sternberg, 1986). They differ in terms of how they determine 'critical incident' because subjects were asked to list typical work-related situations; Wagner and his colleagues then identified the 'critical incident' factor through item-discrimination procedures. In the context of simulation approaches, TKIM represents everyday tasks and then relies on a test using paper and pencil rather than administering the actual simulation (Wagner and Sternberg, 1986).

As a result their work utilises multiple approaches and this makes it more reliable because it considers different methods of measuring tacit knowledge. Consequently, the

present study will select managerial tacit knowledge (Wagner and Sternberg, 1985) as one of the constructs to be examined. Following the approach of Wagner and Sternberg the Tacit Knowledge Inventory for Managers (TKIM) will be administered. TKIM has been repeatedly tested in measuring managerial tacit knowledge in multiple professional domains (for example, Benner and Tanner, 1987; Eraut, 1994; Herbig et al, 2001; Hedlund et al, 2002).

Wagner and Sternberg (1985) constructed TKIM in order to measure managerial tacit knowledge. They created work-related simulation in a series of 12 items in the test and the participants were directed to rank the appropriate solutions to that simulation. The instrument was developed across 8 major studies (Wagner and Sternberg, 1990). These studies involve academic psychology, managers in business management, bank managers (Wagner and Sternberg, 1985), school performance managers (Sternberg et al, 1990), sales managers (Wagner et al, 1992; Wagner et al, 1999), medical managers (Patel et al, 1999), legal managers (Marchant and Robinson, 1999) and teaching managers (Torff, 1999). There have been numerous subsequent studies such as on military leadership (Horvath et al, 1999; Hedlund et al, 2002, 2003), audit managers (Tan and Libby, 1997), nursing managers (Herbig et al, 2001) management (Argyris, 1999; Hatsopoulos and Hatsopoulos, 1999), and public sector managers (Mahmud, 2006).

In the process of developing the work-related simulation for the measurement, Wagner and Sternberg (1986) interviewed the most successful and highly experienced individuals in the work setting. They asked these individuals to describe an incident that they considered the most typical work related situation and their responses to it.

They then conducted an item discrimination to identify the key responses. The simulation below relates to ‘managing oneself’.

‘You are a deputy director of a state economic development agency that is involved in promoting tourism for your state. You have been with this agency since the beginning of your career, having spent thirteen years in a managerial role in human resources and two years in your present position. Your agency has been losing market share of the tourism industry to other states steadily over the past five years. Your agency’s strength in the past has been in introducing new and innovative programmes ahead of other states, but now it seems to be three steps behind other leading states in a rapidly changing market. You believe that your lack of knowledge about the latest development in the industry limits your effectiveness. Your schedule is very busy, but you think it is important to catch up on, and keep up with, innovation that affects the industry. Rate the quality of the following strategies for becoming more knowledgeable about new products and technology on a 1- to 7- point scale

- (a) Ask for a leave of absence to pursue an advanced specialized degree.*
- (b) Order a news clipping service (news clipping services provide news from a large number of sources on a given topic).....*
- (j) Ask for weekly presentations for you and your staff on technical issues by staff in the Research and Development and Operations divisions’*

An example of the simulation for ‘managing tasks’ is as follows:

‘You have been asked to give a talk to managers in the department on tips for good report writing. Rate the quality of the following pieces of advice about report writing that you are considering including in your talk on a 1- to 7-point scale

- (a) Write reports so that the main points will be understood by a reader who only has time to skim the report*
- (b) Explain, in the first few paragraphs, how the report was organized.....*
- (j) Avoid using the first person (e.g., write "it is recommended" rather than "I recommend")’*

The simulation below relates to ‘managing others’.

‘An employee who reports to one of your subordinates has asked to talk with you about waste, poor management practices, and possible violations of both departmental policy and the law on the part of your subordinate. You have been in your present position only a year, but in that time you have had no indication of trouble about the subordinate in question. Neither you nor your department has an "open door" policy, so it is expected that employees should take their concerns to their immediate supervisors before bringing a matter to the attention of anyone else. The employee who wishes to meet with you has not discussed this matter with her supervisor because of its delicate nature. Rate the quality of the following things you are considering doing in this situation on a 1- to 7- point scale.

- (a) Refuse to meet with the employee unless the individual first discusses the matter with your subordinate.*
- (b) Meet with the employee but only with your subordinate present.....*
- (j) Turn the matter over to an assistant*

In order to make available a measure of baseline performance TKIM samples have been given to managers, executives and M.B.A students as well as to individuals with no managerial experience. The instrument is distributed to individuals in various organisations in which performance measures are available. TKIM was selected because extensive results from previous studies (e.g., Wagner and Sternberg, 1986; Busch et al, 2001) indicate that tacit knowledge, as measured by this test, is independent of tests of academic intelligence (e.g. correlations between total deviation scores on TKIM and subtests on the Armed Services Vocational Aptitude Battery [AS'VAB]) conducted with 631 military recruits support the divergent validity of the TKIM (Colonia-Wilner, 1998)

3.3.12 Tacit Knowledge as a Competitive Advantage

Tacit knowledge is difficult to imitate, communicate and transfer (Nelson and Winter, 1982; Badaracco, 1991; Sobol and Lei, 1994). Therefore, it becomes the asset that underlies sustainable competitive advantage. This is because tacit knowledge can

become the asset that enables an organisation to remain superior to its competitors: it is a '*differential ability*' that is diverse across organisations, exclusive, incorrectly immobile and imperfectly imitable (Conner, 1994). However, this argument has remained principally theoretical. There is no experimental confirmation to sustain the theory.

According to Baumard (1999) in KM the organisation normally neglects tacit knowledge. As a result of recognising that tacit knowledge is the source of competitive advantage, the organisation should retain the tacit knowledge of its employees (Lubit, 2001). Knowledge in the organisation must be readily transferred within the organisation in order for the organisation to be competitive. Knowledge that cannot be spread will remain the property of individuals and this will restrict the benefit or value gained by the organisation. Conversely, knowledge that is spread inter-organisation is regarded as best practice and is not the source of competitive advantage. Therefore, the underlying core competency of the firm (i.e. tacit knowledge) is the key to competitive advantage and requires transmitting action within the organisation (Lubit, 2001). Vitalising the cumulative experience embedded in individual or tacit knowledge will make it a source of competitive advantage.

3.4 Knowledge Transfer

Knowledge management is the management of knowledge in the organisation that involves creating, organising, transferring and sharing knowledge throughout the organisation (Wiig, 1993; Davenport and Prusak, 2000; Lee and Kwok, 2000; Liebowitz, 2001, Dayasindhu, 2002; Nemati et al, 2002; Wickramasinghe and Mills, 2002). The aim is to achieve the objectives of an organisation by means of a systematic process of managing and utilising knowledge within an organisation.

3.4.1 Definition

Earlier research conducted by Mehrabian (1968) stated that knowledge transfer is face-to-face communication between two persons. It was found that body language and expression contribute 55 percent (55%) in face-to-face communication, while only 38 percent (38 %) is communicated through tone and the smallest contribution is verbal at 7 percent (7%). Davenport and Prusak (1998) and Shannon and Weaver (1998) believe that the success of knowledge transfer depends on the interaction from source and the absorption of that knowledge by the recipient.

Knowledge transfer is seen as a process in which an organisation recreates and maintains a complex, causally ambiguous set of routines in a new setting (Von Hippel, 1994; Szulanski, 1996; Szulanski, 2000). The word 'transfer' is used to show clearly that the movement of knowledge in the organisation is a distinctive process, because it relies on the attributes of the people involved. Szulanski (2000) emphasises that word 'transfer' is used instead of 'diffusion' to show that the movement of knowledge in the organisation is a distinct experience rather than a gradual process of transmission. This is due to its dependence on the characteristics of people involved. For purposes of this study, knowledge transfer will refer to the transmission of knowledge from individual to individual.

3.4.2 Knowledge Transfer Stickiness

The transfer of knowledge involves a '*stickiness*' factor (Szulanski, 1996; Szulanski and Jensen, 2004). The word '*sticky*' has been used in various approaches to connote immobility, inertness and inimitability (Szulanski, 2003). Sticky has been used as a synonym for inert (Porter, 1994) or difficult to imitate (Foss et al, 1995). Von Hippel

(1994) defined stickiness as the incremental cost of transferring a given unit of information in a form practicable by the receiver. By implication, sticky information is hard to transfer.

Stickiness can be literally understood as something that is hard to transfer: ‘internal stickiness connotes the difficulty of transferring knowledge within the organisation’ (Szulanski, 1996, pg: 29). Therefore, the knowledge transfer process involves a stickiness factor (Szulanski, 1996; Szulanski and Jensen, 2004). Drawing on prior research, Szulanski (1996) identified the three most important knowledge transfer barriers as lack of absorptive capacity of the recipient, causal ambiguity of knowledge transferred and an arduous relationship between the source and the recipient.

This model of stickiness was also tested in a healthcare context and it was found that apart from other factors, sticky knowledge includes causal ambiguity, recipient absorptive capacity and arduous relationship (Elwyn et al, 2007). Moreover, Li and Hsieh (2009) provide evidence that higher levels of knowledge transfer stickiness can result in lower levels of knowledge transfer implementation, internalisation and innovation.

3.4.2.1 Causal Ambiguity

The difficulty in transferring knowledge arises from the causal ambiguity of the knowledge itself (Szulanski, 1996; Szulanski and Jensen, 2004). Causal ambiguity increases stickiness; the process whereby this occurs is explained by Jensen and Meckling:

“Uncertainty about what specific piece of idiosyncratic knowledge is valuable enlarges transfer costs in a subtle way. After the fact, it is often obvious that a specific piece of knowledge critical to a decision could have been transferred at low cost (for example, particular quirks of an organisation, person, legal

rule, or custom). But transferring this specific piece of knowledge in advance requires knowing in advance that it will be critical” (1992: pp. 255).

Essentially, more than absence of know-how, causal ambiguity signals the deficiency of knowledge as to why something is conducted (know-why), including why the given action results in a given outcome. If outcomes cannot be accurately imitated elsewhere because of diverse environmental conditions, and if there are causal ambiguities about the inner workings of productive knowledge, then problems arise in the new environment have to be solved *in situ* through costly trial and error (Szulanski, 2003). In explaining highly technologically sophisticated process knowledge is transferred, Paul Adler (1990: pp.951) noted that *‘its reach into poorly mastered process techniques is such that any substantial divergence of process design risks multiplying operational problems beyond manageable levels’*. Consequently, higher causal ambiguity was likely to increase transfer stickiness.

Knowledge that is likely to appear ambiguous, uncertain and imperfectly understood is inimitable. An example here would be ambiguity about the factors of production and how they interact during the process of production. As a result, they are unable to replicate the results with any precision in the new setting. Other examples of stickiness occur when the knowledge is highly tacit human skills that other people are not able to define so it is imperfectly understood (Szulanski, 1996; Szulanski and Jensen, 2004). In agreement with these views, Murray and Hanlon (2010) regarded tacit knowledge as highly ambiguous; hence, it is hard to transfer.

Context-specific tacit knowledge might be unusual language used in the unit therefore the meaning is hard to interpret (Inkpen, 2008). Additionally, knowledge transfers rely heavily on how easily knowledge can be transmitted, interpreted and absorbed (Hamel

et al, 1989). In this context, Hedlund and Zander (1993) emphasise consideration of the subtle aspect of knowledge, particularly its ambiguity, as this can conflict with clear communication. Transfer of best practices in the organisation has to be concrete and unambiguous (Szulanski, 1996).

3.4.2.2 Absorptive Capacity

The ability to use new knowledge is largely a function of the prior level of related knowledge (Dewar and Dutton, 1986; Cohen and Levinthal, 1989, 1990). In essence, this knowledge embraces essential skills, a shared language, and prior experience that are applicable and recent information on relevant knowledge domains (Walton, 1975; Cohen and Levinthal, 1990; Galbraith, 1990). Critical prior knowledge comprises an awareness of the locus of usefulness complementary expertise within and outside the organisation. For example, the awareness related to knowledge of who knows what, who can help with what problem, or who can exploit new information (Cohen and Levinthal, 1990). The stock of prior-related knowledge determines the ‘*absorptive capacity*’ (Cohen and Levinthal, 1990: p.128) of a recipient of knowledge. A recipient that lacks absorptive capacity will be less likely to distinguish the value of new knowledge, less likely to re-create that knowledge and less likely to implement it successfully.

Absorptive capacity or the ability to fully understand knowledge is the major aspect concerning recipients of knowledge. Stickiness in knowledge transfer will appear when the recipient is lacking absorptive capacity (Cohen and Levinthal, 1990). They add that effective absorptive capacities rely on the intensity of effort in acquisition. For example, knowledge stored as memory requires more effort to process and initiate. Effort is needed to assimilate newly acquired knowledge with existing knowledge, so the retrieval will be better (Cohen and Levinthal, 1990).

As a consequence of stickiness, they are unable to exploit outside knowledge in valuing, assimilating and applying new knowledge efficiently (Szulanski, 1996; Szulanski and Jensen, 2004). The absorptive capacity of the recipient is strongly dependent on a good relationship, trust and openness between recipient and sender (Von Krogh, 1998; Lehner and Lehmann, 2004). Other studies suggest that absorptive capacity is positively related to knowledge transfer (Galbraith 1990; Hamel 1991).

3.4.2.3 Arduous relationship

Transfer of knowledge particularly the transfer of tacit skills involves exchanges between individuals (Nonaka, 1994). Ease of communication (Arrow, 1974) requires frequent and numerous interactions between the parties (Nonaka 1994) or closeness in the whole relationship (Marsden, 1990). An arduous relationship might add to the complexity of the transfer (Szulanski, 1996; Szulanski, 2000; Szulanski and Jensen, 2004). A range of studies have identified the association between a source and a recipient the central factor affecting the transfer of knowledge (Argote, 1999).

A successful communication relies on the value of the relationship. An arduous relationship is defined as an emotionally laborious and distant relationship between a source and a recipient (Szulanski, 1996). A transfer of knowledge is rarely a singular event, but more often it is an iterative exchange process. A potential recipient may require explanations of the nature of the knowledge being transferred to decide whether this knowledge fulfil its requirement. Similarly, once the source engages in a transfer, they may have to work to obtain closer approval of the requirement of the recipient, in an attempt to select relevant components to transfer (Szulanski, 2003). Additionally, in his previous study, Szulanski (1995: p.73) found that

“one of the strongest predictors of best practice transfer was the strength of the relationship between the source and the recipient. The potential adopter of a best practice (the recipient) has to believe that the source is credible and

knows what he or she is talking about. The source has to be generous enough to devote the counselling and communicating time the recipient needs in order to really understand, adapt, and implement practice”.

This type of relationship affects the ability of the source to transfer the required knowledge and it affects the ability of the recipient to learn and apply the knowledge. Hence it is possible that an arduous affiliation between a source and a recipient will have an unfavourable affect on knowledge transfer (Baum and Ingram, 1998).

3.4.3 Factors Affecting Knowledge Transfer

In the context of expert-novice transfer, it was found that sharing expertise is limited by cognitive or mental representation (Hind and Pfeffer, 2002). As expertise increases, mental representation becomes more abstract and simplified. As experts begin to automate aspects of the assignment, details of the assignment become less prominent and expert begin to view the assignment in an oversimplified way. They found that experts' list of assignment components contained significantly fewer specific steps than did the list of those with less expertise. For example in Adelson's (1984) study, expert programmers used conceptually-based (abstract) representation in explaining programming task, compare to their novice colleagues who used syntactically-based (concrete) representation.

Experts tend to simplify their mental representations due to their expertise that allows them to process information more rapidly, view the task holistically and avoid details (Langer and Imber, 1979). This attempt at mental representation will interfere in knowledge transfer. Moreover, when the expert was required to show and explain detailed steps, this might affect his/her performance in the job, due to concentration on the details (Wilson and Schooler, 1991). Moreover, Murray and Hanlon (2010)

determined in their interviews that interviewees stated that tacit knowledge was difficult to articulate; for example one of them explained that ‘It’s *terrible not being able to explain but you just can’t*’. From their study, they identified that the transfer of tacit knowledge as ‘*time-consuming, frustrating and often just not possible*’.

In the study on knowledge communication barriers it was found that the expert individual tends to favour their own opinion instead of practising knowledge transfer (Yaniv and Kleinbeger, 2000). Other research identifies that the knowledge transfer barrier among experts might face a syndrome known as *Not-Invented Here (NIH)* when knowledge from others is sometimes rejected because it is originated elsewhere (Katz and Allen, 1982). On the contrary, Menon and Pfeffer (2003) identify that the expert prefers the outsider’s opinion to internal knowledge. They argue that the manager values outside knowledge because it has higher status, it is scarcer (difficult access) and it is less scrutinised for errors than internal knowledge.

In relation to this oversimplification, experts tend to have incomplete and inaccurate information of their own learning experience; therefore, they underestimate the novice performance (Hind, 1999). This situation will affect their transfer process because normally expert adjusts downward their explanation to the level of those less experience by recalling their own experience. These limitations indicate that although the experts are willing to share their knowledge, they might face a challenge, particularly in accommodating the requirements of novices.

In transferring tacit knowledge, experts have difficulties to transfer their knowledge as a whole and they tend to impart only part of the knowledge due to uneasiness in trying to describe tacit knowledge. In a study on pizza parlours, Epple et al (1996) notes that

employees acquired both explicit and tacit knowledge, and were able to share with the others a system for optimising pizza preparation based on cooking times of different pizzas. Conversely, they were unable to share how to hand-toss a pizza due to the tacit nature of the knowledge.

Another issue in articulating tacit knowledge is that it is contextual. The expert is able to transfer the steps taken in performing a particular task in their own environment; however, these might be not appropriate in a different environment, an example of 'not invented here' (Lave and Wenger, 1993; Brown and Duguid, 1998; Hansen, 1999). Leonard and Sensiper (1998) suggest that sharing expertise can be difficult, particularly when it based largely on tacit knowledge. For example, in designing computer interfaces, some experienced user interface specialists know why the button should be placed in a certain configuration but are unable to explain why. In the organisation that concern on hard data, transferring tacit knowledge via opinions and intuition convey ambiguity and uncertainty, because transfer of tacit knowledge requires trust.

Apart from cognitive issues, motivation also has an effect on knowledge transfer. In the organisation, individuals are obviously competing with each other, particularly on promotion, raises and award. This competition will discourage the knowledge-sharing and transfer (Hind and Pfeffer, 2002). For example in O'Dell and Grayson (1998: p. 18) study, they stated that one manager said, "*When it comes to bonus time, we play a zero-sum game around here. To get my share of the bonus pool, I have to take it away from someone else. Why should I share my best ideas?*" The individual also might face an intergroup conflict which reduces cooperation within the organisation (Kramer, 1991) and impairs the sharing of information and transfer of knowledge across groups (Argote, 1999).

Reciprocity in the knowledge exchange should also be considered. On one hand, an individual transfers their knowledge to the benefits of the recipient; on the other hand the recipient will reciprocate with respect that brings status to the source. This exchange will balance the interpersonal relationship. However, in an imbalanced exchange, where the source does not obtain anything, they might be reluctant to engage in the exchange. The expert also sometimes regards knowledge for status and property, thus their willingness to share was affected (Hind and Pfeffer, 2002).

Another factor influencing knowledge transfer is incentive. Organisations should provide adequate incentives for individuals who share their knowledge, not to those who develop and maintain knowledge monopolies (Davenport and Prusak, 1998). This is in line with motivation theories which suggest that people can be expected to share their expertise more when they are offered incentives for doing so (Huber, 1991; Pan and Scarborough, 1998).

This was also evidenced in the interview reported by Hinds and her colleagues (Hinds, et al, 2001). The director of a consumer products organisation said:

“We are so focused on results and we are measured on results....and nowhere, anywhere, does it say you should share knowledge, help other people with the knowledge you have and you will be rewarded for it..I won’t make more money by sharing more and I won’t get promoted by sharing more”.

On the contrary, when the incentive is provided, sharing occurs. In one division of the same consumer products organisation, an award was offered for information sharing, and one of the directors stated that this division is ‘doing a great job’ because they were vigorously talking to others in the company and sharing knowledge across divisional boundaries (Hinds et al, 2001). This practice was implemented by the Price Water House Company by including knowledge-sharing in its performance appraisal system.

The consultants in this company are required to produce ‘evidence’ of actual sharing as such training, development of methodology, publishing and presenting on topics, coaching and mentoring. This practice shows a good encouragement in knowledge-sharing practices in the Price Water House Company. Therefore, the culture of the organisation that encourages knowledge sharing and knowledge transfer is important (O’Dell and Grayson, 1998).

Lack of a set of common perspectives and terms was also found to influence knowledge transfer in the organisation (O’Dell and Grayson, 1998). In describing this finding, they point out that different departments use different words to depict, catalogue, and document their processes and practices. Such departmental dialect hinders cross-functional communication and no coherent vocabulary to illustrate processes and performance.

The willingness to share knowledge might be affected due to non-existence of ‘book of reference’. In the organisation that emphasises ‘by-the-book’ practices, or documented knowledge, the aspect of tacit knowledge transfer would probably be neglected (O’Dell and Grayson, 1998). This tendency exhibits heavy reliance on transmitting explicit rather than tacit knowledge.

3.4.4 Knowledge Transfer and Mechanisms

Knowledge transfer mechanisms very much depend on the type of knowledge. Basically, explicit knowledge can be codified, collected and documented as best practices (Dixon, 2000). Therefore, documentation can be considered as a transfer mechanism. The second mechanism of knowledge transfer is technology. This mechanism is more appropriate for explicit knowledge. This is supported by research conducted by O’Dell

and Grayson (1998), who suggest that Lotus notes, e-mails and databases are efficient ways to distribute explicit knowledge. This opinion is consistent with Davenport and Prusak (1998), who point out that the most effective way of knowledge transfer and practices between areas is the actual transfer of people from one place to another. They state that through physical transfer, all types of knowledge including tacit and implicit and will move together. Nevertheless Dixon (2000) stated that this mechanism has limitation on the receiver. Above all transfer mechanisms, face-to-face mechanism is regarded as the most efficient approach in transmitting tacit knowledge.

Regarding tacit knowledge as the key to developing sustainable competitive advantage, Lubit (2001) suggest that it is crucial to transfer tacit knowledge in the organisation. He suggests three transfer mechanism, which are working with experts and coaches, network and workgroups, and recording tacit knowledge.

According to Lubit, through working with experts and coaches, the recipients of knowledge have an opportunity to observe closely the way experts (i.e sources) act in the real world by solving problem, decision making, handling situation and others. Hence, this chance will offer the recipient involvement in the process. As a result, they can learn faster compared to the trial and error process. He adds that people slowly build know-how and decision-tree problem solving by means of experience under the supervision of the 'source'. This supervision creates learning opportunities through reflecting the inaccuracies and steps necessities in making the corrections (Lubit 2001).

Throughout the working activities, thinking out loud by the experts, allow the recipient to evaluate and judge the context. For Lubit, thinking out loud involves sharing insight and noting the most important factors. An example of thinking out loud activities is a

discussion on the diversity of approach in handling situation. Normally this learning process will be enhanced through the trial by the protégé which will be commented on by the mentor. Lubit believes that coaching and mentoring will be the most efficient ways of knowledge spread when managers know exactly which skills are required to be successful. As a result, they can assist the subordinates to enhance this particular knowledge (Lubit, 2001).

Both of these transfer mechanisms, experts and coaches as well as thinking out loud by experts, are very similar to the study context because experts and coaches are represented by the supervisor while the subordinate is the recipient. When the expert supervisor is thinking out loud through discussion, then the subordinate will also have the opportunity to learn.

The second transfer mechanism proposed by Lubit (2001) is network and workgroup. Naturally, people in the organisation will form a network to share similar interests or create a community of practice to share their experiences. They will periodically assemble to discuss their problems, brainstorm and share knowledge and follow this by storing the knowledge in the database for future retrieval. Working in group provides an opportunity to share tacit knowledge. By means of cooperation at work, people tend to talk about their experience more through socialisation. Therefore much more tacit knowledge will be transferred.

The third mechanism is recording tacit knowledge. Learning about the history of the company's critical events such as change initiatives, innovation and product development assist the employee to address mistakes and understand the reason behind decisions made. By documenting the history, it will become a source of reference for

the newcomers in the company (Lubit, 2001). Inkpen (2008) in his research in NUMMI case indicates that through systematic knowledge transfer, knowledge stickiness and ambiguity is flattened. For example, the establishment of the Technical Liaison Office (TLO) in General Motors facilitated the transition of Toyota Production System (TPS) tacit knowledge into easily movable explicit knowledge.

Darr et al (1995) with reference to Tushman's (1977) work stated that social networks that include regular communication and personal acquaintance are regarded as knowledge transfer mechanism. They add that a high level of transfer mechanism is related to high level of technology transfer. Regular communication is defined as exchanges of information happening at standard and repeated intervals via means of progress report and phone calls.

In an attempt to support this idea, they bring evidence from the work of Ghoshal and Bartlett (1988), which indicates that a high level of communication facilitates transmission of innovation. Furthermore regular communication also found to ease technology transfer in textile machinery sector (Rothwell, 1978). Consistent with previous findings, in their research, Darr et al (1995) found that knowledge transfer through regular communication commonly occur in stores own by the same franchisees because they communicate frequently.

Darr et al (1995) support their idea on personal acquaintances as a transfer mechanism by bringing evidence from Huberman (1983) who found that personal acquaintance had been utilised as a transfer mechanism in transmitting organisational policies between universities and high school district. Additionally they stated evidence from Martilla (1971) work which show that the interpersonal relationship is relevant in different

organisation, particularly in decision making. Furthermore, they stated that Liebenz (1982) proved that personal acquaintance facilitate in technology transfer between United States and Eastern European Companies. Similar to prior research, Darr et al (1995) show that personal acquaintance is a transfer mechanism used to transfer learning in the same stores own by the same franchisee.

Congruent with findings in Dutton and Starbuck's (1978) research, Darr et al (1995) indicate that face to face meeting was superior between stores owned by the same franchisee compare to stores owned by different franchisees. In the study conducted by Inkpen (2008), it was found that there are six success transfer mechanisms; transfer of people, training programmes, visits, coordinating office, leadership commitment and creation of network.

In both cases, SIP and NUMMI transfer their managers through alliances to act as teachers. They also make an attempt to send their employees to specific training and NUMMI customise the training as well as appointing the trainees to become mentor. Beside they arrange an official visit to learn from visiting others branches and initiate coordinating office to manage and organise the transfer process. The process of transfer requires the support and leadership commitment to ensure it success. The manager that has been through the transfer process will be position in different position in the company and their experience will be shared and as a consequence their experiences create a network.

People at work are likely to talk explicitly about their knowledge in several facilitating circumstances (Eraut, 2000). The person required a mediating object for example picture, video, diagrammatic representation as such graphs and chart in order to transmit

their knowledge easily at work. Moreover, climate and the culture of organisation that encourage knowledge transfer also can assist in the transmitting process. Furthermore, training and mentoring relationship will facilitate the transfer of knowledge. Other than that, he suggests that informal relationships and a crisis of review of change offer an opportunity to exchange opinion and acquired knowledge.

Knowledge in the organisation is transmitted through variety of mechanisms (Argote et al, 2000). They point out the mechanisms found in prior research such as personnel movement (Almeida and Kogut, 1999; Gruenfeld et al, 2000); training (Moreland and Myaskovsky, 2000; Thompson et al, 2000); communication (Levine et al, 2000; Rulke et al, 2000; Stasser et al, 2000); observation (Nonaka, 1991) and technology transfer (Galbraith, 1990). Knowledge also can be transmitted through patents, scientific publications, and presentations (Appleyard, 1996); interactions with suppliers and customers (von Hippel, 1988); and alliances and other forms of inter-organisational relationships (Darr et al, 1995; Powell et al, 1996; Larsson et al, 1998; Baum and Ingram, 1998; McEvily and Zaheer, 1999).

3.4.5 Knowledge Transfer and Competitive Advantages

Argote et al (2000) argue that knowledge transfer has become increasingly significant in the organisation. They emphasise that firms today are competing with each other, therefore they strive to benefit from differences in expertise. For example, effective management requires knowledge to be transferred from one team to another team.

They further stress that organisations that are able to transfer knowledge effectively are more productive and successful at surviving the competition. Knowledge transfer occurs in everyday activities, such as employees asking their peers to help with handling

customer problems or during the process of employees transmitting their experience are examples of a knowledge transfer process. When a sales representative asks his boss about the needs of a particular customer, both of them are exchanging knowledge (Davenport and Prusak, 1998).

Since knowledge transfer is essential of competitive advantage, leaders as the knowledge management drivers for effective KM (Bryant, 2003) have to play their major role in leading the organisation in knowledge transfer activities (Davenport and Prusak, 1998; Bryant, 2003; Dubrin, 2004; Cenusu, 2005; Morales et al, 2008). As discussed earlier, leaders need to influence employees towards the KM goals of the organisation (Politis, 2001). Consequently, without these initiatives, and without the support of leaders it is difficult to begin knowledge transfer activities in the organisation and to exploit leadership influences on knowledge transfer. A greater understanding of the role and impact of leaders will hopefully bring new insights to bear on the existing body of knowledge as well as insights into the practical implications. Therefore the following discussion will present a detailed review of the literature on leader member exchange (LMX) theory.

3.5 Leadership

3.5.1 Definition

Basically the process of leadership involves influence, occurs in a group context and involves goal attainment. With reference to these components, leadership is defined as *'A process whereby an individual influences a group of individuals to achieve a common goal'* (Northouse, 2007, p: 3).

3.5.2 Traditional Leadership Theory

The evolution of leadership theories is a very useful resource for understanding the leadership domain. Several categories of leadership theories have been identified (Stogdill, 1974). The first trend focused on the attributes of great leaders in the belief that leaders are born and not bred (Bernard, 1926). The drawback of this theory is that it omits the situational and contextual factors that play a major role in leadership effectiveness (Horner, 1997).

The second trend of thought looked at the behaviour of leaders (Halpin and Winer, 1957; Hemphill and Coons, 1957). The Michigan and Ohio State leadership studies used this approach and determined two types of leadership behaviour: consideration and initiation of structure (Halpin and Winer, 1957; Hemphill and Coons, 1957). Consideration behaviours were essentially behaviours that involved building trust, respect and liking between leaders and followers. Initiation of structure is basically task behaviours including organising work, arranging the work environment, defining role responsibilities, and arranging work activities (Northouse, 2007).

The third trend is the Contingency Theory: a theory focused on leadership traits, behaviour and situation (Fiedler, 1967). Contingency Theory assumes that the effects of variables are contingent on other variables; in other words leadership might be different in the certain situations (Saal and Knight, 1988). Another theory that focuses on followers is called Path Goal Theory (House and Mitchell, 1974) and this also comes under the contingency approach. Path Goal Theory suggests that the role of leaders is to assist followers in achieving their goals.

Another leadership approach that applied contingency theory was initiated in the 1960's (Dansereau, 1995). This began with observations of the leadership relationship. These observations indicated that superiors were very influenced by their own preferences when viewing their subordinates (Graen et al, 1972; Dansereau et al, 1973). One observation of the study was the act of a superior who occasionally sacked subordinates who were not consistent with his preferences. In order to find empirical evidence for this observation, Dansereau and his colleagues administered the Leader Behaviour Description Questionnaire (Stogdill and Coons, 1957 cited in Dansereau, 1995).

The results showed variance among individuals working under the same superior (Dansereau, 1995). In contrast to traditional leadership theories, the authors concluded that leaders discriminate against people (Graen et al, 1972; Dansereau et al, 1973). The LMX theory confronts the 'average leadership styles' (ALS) model (Schriesheim et al, 2001) with the claim that there is differentiation in the relationship between leaders and each of his or her subordinates (Dansereau et al, 1975; Graen and Cashman 1975; Graen 1976; Graen et al, 1982b; Graen and Scandura, 1987; Graen and Uhl-Bien 1991; Graen and Wakabayashi, 1994). LMX Theory emerged from these initial findings.

LMX theory focuses on dyadic exchange and differentiation in relationships. By examining these differences LMX can determine high quality relationships, normally termed as 'in-group' exchanges, and low quality relationships, also known as 'out-group' exchanges. This identification was empirically verified as a factor that affects performance (Mardanov et al, 2007; Burton et al, 2008; Golden and Veiga, 2008; Mayer et al, 2008).

Based on this differentiation, LMX theory is an empirically appropriate approach to the study of managerial tacit knowledge transfer. The rationale behind this linkage is that tacit knowledge transfers require socialisation, communication and a good relationship between the source and the recipient. The identification of 'in-group' and 'out-group' fulfils this requirement in that it determines what counts as a good or bad relationship between source and recipient. The underlying assumption is that the in-group relationship will show high managerial tacit knowledge transfer on the basis of close relationships, whilst the out-group will show a contradictory result.

With reference to the preceding discussion, the implication was that causal ambiguity among the recipients will be higher when there is a gap in the relationship. This is reasonable because with a distant relationship, it is difficult for the recipient to clarify ambiguity, whereas in close relationships among the in-group team ambiguity can be easily clarified.

Similarly, in the case of absorptive capacity, a close relationship including high levels of respect, trust and obligation implies an enhanced capacity to assimilate new knowledge. Individuals who respect and trust a particular individual will naturally absorb what they receive from that person. An arduous relationship will result in a negative exchange. Difficulties in the exchange will reduce levels of respect, trust and obligation and make it harder transfer knowledge. This discussion makes clear that the proposed study is the key to furthering our understanding of how relationship differentiation will affect managerial tacit knowledge transfer. This knowledge is expected to bring new insights into the existing body of knowledge.

3.5.3 Leader Member Exchange (LMX)

LMX theory first appeared during the 1960s in the work of Dansereau et al (1975), Graen and Cashman (1975) and Graen (1976). Since then it has undergone several revisions, and it continues to be of interest to researchers studying the leadership process. LMX leadership theory applies a different approach to the one found in traditional leadership theory because it refers to leadership as a process centred on the interaction between leaders and followers (Graen and Uhl-Bien, 1995; Northouse, 2007).

3.5.3.1 *Conceptual Definition of LMX*

LMX is a leadership theory that focuses on multiple domains comprising follower, leader and relationship (Graen and Uhl-Bien, 1995). This theory emphasises the dyadic relationship between leaders and followers in situations in which leaders treat different subordinates differently (Graen and Uhl-Bien, 1995; Liden et al, 2006); in other words, unique relationships. Scholars have given various definitions of LMX. For example Yammarino and Dubinsky (1990) state that LMX is latitude or supervisor attention, Deluga and Perry (1991) stated that LMX is a social exchange relationship. It seems that these perspectives centre on the relationship but they differ in terms of what other factors are involved in the relationship (Schriesheim et al, 1999).

The formation of unique relationships is due to the limited capability of leader in completing all organisational responsibilities alone, he or she must delegate some of the organisational assignments. Similarly, because the ensuing work will be a manifestation of the leader, he or she will obviously choose the subordinates that can be reliable to execute the task in a successful manner (Liden and Graen, 1980).

Thus, LMX theory is based on the underlying assumption that organisational leaders only have inadequate amounts of personal, social, and organisational resources, and, thus, must selectively segregate such resources among subordinates (Dansereau et al, 1975; Graen and Scandura, 1987; Graen and Uhl-Bien, 1995).

This allotment of resources leads to dissimilar formations of LMX quality. For example, supervisors with 10 or 15 subordinates will consequently have 10 or 15 individual LMX relationships. Moreover, because a manager or supervisor is constrained in time and resources, LMX quality will inevitably be different between each dyadic pair. Some interaction will develop into high quality working relationships characterised by mutual trust, respect, and commitment, while others will develop into low quality relationships that go little beyond the formal employment contract (Dienesch and Liden, 1986).

This study will adopt the definition put forward by Graen and Uhl-Bien (1995). This definition was developed after the authors reviewed the development of LMX theory over the past 25 years. They entirely reviewed LMX theory including its evolution, its dimensions and its construction. They finally suggested that LMX is the relationship between leader and member that involved mutual respect, reciprocal trust and obligation. Mutual respect between leaders and members refers to the capabilities each of them has to execute each role.

In addition the relationship requires the anticipation of deepening reciprocal trust between them to ensure that tasks are performed excellently. It is expected that mutual obligation will develop over time as career-oriented social exchange blossoms into a partnership. The development of LMX is also based on what characterises the working relationship as opposed to what characterises personal or friendship relationships.

Trust, respect, and mutual obligation refer specifically to the assessments individuals make of the professional capabilities and behaviours of others (Graen and Uhl-Bien, 1995).

3.5.3.2 Vertical Dyad Linkage, In-Group and Out-Group

The early stage of LMX development is called Vertical Dyad Linkage (VDL); researchers focused on the nature of the vertical linkages leaders formed with each of their followers (Dansereau, 1995). A Dyadic Relationship (Figure 4) is formed when a leader individualises working relationships with each of his or her subordinate. In the work unit context, the leader's relationship was viewed as a series of vertical dyads (Figure 5). Within an organizational work unit, subordinates become a part of the in-group or the out-group based on how well they work with the leader and how well the leader works with them.

In assessing the attributes of these vertical dyads, researchers found two basic kinds of linkages (or relationship): those that were based on expanded and negotiated role responsibilities (extra roles) were called the in-group. Relationships within the in-group are marked by mutual trust, respect, liking and reciprocal influence. In addition, membership in one group or the other is based on how subordinates involve themselves in expanding their role responsibilities with the leader (Graen, 1976). Subordinates who are interested in negotiating with the leader what they are willing to do for the group can become a part of the in-group. These negotiations involve exchanges in which subordinates do certain activities that go beyond their formal job descriptions, and the leader, in turn, does more for these subordinates. Those that were based on the formal employment contract (defined roles), were called the out-group, which is marked by formal communication based on job descriptions. In Figure 6, plus 3 is a high quality relationship, and zero is a stranger (Northouse, 2007). With reference to the preceding

discussion, a differentiation between the in-group relationship and the out-group relationship will enhance understanding of managerial tacit knowledge transfer based on the premise of knowledge exchange between the managers.

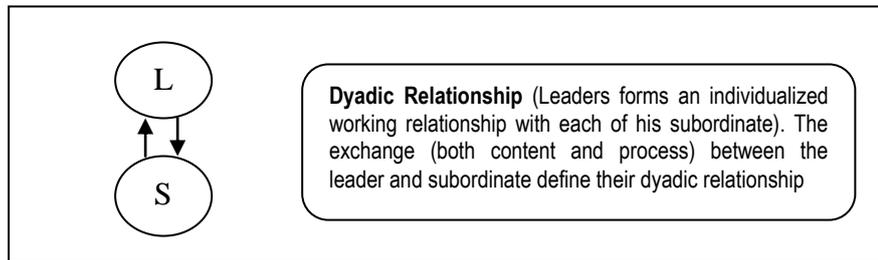


Figure 4: Dyadic Relationship
(Adapted from Northouse, 2007)

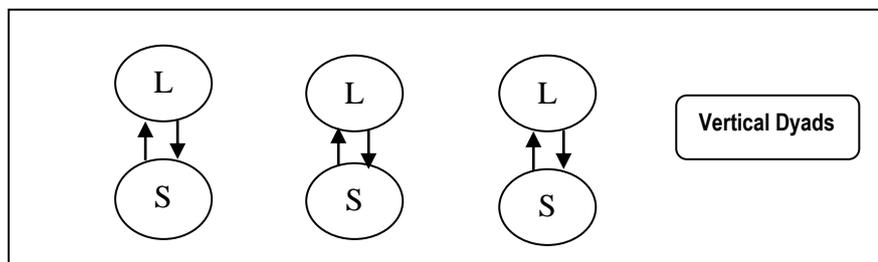


Figure 5: Vertical Dyad Relationship
(Adapted from Northouse, 2007)

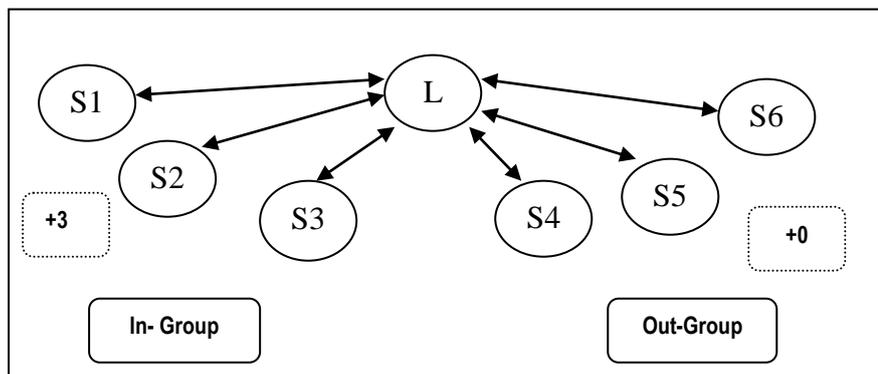


Figure 6: In-group and Out-group Relationship
(Adapted from Northouse, 2007)

3.5.3.3 LMX and Leadership Making Model

Leader member exchange is a process of developing a leadership relationship into a mature partnership, where highest and mutual benefits of association with the other

dyad member are obtained. This section examines more directly how dyadic members establish a relationship into one of high quality. Relationship quality development refers to the third and four stages of LMX theory development by Graen and Uhl-Bien (1995), where the notion of 'leadership making' was introduced.

In the leadership making model (Graen and Uhl-Bien, 1995) (Figure 7, p.94), the process begins with the relationship building phase of *stranger*. Individuals in the organisation are initially strangers who engage in inter-related roles. During this phase interactions between individual are considered to be formal features and 'cash and carry' exchanges. For example, leaders recognise the necessary requirements for members to complete their job, and the members perform as directed and execute the job description. Exchanges and interaction between members are solely contractual, where both members behave only within required limits, and do not go beyond fixed job descriptions and formal role definitions. This phase has also been called the 'role taking' phase (Graen and Scandura, 1987). This level of exchange is considered to be lower quality of LMX, where influence will be unidirectional, and from the leader, resulting in a weak relationship process. In this phase, 'mutual respect is expected to be the critical quality and is the foundation of interactions during the initial sampling phase' (Scandura et al, 1996), it is considered that strangers can respect each other, although they are unlikely to trust each other, or feel obligated to each other.

Next, the relationship will turn into the 'acquaintance' stage. Here, the social exchange is expanded and their sharing is unlimited to contractual requirements. As a result, greater information and resources concerning personal and work issues is transmitted. Nevertheless, this exchange is regarded as a testing ground and there is only a reasonable return of favours. The offer may be made by either member, although it

must be also accepted for the relationship quality to grow. However, not all offers are accepted. When an offer is accepted, interaction become less contractual and greater amounts of information and resources of both a work and personal nature are shared. The relationship builds through such exchanges as they provide access to internal information, let influence to be exercised within organisation, increased authority to make decisions, and mutual support for each other's activities (Borchgrevink and Boster, 1997). These exchanges are limited, and arise over a short phase of time, as they are used to test the rapport. The dimension of trust is added at this stage. Members in this phase are referred to as 'trusted assistants'. Trust is defined by Scandura et al (1996) as *"reliance on the other person and confidence in the appropriate predictability of their response to a request"* (Scandura et al, 1996, pp. 248) and the establishment of trust makes more predictable the responses, performance, and support of both parties. The second phase is sometimes referred to as 'role making' (Graen and Scandura, 1987). The 'acquaintance' phase is a decisive stage in determining the future of the relationship, as, according to Graen and Uhl-Bien (1995), those dyads that do not progress from here revert to the first stage. The relations at the acquaintance phase are considered to be of intermediate LMX quality.

Phase three is the basis of a mature partnership, where the relationship and the exchanges have become highly developed. Exchanges are 'in kind', rather than part of an expected and prescribed working behaviour. Reciprocation of exchange may span a much longer time frame than phase two, as mutual trust and loyalty are established. Interaction is of both a behavioural and emotional nature, and respect, trust and obligation grow gradually. An increase in these encourages subordinates to acquire more responsibility than is stipulated in a contractual agreement, and they might usually do, and their interests move beyond a focal point on the benefits to oneself, to an

interest in mutual and perhaps organisational issues. Moreover, leader is also available for support, encouragement, and access to career opportunities, in order to benefit the subordinate. An awareness of role interdependency also forms, promoting obligation. This is the third LMX dimension identified by Graen and Uhl-Bien (1995), and it is built on a history of sustained performance and support. At this stage the effect is very high and the leadership also extremely high. The predominant differentiating characteristic of a high quality LMX is the relaxation of a formal hierarchical relationship, and the development of a peer association. This stage has also been termed ‘role-routinisation’ or the ‘commitment stage’ (Graen and Uhl-Bien, 1995). The Leadership Making Model is essential to understand the relationship process between supervisor and subordinate in this particular study. This model shows the stages of relationship development from stranger to mature partnership where the former is termed an out-group relationship and later becomes an in-group relationship. The characteristics presented are helpful in distinguishing between in-group and out-group relationships in the organisation.

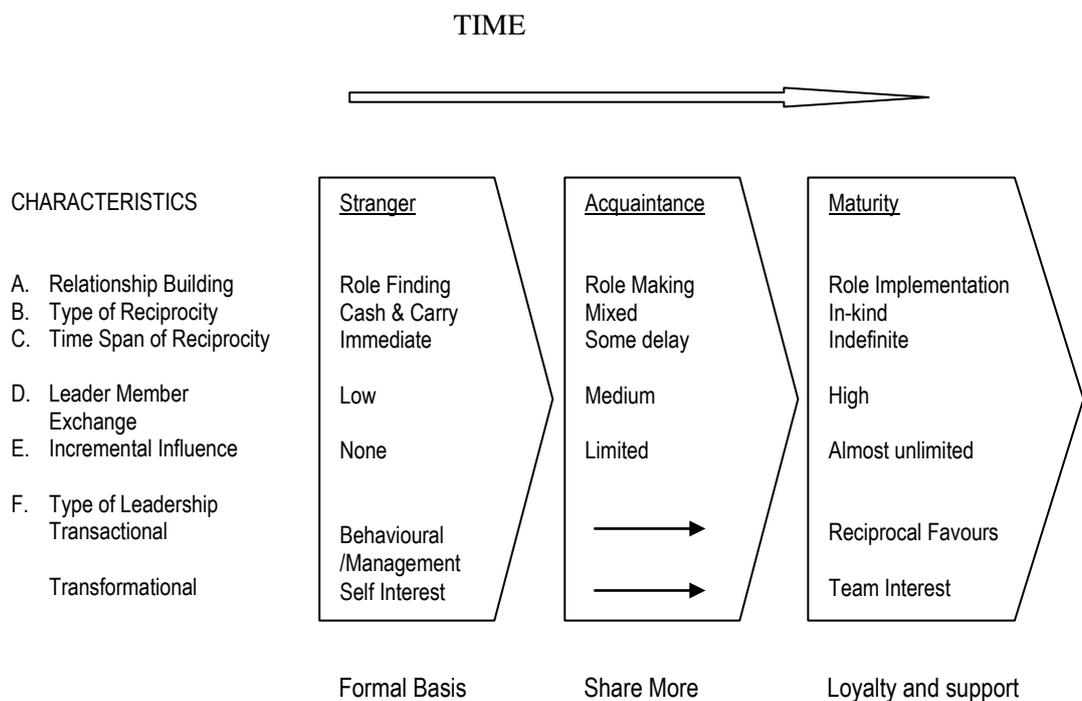


Figure 7: Life Cycle of Leadership Making
 (Adapted from Graen and Uhl Bien, 1995, p: 231).

3.5.4 LMX and the Dimension

Researchers are divided on the issue of LMX dimensions. Graen and Scandura (1987) argue that LMX is one-dimensional. They assume that leaders assess members through multiple assignments and that members conform to the demands of the task thus demonstrating that they are trustworthy. This in turn dictates the type of LMX relationship that is formed. For example, leaders will reciprocate with work-related resources such information, challenging task assignments and autonomy.

According to Dienesch and Liden (1986) leader member exchange is multi-dimensional. There are three dimensions of LMX: contribution, loyalty and affect. Contributions can be understood as a perception of the amount, direction and quality of work-oriented activity each member puts towards the mutual goals (explicit or implicit) of the dyad. Loyalty is the extent to which both leader and member publicly support each others' actions and characters. Affect can be perceived as the mutual affection between the members of the dyad based principally on interpersonal attraction instead of work or professional values. Leaders have a multidimensional role involving activities such as supervision, resource allocation and liaison (Liden and Maslyn, 1998).

Graen and Uhl-Bien (1995) support the view that LMX is multidimensional but they argue that all dimensions are highly correlated and can be made into a single measure of LMX. Their dimensions of LMX are respect, trust and obligation. This perspective seems to be an extended version of the LMX dimensions in Graen and Scandura's perspective (1987). In his later research, Graen (2008) asserts that LMX dimensions are also referred to as the big 3 involving 'respect for competence, trust in motivation and commitment to common values' (Graen, 2008, p. 5) all of which are similar. Graen's latest view is consistent with his collaborative view in 1995: LMX is multi-dimensional.

For purposes of this study the dimension suggested by Graen and Uhl-Bien (1995) will be adopted due to its extensive review in LMX theory development. Furthermore, this dimension was also tested repeatedly in various LMX research studies (Tse et al, 2006; Kacmar et al 2007; Huang et al, 2008; Hooper and Martin, 2008; Golden and Veiga, 2008).

3.5.5 LMX and Measurement

Dienesch and Liden (1986) have offered their viewpoint on LMX construction. They note that LMX has been operationalised in various approaches. They offer evidence from prior literature that LMX uses difference approaches. For example, LMX 2-item measurement has been used by Dansereau et al (1975), 4 items were utilised by Graen and Schiemann (1978); Liden and Graen (1980), 5 items (Graenet al, 1982a), 7 items (Graen et al, 1982b; Seers and Graen, 1984), 10 items (Ridolphi and Seers, 1984) and 12 items (Wakabayashi and Graen, 1984). They argue that these LMX scales were not all constructed based on systematic psychometric study or construct validation.

Although there are many differences in the LMX measurement, 7 items LMX use the central item of '*How effective is your working relationship with your leader?*' as the most appropriate and suggested measure of LMX. Researchers tried to add items onto the existing 7 items LMX, but the extended measures are highly correlated with the 7 items. The Cronbach alphas for single measures were consistently in 80-90% range, and high correlations among the factor scales indicate that these factors are multi-measure inappropriate (Graen and Uhl-Bien, 1995). Although many LMX measures exist, Gerstner and Day's (1997) meta-analysis and Schriesheim et al (1999) found that this measure contained the strongest psychometric properties of all the LMX instruments they examined. Moreover, recent studies that employ this scale has shown that

reliability is 0.78 to 0.93 (Tse et al, 2006; Kacmar et al, 2007; Huang et al, 2008; Hooper and Martin, 2008; Golden and Veiga, 2008).

3.5.6 LMX Quality Development

Masllyn and Uhl-Bien (2001) propose that the leader member relationship is shaped as a sequence of exchanges between the members of the dyad. From each exchange, both supervisors and subordinates assemble information as such the nature of trust, respect, and obligation owed to one another. High-quality LMX relationships will be formed if these exchanges persist in a positive manner. Alternatively, if exchanges are unsuccessful, or if one member of the dyad perceives that the other member is untrustworthy or unable to reciprocate obligations, the LMX association is likely to stay at low levels (Dienesch and Liden, 1986; Graen and Scandura, 1987; Masllyn and Uhl-Bien, 2001; Uhl-Bien et al, 2000). In supporting this insight, in a recent empirical study it was found that leaders were able to form higher quality relationships with their subordinates on the condition where they also had a high quality relationship with their superior and peers (Venkataramani et al, 2010).

High quality LMX relationships are usually regarded by enhanced levels of fulfilment and effectiveness, as well as reciprocal respect and influence, open communication, greater access to organisational resources, and even extra role behaviours (Gerstner and Day, 1997). High quality LMX relationships on average transcend the formal employment contract (Uhl-Bien and Graen, 1992).

On the contrary, subordinates in low quality LMX relationships obtain less resource, receive more constrained information, and have fewer promotional opportunities, which

can lead to job disappointment, low organisational commitment, and potentially employee turnover (Gerstner and Day, 1997).

Typically, low quality LMX relationships more strongly resemble official employment contracts; thus, leaving such members to be depicted as “hired hands” (Dansereau et al, 1975). By and large, LMX theory proposes that organisational leaders develop unique relationships with their subordinates. These relationships present across a continuum ranging from low quality relationships, characterized as no more than basic employment exchanges, to high quality relationships, characterised by mutual exchanges that go greater and further than those elementary to the employment contract.

3.5.7 Benefits of Studying LMX

There is undeniable evidence of the benefits of studying leader member exchange. Social exchange theory and the norm of reciprocity imply that workers who observe leadership support (seen through high quality LMX relationships), suppose to experience a sense of obligation to reciprocate by performing better and engaging in beneficial activities such as organisational citizenship behaviours. Essentially, strong empirical support has indicated favourable returns for high quality LMX relationships. For example, LMX has been linked to important organisational variables such as performance which will be presented in section 3.5.8 LMX and Performance.

3.5.8 LMX and Performance

These studies focused specifically on how the quality of LMX was related to positive outcomes for leaders, followers, groups and organisations in general (Graen and Uhl-Bien, 1995). For example studies on the quality of LMX reveal that it can be a positive

influence on performance, organisational commitment behaviour (Burton et al, 2008), and job satisfaction (Mardanov et al, 2007; Golden and Veiga, 2008; Mayer et al, 2008). Others found that LMX was also positively associated with performance (Dunegan et al, 1992), work effort (Kacmar et al, 2007), affect, loyalty, contribution and professional respect (Mardanov et al, 2007), sponsorship of subordinates in social network (Sparrowe and Liden, 2005) and empowerment (Chen et al, 2007; Liden et al, 2000). On the other hand, studies on LMX and employee turnover (Graen et al, 1982a) and job resignation (Graen and Ginsburg, 1977) show negative associations.

3.6 Cognitive Style

Cognitive style is related to knowledge because it relies heavily on individual differences and the process of learning of new knowledge. The assumption of this study is that knowledge transfer will be affected by the cognitive style of the individual. Consequently, this section will review the appropriate literature associated with individual differences in cognitive style.

3.6.1 The Development of Cognitive Style

In the 1920s, the Austrian psychoanalyst Carl Jung (1923) presented a model of cognitive styles or personality types. He alleged that individuals logically decide on their own preferred kinds of comprehensions and can be separated into two fundamental classes with various personality or attitude types: the introverted and the extroverted. Beneath these two key psychological types, Jung determined four additional critical 'functions types': thinking, feeling, sensation and intuition. Each of these four functions types are suitable to be classified as either introverted or extroverted. With more emphasis on judgement, the forms of thinking and feeling blend in the logical

dimension, whereas sensation and intuition are assimilated to an irrational dimension relying heavily on perception.

Jung (1923, p.406) argued that “*the auxiliary function is possible and useful only in so far as it serves the dominant function, without making any claim to the autonomy of its own principle*”. Thus, there are eight sub-classifications designed and these correspond with the rational and irrational dimension. The eight types are Extrovert Feeling (EF), Extrovert Thinking (ET), Introvert Feeling (IF), Introvert Thinking (IT), Extrovert Sensation (ES), Extrovert Intuition (EN), Introvert Sensation (IS) and Introvert Intuition (IN). The first four types (ET, EF, IT, IF) link to the rational way of information processing while the latter four (EI, ES, IN, IS) to the irrational manner. Jung's work and theory have had an enormous impact on later researchers, as such Myers (1962) and Kolb (1976).

In the 1930s, Allport and Vernon (1933) introduced the concept of style into the argument of individual differences. They considered their research of expressive movement as corresponding to individual differences in the conduct of performing adaptive acts.

Their suggestion was that adaptive acts are less dependent upon external and temporary settings than upon continuing qualities of personality. They understood that the individual is the primary and unique unit of all conducts including verbal, artistic and economic; and that the individual style articulates that fundamental uniqueness (Allport, 1937). In his clarifications on how people recognise the atmosphere, which includes music, painting and even food, Allport (1937) introduced the term ‘style’ into psychological research and regarded it as the most multifaceted form of expression.

Gardner et al (1959) credited Allport as being pioneer a in the practice of cognitive style research.

In the 1960s, Gardner (1962) expanded the definition of cognitive style and integrated the ideas of individual style, thinking and behaviour. Since the 1970s, the prominence of the research was extended and applied in pedagogy setting (Sternberg and Grigorenko, 2001). Cognitive style was further developed and has been broadly acknowledged by researchers as the individual's consistent differences in information processing (Messick, 1976; Riding and Rayner, 1998).

Reassessment of cognitive style and learning style in the past 20 years has been attempted by many researchers due to the fact that prior studies are naturally conducted in their own situations, in segregation from others, designed their own instruments for assessment and regarded as their own dimension with less reference to the work of others (Curry, 1983; Riding and Cheema, 1991; Armstrong, 1999; Cassidy, 2004; Coffield et al, 2004).

3.6.2 Definition of Cognitive Style

Cognitive style has been rigorously studied for several decades, mostly in the area of individual differences, learning, personality and behaviour. There are various of definitions outlined in prior studies and the focal point of next discussion will be on the definition of cognitive style. As early as 1962, Gardner defines cognitive style as *“cognitive controls or cognitive control principles are the individual characteristics in perception, thinking, remembering, concept formation, attention deployment etc”* (p.183).

Then, subsequently, in 1971 Kogan stated that cognitive style was “*an individual variation in or modes of perceiving, remembering and thinking, or as distinctive ways of apprehending, storing, transforming and utilizing information*” (p. 244). In line with this definition was that of Messick (1976) who referred to cognitive style as “*consistent individual differences in the ways of organising and processing information and experience*” (pp.4-5).

Witkin et al (1977) consistently supported this definition, indicating that “*cognitive styles are concerned with the form rather than the content activity*” and stating that “*they refer to individual differences in how people perceive, think, solve problems, learn and relate to others*”. Kirton and McCarthy (1988) add the element of creativity in their definition by pointing out that “*individual have characteristically different styles of creativity, problem solving and decision making*” (p.176).

In different studies, Witkin and Goodenough (1981) refine the definition by indicating that cognitive style as “*a pervasive dimension of individual functioning, showing itself in the perceptual, intellectual, personality and social domains, and connected in its formation with the development of the organism as a whole: individual differences in process rather than content variables: people’s standing on the dimension is stable over time*” (p.57).

A recent study by Armstrong et al (2011b) involving an international style researcher community yielded the following definition of cognitive style:

“Cognitive styles refer to the individual differences in peoples preferred ways of processing (perceiving, organising and analysing) information using cognitive brain-based mechanisms and structures. They are assumed to be relatively stable and possibly innate. Whilst cognitive styles can influence a person’s behaviour, other processing strategies may at times be employed

depending on task demands- this is only because they are only preferences”(p. 3).

Sadler-Smith's (1996), in-line with Messick (1976), described cognitive style as "*a distinctive and habitual manner of organising and processing information*". Hayes and Allinson (1994) clearly defined cognition as "*the way individual acquires, stores and uses knowledge*", (p. 53). This study will adopt the definition by Hayes and Allinson, (1994), who refer to cognition as an approach individual's use in acquiring, storing and using knowledge.

3.6.3 Measurement of Cognitive Style

In a review of 40 years of research into cognitive style in the context of business and management (Armstrong et al, 2011c), these authors identified six valid and reliable methods of assessment of cognitive style for use in business and management settings. These will now be reviewed.

3.6.3.1 Myers-Briggs Type Indicator (MBTI)

MBTI was highly affected by psychological theory. It is also associated with personality and widely known in cognitive style discipline. Besides its application as a cognitive style indicator in research setting, MBTI is also applicable in practice. Additionally, MBTI was popularly used in demonstrating convergent validity of cognitive style instrument. The internal consistencies of MBTI were found to be above .75 for all four scales (Armstrong et al, 2011c).

3.6.3.2 Kirton Adaption-Innovation Inventory (KAI; Kirton, 1976)

Kirton (1976) stated that cognitive style is a single dimension. He further added that individuals in the organisation diverge in their favoured approaches to handling change, creativity, problem solving and decision making (Kirton, 1994). Consequently, Kirton

devised an instrument called the *Kirton Adaption-Innovation Inventory (KAI; Kirton, 1976)* which consists of 32 items. It was developed as a single dimension of cognitive styles. Adaptors are presented with fewer problem solutions and hence apply conventional ways to enhance efficiency and devotion to regulations. Conversely, an innovator has a large number of ideas and proposes radical change in increasing efficiency and slightly intimidates traditional rules. *KAI* has demonstrated appropriate levels of internal reliability (Kirton 1976) and temporal stability; its uni-dimensional structure was confirmed by Kirton's own work (1989).

The second school of thought contends that cognitive style is multi-dimensional. Among the instruments that have been developed are Cognitive-Experiential Self-Theory (CEST), Linear Non-Linear Thinking Style Profile (LNTSP), Cognitive Style Indicator (CoSI) and The Cognitive Styles Analysis (Riding 1991).

3.6.3.3 Cognitive-Experiential Self-Theory (CEST)

Epstein (1991, 1994) developed this measurement based on the distinction between individual thinking and feeling. He suggested that the processing of information involves rational and experiential elements. A rational system in this context is equivalent to 'analytical' in the CSI model because it is operationalised on the premise of the conscious level; it is intentional, analytical and relatively affect-free.

An experiential system is more likely to be automatic, preconscious, holistic and intimately related to affect. Experiential system is comparable to 'intuitive' thinking style in CSI model. This instrument was then developed (Epstein et al, 1996) into a new self-report measure of individual differences to assess rational and experiential processing modes and it was named as Rational-Experiential Inventory (REI).

3.6.3.4 Linear Non-Linear Thinking Style Profile (LNTSP)

In the quest to find an instrument to measure linear and non-linear thinking styles, Vance and colleagues (2007) failed, but they developed their own measurement called Linear Non-Linear Thinking Style Profile. This multi-faceted construct of thinking style is based on 2 fundamental dimensions: a linear dimension which involves rationality, logic and analytical thinking and a non-linear dimension which is related to intuition, insight and creativity.

3.6.3.5 Cognitive Style Indicator (CoSI)

The latest instrument in cognitive style known as the Cognitive Style Indicator (CoSI) by Cools and Van den Broeck (2007) which contains 18 items and is a refinement of analytic-intuitive cognitive style dimension which differentiate between three dimension of cognition known as knowing, planning and creating styles.

Cools et al (2009) assert that people who score high in knowing are considered as having high analytical skills, and are in favour of logical, rational and impersonal ways of processing information. In contrast, people who are good in planning style are more structured, prefer certainty and favour a well-organised environment. Individuals who fall into creating style of thinking are always searching for renewal and are strong in imagination. They tend to make decision based on 'gut feeling' or intuition.

3.6.3.6 Cognitive Style Index (CSI; Allinson and Hayes, 1996)

Another instrument that has been developed in-line with uni-dimensional (bi-polar scale) category is the Cognitive Style Index (CSI; Allinson and Hayes, 1996). This instrument was developed especially for managerial and professional use and it consists of 38-items. Cognitive Style Index is used to assess individual cognitive style base on the generic analysis-intuition dimension. Many scholars (for example, Allinson and Hayes,

1996; Armstrong, 1999) have posited that the dimension of cognitive style can be conceptualised in terms of the intuitive-analytic.

This study will employ this uni-dimensional index. The selected measurement to assess the analytic-intuitive cognitive style for the present research is Allinson and Hayes' (1996) Cognitive Style Index (CSI). The CSI contains thirty-eight statements in a pencil-and-paper and self-report format with 'true-uncertain-false' choice of answers. Allinson and Hayes (1996) developed this psychometrically sound assessment of cognitive style for administering in a convenient manner in large-scale organisational studies.

The other scales, for example the Rod and Frame Test (Witkin et al, 1977) and the Body Adjustment Test (Witkin et al, 1977) need to be conducted in the laboratory and hence are inappropriate in this study. As for the Myers-Briggs Type Indicator (MBTI-Myers, 1962), it consists of many items and requires a considerable time to administer. Furthermore, its four-dimensional structures in identifying sixteen types of individuals are rather too complex (Priola, 2001).

Moreover, the current study is also unable to provide a large number of computers in order to consider an administration the Cognitive Style Analysis (CSA-Riding, 1991). The Kirton-Adaptation Innovation Inventory (KAI, Kirton, 1976) was also not adopted for this study because the criticisms on the conceptual basis of the inventory cast doubt on whether the KAI really measures the concept of pure cognitive style (Taylor, 1989 in Priola, 2001).

The CSI instrument is deemed to be most appropriate due to the following advantages. Firstly, because the psychometric values of the CSI produce a distribution of scores closely approximating to theoretical expectations. Secondly, it was indicated to be extremely reliable in terms of internal consistency, which was reported within the range of .84 to .92 (Allinson and Hayes, 1996; Armstrong, 1999).

Thirdly, the CSI was reported to show good initial evidence of construct and concurrent validity (Allinson and Hayes, 1996; Armstrong et al, 1997; Sadler-Smith et al, 2000). Fourthly, the CSI can be completed in only 5-10 minutes therefore it is brief enough to be included into a larger survey questionnaire. Finally, the CSI is appropriate for use in organisational settings (Armstrong et al, 2011c).

Despite demonstrating high internal consistency and test-retest reliability, some recent factor analytic studies (Hodgkinson and Sadler-Smith, 2003; Hodgkinson et al, 2008) that have re-examined the structure of the CSI suggest that analysis and intuition are more likely to be separate styles of information processing. However, in recent attempts to replicate these findings (Hammad, 2012) support was found for Allinson and Hayes (1996) original unitary (bi-polar) dimension.

3.7 Conclusion

This chapter discussed the literature related to knowledge, tacit knowledge, knowledge transfer, leader member exchange and cognitive style. The discussion has revealed that tacit knowledge transfer is the primary activity that enables organisations to achieve a competitive advantage. It is undeniable that knowledge, particularly tacit knowledge, is the key to organisational efficiency and for purposes of this research managerial tacit knowledge is of paramount importance.

The transferability of knowledge very much depends on the encouragement and commitment of leaders in the organisation. Leaders are viewed as both drivers and initiators in knowledge transfer activities. Based on this premise, this research will aim to further investigate the effect of the leadership role in knowledge transfer activities by testing LMX theory. At the same time, this research also attempts to gain an in-depth understanding of internal stickiness in managerial tacit knowledge transfer. Part of this understanding will be to demonstrate; (1) how managerial tacit knowledge transfer influences the success of managers; (2) how the transfer of managerial tacit knowledge is influenced by the quality of leader member exchange relationships and differences and similarities in individuals' cognitive styles.

4 RESEARCH FRAMEWORK AND HYPOTHESES

4.1 Introduction

As a continuation of the literature review in the previous chapter, this chapter will extend the argument in order to map the framework from selected variables. The central focus of discussion is on the linkages between variables that were found in prior research. Firstly, findings on the association between knowledge transfer and LMX are briefly discussed followed by the prior research results on the relationship between LMX and managerial tacit knowledge. Thirdly, this chapter presents the evidence on cognitive style and its relation with knowledge management as well as leadership. Finally, the research framework is developed on the premise of previous literature. Subsequently, research hypotheses are outlined with the aim of guiding this particular research.

4.2 Tacit Knowledge Transfer

Essentially organisations utilise socialisation policies consisting of formal and informal knowledge transfer in order to enhance their employees' knowledge. An example of formal knowledge transfer is instructor-led training and computer based training. Conversely, informal knowledge transfer (which is more helpful) takes place via relationships with peers, colleagues, mentors and supervisors, also known as a social network (Lahti et al, 2002). It has been found that new employees in the organisation gain job task knowledge by way of a social network and documentation rather than through other types of knowledge (Lahti et al, 2002).

Interaction with other people is the key factor in knowledge conversion (Stover, 2004). Transfer of tacit knowledge relies on face-to-face interaction, arm's-length relationships and personal and informal communication (De-Alwis and Hartmann, 2008); proximity between two workers (Cavusgil et al, 2003); and body language and practical demonstrations (Leonard and Sensiper, 1998). Nonaka (1994) suggests that social interaction will generate knowledge. Moreover, Murray and Hanlon's (2010) interviewees stated that tacit knowledge was difficult to articulate; for example one of them explained that *'It's terrible not being able to explain, but you just can't'*. From their study, they identified that the transfer of tacit knowledge is *'time consuming, frustrating and often just not possible'*.

These findings indicate that socialisation is important in tacit knowledge transfer. Relationship-building through social activities among individuals in the organisation will facilitate tacit knowledge transfer. Consistent with this notion, LMX theory promotes relationship-building. It practices socialisation to initiate exchanges among individual managers in the group. Consequently, socialisation is a key to the transfer of knowledge, whereas LMX studies emphasise exchange that requires socialisation activities.

4.3 Knowledge Transfer and LMX

In their study on knowledge transfer stickiness in intra-firm transfer, Szulanski and Jensen (2004) identified that the leaders' role in facilitating knowledge transfer is necessary during high transfer stickiness as compared to the low transfer stickiness. LMX and knowledge transfer require relationships between people, and issues of respect and trust in that relationship form the central point of discussion. In the absence of trust and respect between leaders and subordinates, the exchanges between them may

be of low quality (Graen and Uhl-Bien, 1995). This applies similarly to knowledge transfer activity. According to Szulanski (1996), the source must be reliable and trusted by the recipient in order to avoid resistance to knowledge.

Prior research has confirmed a significant association between the quality of trust and knowledge transfer. For instance, Penley and Hawkins (1985), Tsai and Goshal (1998) and Cross and Prusak (2002) show that trust leads to increased overall knowledge exchange. It was also found that trust makes knowledge exchange less costly (Currall and Judge, 1995; Zaheer et al, 1998), competence-based trust was especially important in the receipt of tacit knowledge (Levin and Cross, 2004), and that maintaining mutual trust and close interaction contributes to effective tacit knowledge transfer (Cavusgil et al, 2003).

Several other researches (Argyris, 1982; Mayer et al, 1995; Cross et al, 2001 and Levin and Cross, 2004) indicate that trust increases the likelihood that knowledge acquired from a colleague will be sufficiently understood and absorbed for a person to be able to apply it. Furthermore, research conducted by Abram et al (2003) revealed that trustworthy sources of knowledge tended to act with discretion, be congruent in word and deed, be engaged in frequent collaborative communication as well as ensuring that decisions are made fairly.

The notion of trust as having a significant impact on knowledge transfer was also supported by the study of interpersonal exchange in informal information exchanges among researchers. One of the findings concluded that scientists are ready to exchange resources when they believe that there is an element of mutual trust in the relationship (Bouty, 2000). An organisational culture that nurtures openness and trust among its

employees is essential if tacit knowledge is to be easily created, shared and used innovatively (de-Alwis and Hartmann, 2008).

Trust is considered to be a factor that influences whether or not people decide to share knowledge. Previous research has provided evidence that trust affects workplace attitudes, behaviours and performance (Golembiewski and McConkie, 1975; Mayer et al, 1995; Jones and George, 1998; Dirks and Ferrin, 2001). Argyris (1964) was among the earliest researchers to examine this issue. Argyris suggested that trust in management was crucial for organisational performance. Trust in management leads to high levels of collaboration and increased willingness to share knowledge on the part of individuals.

Dirks and Ferrin (2001) add that trusting relationships lead to greater knowledge exchange. A recent study conducted by Renzl (2008) provides empirical evidence that trust has an impact on knowledge sharing when it reduces the fear of losing one's unique value and that it improves knowledge documentation. Nonaka (1994) also agrees that building mutual trust among members is crucial in initiating knowledge sharing and knowledge creation.

According to Collins (2001), tacit knowledge transfer requires trust between the source and the recipient. He gives the illustration of an experiment to build helium-neon lasers in the lab. The building process calls for high levels of patience and high levels of belief because if the creator wants to transmit knowledge it is difficult to believe in the experiment without witnessing the process of its creation. Therefore, it is necessary for recipients to place their trust in the scientist.

Furthermore, there is minimal evidence supporting how the quality of the manager-staff relationship affects knowledge transfer and use in practice (Davies et al, 2011). In their study, it was found that higher levels of empowerment and leader member exchange quality resulted in increased participation in personal knowledge transfer in practice. Thus, it is understood that trust and respect are needed in both the LMX relationship and the knowledge transfer relationship between the source and the recipient. The similarities in both relationships offer an opportunity for the researcher to map both of them in the research framework.

4.4 LMX and Managerial Tacit Knowledge

According to Wagner (1987), there are three kinds of tacit knowledge: managing oneself, managing others and managing tasks. The aspects of tacit knowledge that have been adopted in this particular study are those associated with managers in generic leadership roles (Adair, 2005). Prior research on managerial tacit knowledge has used managers as a sample (Wagner and Sternberg, 1985; Wagner, 1987; Wagner and Sternberg, 1990; Sternberg et al, 1990; Colonia-Willner, 1998; Sternberg et al, 2000; Hedlund et al, 2002; Hedlund et al, 2003).

This particular study will also choose managers as a sample and those managers have the role of leaders in the organisation. Furthermore, Tan and Libby (1997) indicate that top managers show high levels of managerial tacit knowledge compared to top staff. The study conducted by Hedlund et al (2003) also shows that tacit knowledge is related to leadership behaviour. Managers who assumed leadership accountability and had good management skills demonstrated good leadership practices (Jaques and Clement, 1991; Bedein and Hunt, 2006).

4.5 Cognitive Style and Knowledge

The linkages between cognitive style and knowledge can be seen through the existence of a relationship between Kolb's experiential learning model and cognitive style. This association basically rests on the premise that individual learning is the process of knowledge formation among the individuals who receive knowledge. Scholars refer to learning thus:

“Learning is the process whereby entities create knowledge through the transformation of experience in order that they increase their capacity to take effective action” (Kolb, 1984).

In agreement with this definition, learning style will be seen here as *"a distinctive and habitual manner of acquiring knowledge, skills or attitudes through study or experience"* (Sadler-Smith 1996, p. 186). These definitions are further supported by a direct link back to the *CSI* and the intuition-analysis facet of cognitive style (Allinson and Hayes, 1996) through Kolb's (1985) *LSI* and Honey and Mumford's (1986) *LSQ* to the experiential learning model. In addition, Kim (1993) suggests that a mental model is related to individual conceptions of 'know-how' and 'know-why'.

The growth of the *CSI* by Allinson and Hayes (1996), depends at least in part on their preliminary research with Honey and Mumford's (1986) *LSQ*, in which they acknowledged two super-ordinate factors labelled 'action' and 'analysis' (which link to intuitive and analytical styles respectively). Honey and Mumford's (1986) model itself counts Kolb's (1984) *LSI* as its leading antecedent, and the associations between the dimensions of the *LSI*, the experiential learning model.

In terms of the experiential learning model (Kolb, 1984), cognitive style affects the way an individual typically engages in each steps of learning cycle. As such, field

dependents and field independents (Witkin and Goodenough, 1981), adaptors and innovators (Kirton, 1989) or intuitives and analysts (Allinson and Hayes, 1996) observe and reflect on their experience differently, adopt different approaches to creating abstract concepts and generalisations based on their manifestations, and accept different approaches to testing new ideas in new contexts. In other words, it can be concluded that cognitive style influences the way people process information in interpreting any changes in the situations, predict the consequences of their actions and other peoples' actions in that context. Next, they use this understanding to process their mental model of how the world and their immediate situation is operating (Hayes and Allinson, 1998).

Similarly a connection can be hypothesised between Argyris and Schon's (1978) single-loop and double-loop learning, and Senge's (1990) adaptive and generative learning and cognitive style. It can be argued that the individual is the elementary unit of learning in organisations (Hedberg, 1981) and the cognitive styles of the individuals in an organisation could ultimately shape that organisation's tendency to adaptive and generative learning.

Adaptive learning is about dealing and coping with the existing environment in new and better ways and equates with an analytical style of thinking, whilst generative learning necessitates individuals and organisations to think globally and generate new methods of observing the world, and as such it can be seen as being featured by intuitive thought (Sadler-Smith, 1998).

Learning style is usually regarded as a subcategory of cognitive style (Hayes and Allinson, 1998). For example, Claxton and Ralston (1978) define learning style as a consistent way of responding and utilising stimuli in the context of learning. Learning

style, like cognitive style, portrays the ways in which individuals process information when interpreting situations, assess the consequences of actions in those circumstances and employ this understanding to refine (or redefine) their theories in use (Hayes and Allinson, 1998). Cognitive style is another individual characteristic that has a significance influence on information processing at individual and organisational level.

An individual preferred mode of information processing or cognitive style can affect the growth of his or mental model. For instance, analysts (Allinson and Hayes, 1996) focus on 'hard data', concentrate on details, and adopt a step by step, systematic and sequential approach in information processing. On the contrary, the intuitive pay less attention to details, are more receptive to 'soft data', emphasise synthesis and the instantaneous integration of many inputs at the same time, and are more prone to arrive at instant judgements based on opinion and to adopt a universal perspective (Hayes and Allinson, 1998).

The idea that individual cognitive style is influenced by the information processing was also found in the study on learning from web-based instructional systems. Graff (2003) noted that wholists score higher than analytics on a more segmented web condition, because wholists are able to learn better than analytic from short page, segmented condition where the information was prearranged unequivocally. A review of literature on web-based instructional systems suggest that in assessing the success of web-based learning users' engagement, cognitive style is an important factor to take into account (Graff, 2006).

Other scholars believe that intuition is related to practical intelligence as they define intuition as 'knowing without being able to explain how we know' (Vaughan, 1979).

Most of these scholars emphasise the importance of intuition; for example, in professional decision making (Rockenstein, 1988; Ray and Meyers, 1989) and in the context of discovery (Bowers et al, 1990) because the nature of day-to-day life relies heavily on alternatives and there is little time to screen all the information.

Goldberg (1983) suggested that multiple facets of intuition are related to tacit knowledge. He suggested that intuition could be classified into six categories, where the first two facets are associated to creative processes and the sixth facet is linked to self-realisation. The third, fourth and fifth facets of Goldberg's intuition interpretation are appearing to correlate between intuition and tacit knowledge. Describing this facet of intuition, Goldberg gave the example of the experience of a financial planner who makes contingency plans on technical analysis, thereby making a decision on the basis of their feeling, or intuition.

Theorising the linkages between intuition and tacit knowledge is important, particularly in the development of practical problem solving (Sternberg et al, 2000). Tacit knowledge is action-oriented and allows individuals to achieve goals they personally value (Sternberg et al, 1995), likewise, professionals who are capable of highly reliable intuitive judgements are increasingly rewarded in the organisation (Rockenstein, 1988) and most managers admit that they rely on their intuition and 'gut feeling' (Ray and Myers, 1989). Additionally, intuitive managers, who depend on intuition as well as analysis in high-risk decision making, achieve more profit (Ray and Myers, 1989). From the findings from these two areas, it can be noted that both results are likely to be interrelated.

Bhagat et al (2002), in a cross-border transfer study, suggest that horizontal individualists are more likely to possess a higher tolerance for ambiguity and therefore are better able to absorb knowledge that is complex and perhaps sticky in nature. In a study on the impact of cognitive system on tacit knowledge transfer, a slightly different result revealed that the style of the cognitive system of the knowledge receiver shows a significant effect on transfer performance. Particularly, the performance of knowledge receiver with a field-independence style is significantly better than that of one with a field-dependence style (Chang, 2008). Bhagat et al (2002) also found that transfer performance was best when the source of knowledge and the recipient had the same cognitive system of field-independence style.

4.6 Cognitive Style and Leadership

In studies on LMX relationship, it was found that intuitive leaders are more likely to be less dominating and more nurturing than leaders who lean towards analytical styles (Armstrong, 1999; Allinson et al, 2001). Intuitive leaders are more favoured and better respected by analytic members than analytic leaders by intuitive members (Allinson et al, 2001).

According to Tierney et al (1999), there is a relationship between employees' cognitive style and supervisors' ratings of creative performance and this is very dependent on high quality LMX. They assert that innovative members receive high ratings regardless of leader/member relationship, whereas adaptive members receive higher creativity rating in the circumstances of a positive relationship with their leaders.

Drawing from adult learning theory, Buckingham (2005) suggests that effective leadership and management are related to analysing, doing, and watching styles. He

further adds that analysing the style of a leader who understands the task by taking it apart, investigating its elements and reconstructing it bit-by-bit. Analytical style leaders' most powerful learning moments come before the performance, whereas doing style leaders' most powerful learning moments occurs during the performance. Watchers are most powerful when they have an opportunity to see the total picture of performance. In the study of creative performance by Clapham (2000), it was noted that leadership is crucial in facilitating subordinate creativity and individual characteristics such as cognitive style.

Cognitive style and job level have been found to be related. Intuitive styles are fundamental among top managers, while sensing styles are frequently connected with middle managers or lower level managers (Gardner and Martinko, 1996; Schloemer and Schloemer, 1997). This is consistent with previous studies that indicate that senior managers gravitate to intuitive styles and are less analytical, in contrast to middle manager or lower level managers (Armstrong, 1999; Sadler-Smith et al, 2000). Additionally, cognitive style is renowned as influencing individuals' work setting behaviour, and their ability to perform in a range of responsibilities and scenarios (Struefert and Nogami 1989).

The findings from cognitive similarity studies were also consistent with the similarity-attraction paradigm (Byrne, 1971) where they assert that similarity give rise to attraction while dissimilarity engenders repulsion. Among the earliest study is Witkin et al (1977). They suggest that cognitive similarity will generate smoother interactions and positive mutual feelings that lead to shared interests, common personality attributes and comparable communication modes. Most scholars point out that mismatching on the cognitive style will lead to a conflict (Goodenough et al, 1974; Lindsay, 1985; Tullet,

1995). Lawrence (1993) further adds that style differences generate differences in interest, values and problem-solving approaches that might influence the working relationship. This evidence was observed by Kirton (1989), who found that a highly adaptive individual does not easily match with a highly innovative individual. Recent study indicated that similarity in cognitive styles between leaders and subordinates leads to a higher quality leader-subordinate relationship. These circumstances enhance interaction and communication between them and at the same time reduces the feeling of breaching psychological contracts among subordinates (Suazo et al, 2008).

A person enters into situations either with matches or mismatches on the information-processing requirements of the situation. In a match situation, people tend to interpret relevant information relatively easily and apply it in order to perform effectively. On the other hand, where there is mismatch, people may not attend to interpret important information, including the consequences of their past behaviour. This circumstance occurs in time-consuming and critical situations where these people are unable to analyse the details of information. As a consequence, this mismatch results in failure to acquire necessary information to modify their interpretation of the situation (Hayes and Allinson, 1998). Sternberg (1988) suggests that people select situations that allow them to utilise their preferred cognitive style and avoid situations that repeatedly pose alternative demands.

On the contrary, Winch et al's (1954) theory proposed that a successful interaction might be an outcome of reciprocal need fulfilment. For instance, they stated that a submissive person would be attracted to someone who is highly ascendant (Winch et al, 1954). Similarly to Winch's theory, studies on cognitive dissimilarity determined that it may lead to positive outcomes. Cheng et al (1998) studied performance of a pair of

accounting students in a complex decision task. They found that a diverse match dyad (sensor or intuitive) on the Myers Briggs Type Indicator (Myers, 1962) produced a high quality decision as compared to a homogeneous sensor dyad. In educational settings, Garlinger and Frank (1986) found that mismatching field-independent teacher and field-dependent learner was beneficial for learning and performance. Similarly, it was also found that in student-supervisor relationships, more empathy was perceived when there was a combination between intuitive and analytic cognitive styles (Armstrong et al, 1997).

Furthermore, Allinson et al (2001) identified that *'intuitive leaders may be less dominating and more nurturing than their analytic colleagues, and they are more liked and respected by analytic members than analytic leaders by intuitive members'* (p. 201). They further add that assigning an intuitive leader to an analytic subordinate will generate reasonably warm and encouraging interactions. In the study of mentoring relationships between mentor and protégé, it was determined that an analysis-intuition dimension of cognitive style partly led to a successful mentoring relationship (Armstrong et al, 2002). In 2004, Armstrong studied research supervision relationships between supervisors and students. Interestingly, it was found that the analytic supervisors gave high-quality supervision and this increased with the degree of the supervisor's analytical style. This result was irrespective of the match or mismatch between the cognitive styles of the supervisor and subordinate. In a comparable study, it was found that *'analytic supervisors were perceived to be significantly more nurturing and less dominant than their more intuitive counterpart, indicating a higher degree of closeness in their relationships. This led to increased liking in the relationship, and significantly higher performance outcomes for the student. These effects were highest in*

dyads whose students and supervisors were more analytic' (Armstrong et al, 2004, p. 41).

4.7 Cognitive Style and Management

Cognitive styles were reported to play significant roles in the process of selecting and guiding the appropriate career pursuit (Witkin et al, 1977). It is beneficial for students in their process of selecting an appropriate career to do so according to their cognitive style. Furthermore, cognitive styles were also useful for managers or leaders in guiding the new employee in their career development.

Kirton and McCarthy (1988) noted that managers can tend towards certain tasks which are harmonious with their cognitive styles. This opinion was supported by Foxall et al (1992) in their findings indicating that managers that are internally-oriented are inclined to influence people with adaptive cognitive styles. On the contrary, managers that with externally-oriented sub-functions tend to attract people with added innovative cognitive styles. In addition, in work group that needs more configurations, such as production or accounting, their cognitive style inclines towards adaptation, while in less structured jobs as such marketing, sales or personnel, the cognitive style is oriented towards innovation (Kirton, 1989).

In relation to the implication of cognitive styles in management practice, it was argued that the differences in level of training, intelligence and experience may not provide an adequate explanation for the reason why managers successfully perform their tasks continuously, whereas other managers who were previously successful, fail drastically when they are transferred to a different task situation (Streufert and Nogami, 1989). They proposed that cognitive styles might be one of the possible variables in explaining

why people respond appropriately across a variety of contexts. The authors further add that employee behaviour is a result of cognitive style and other constructs such as knowledge and skill.

In 1980, Kirton identified that a local organisational environment which matches with the cognitive style may be a factor in assisting the employee preference in choosing their work department. Particularly, the author specified that adaptors are comfortable to work in the office and focus on in-house problem solving while the innovators prefer to work outside and solve the 'outside' problems, for example sales or marketing jobs.

Sternberg and Grigorenko (1997) in proposing a theory on thinking style called *mental self-government theory*, suggest that '*everyone possesses every style to some degree, and what differ across individuals is strength of preferences and the kind of tasks and situations that evoke various preferences*' (p. 707). They identify 3 styles: *legislative* style, who enjoy creating and formulating their own rules; *executive* style, those who are implementers, and prefer to follow rules and rely on an existing manual; and *judicial* style, those who like to judge things, such as by analysing and evaluating existing rules, ways and ideas.

4.8 Research Framework

There is research evidence and findings to indicate the significance of both managerial tacit knowledge and LMX on organisational performance (Wagner and Sternberg, 1985; Wagner, 1987; Sternberg et al, 2000; Golden and Veiga, 2008; Mardanov et al, 2008; Mayer et al, 2008). Taking into consideration that this evidence found a positive relationship between LMX and performance as well as tacit knowledge and performance, this study focuses on something that has not been studied before as far as

the author is aware: the effect of LMX on managerial tacit knowledge transfer. Further, this study also aims to investigate the influence of cognitive style on knowledge transfer stickiness. The study proposes to examine the impact of LMX on managerial tacit knowledge transfer stickiness and at the same time to examine knowledge transfer in the organisation, particularly managerial tacit knowledge transfer among managers (Figure 8, p.132). Additionally, the affect of cognitive style on knowledge transfer stickiness will also be considered.

4.8.1.1 Independent Variable

In this present study, knowledge transfer stickiness (Szulanski, 1996, 2000, 2003) will be adopted as the independent variable (Figure 8). Szulanski's model of knowledge transfer was selected because it focuses primarily on transfer difficulties which are very naturally related to tacit knowledge. Furthermore, Szulanski's looks into transfer as a process and not an act; hence it will allow the study to look at the transfer of tacit knowledge in detail. This model also examines the transfer of knowledge at individual level, not at organisational level (Murray and Hanlon, 2010).

One of research questions aims to examine the relationship between knowledge transfer stickiness on managerial tacit knowledge. As the knowledge transfer process requires a transferor and a transferee (Narteh, 2008), the study framework selects a supervisor (senior manager) and the subordinate (middle manager) as the transferor and the recipient of tacit knowledge. Since the respondents selected are supervisors and subordinates, the nature of their work mostly involves managerial tasks; therefore, the influence of knowledge transfer stickiness will focus specifically on the managerial tacit knowledge introduced by Wagner and Sternberg (1987).

Managers are selected as the source of knowledge because they essentially possess levels of corporate knowledge that have accumulated over a long period. The role of the manager is expected to become easier with lengthier experience of the tasks involved. As the years pass, their awareness of the tacit and explicit knowledge embedded in managerial task broadens.

This knowledge becomes integrated into their corporate memory and assists them in constructing competent management practices. This tacit knowledge will normally transfer to their peers and subordinates. Since the transfer of knowledge occurs internally within the organisation, Szulanski's approach to exploring internal stickiness of knowledge transfer is consulted.

4.8.1.2 Dependent Variable

The dependent variable in this study is managerial tacit knowledge (Figure 8). In an attempt to identify the tacit knowledge transfer, the researcher decided to select managers comprising supervisors and subordinates for the purpose of measuring managerial tacit knowledge. They were selected because they are the backbone of the organisation. This is the level at which government policy is interpreted and the coordination and implementation strategies are also central to this level of management (Nonaka, 1991; Nonaka and Takeuchi, 1995). They act as links between top management and low level staff in the organisation. Managers are by definition involved in a heavy managerial workload. The rationale for choosing managerial tacit knowledge is that it is perceived as the organisational resource that can aid competitive advantage.

4.8.1.3 Mediator

LMX was selected as the mediator in the relationship between knowledge transfer stickiness and managerial tacit knowledge. This was built on the premise of previous literature which suggest that leaders, by exhibiting transformational leadership and by building high quality leader member exchanges, fulfil an important role in the development of employee relational identification and organisational identification which in turn, results in increased knowledge sharing (Carmeli et al, 2011). In a study on social network perspective, particularly intra-firm knowledge transfer, it was found that an interpersonal relation, especially face to face interaction mediates the transfer activities (Kase et al, 2009). Face-to-face interaction in this particular study refers to the face-to-face interaction between managers in the public sector.

The relationship between supervisors and subordinates is a relationship between leaders and members; it is also known as LMX. This relationship occurs simultaneously during the transfer process. Therefore, the nature of work requires that the supervisors in this particular study also act as mentors to guide and facilitate subordinates in their execution of organisational tasks. As a supervisor, the senior manager must treat the subordinate according to the requirements of the job; this means providing resources, facilities, encouragement and motivation to ensure the task is executed successfully. The role of supervisors is similar in that they provide guidance and work experience (or resources) to the subordinate and this study is concerned with managerial tacit knowledge.

This study aims to explore the mediating role of LMX between supervisor and subordinate in the organisation. The underlying assumption of the study is that high-quality LMX between supervisor and subordinate facilitates high levels of managerial

tacit knowledge transfer. In other words high quality LMX will assist the managerial tacit knowledge transfer process, because the subordinate is part of the 'in-group'. Inclusion into the in-group results in a closer relationship to the supervisor. The outcome is closer interaction and communication and this in turn aids the transfer of managerial tacit knowledge.

LMX was selected as the mediator because there is a relationship between knowledge transfer stickiness as the independent variable with managerial tacit knowledge as the dependent variable (for example: de-Alwis and Hartmann, 2008; Murray and Hanlon, 2010). Baron and Kenny (1986), Holmbeck, (1997) argue that the prerequisite test of mediated effect is the significant relationship between both variables. It is anticipated that LMX will mediate the relationship between knowledge transfer stickiness and managerial tacit knowledge, since positive LMX provides essential support elements, such as special information and preparation for challenging work assignments (Graen and Uhl-Bien, 1991) that are necessary for knowledge transfer. Moreover, it is assumed that there is an association between knowledge transfer stickiness and LMX, LMX and managerial tacit knowledge, knowledge transfer stickiness and managerial tacit knowledge which meet the conditions of a mediator (Baron and Kenny, 1986).

Tacit knowledge is ingrained in the minds of individuals and tacit skills are not easy for other people to interpret (Inkpen, 2008). Therefore, the appearance of high quality LMX in the in-group team will facilitate managerial tacit knowledge transfer by reducing ambiguity. This circumstance refers back to the close relationship between the source and recipient that is built on the premise of high respect, trust and obligation. On the other hand, for the out-group, the relationship with leaders is of low quality. When levels of respect, trust and obligation are decreased, there will be increased causal

ambiguity. Increased causal ambiguity means that the managerial tacit knowledge transfer will be much harder. This situation probably arises as the result of formal interactions. Therefore the out-group team rely more on explicit knowledge.

Absorptive capacity is strongly dependent on good relationships, openness and trust between source and recipient (von Krogh, 1998). As a result high LMX (high quality respect, trust and obligation) will facilitate absorptive capacities in the knowledge recipients. A high quality relationship between supervisor and subordinate that indicates closeness will assist in the assimilation of newly-learnt knowledge with existing knowledge. Conversely, in the out-group team, a low quality relationship will reduce the absorptive capacities of members due to relationship distance.

Arduous relationships will negatively affect knowledge transfer (Szulanski, 1996). High quality exchange in in-group teams will decrease arduous relationships. Consequently, managerial tacit knowledge transfer will flow easily between supervisors and subordinate who are included in the in-group team, whereas members of the out-group team might face difficulties in managerial tacit knowledge transfer. This is due to an arduous relationship between supervisor and subordinate in the team. Hence, it is anticipated that exchanges among in-group members that include high quality respect, trust and obligation, will indicate a low level of stickiness leading to a high managerial tacit knowledge transfer, whereas out-group exchanges that include low quality respect, trust and obligation, will show high level of stickiness resulting in a low managerial tacit knowledge transfer.

Cognitive style is the second mediator in this study. Cognitive style is mapped into this study with the aim of understanding the effect of cognitive style on supervisors and

subordinates in knowledge transfer stickiness. Cognitive style is appropriate in the position as a mediator in this study due to its being related to knowledge as well as leadership.

The association between cognitive style and knowledge was found in the prior research, such as in the studies conducted by Kolbs (1985); Honey and Mumford (1986) and Kim (1993); Allinson and Hayes (1996). They indicated that cognitive style was initiated from the learning domain, which is referred to as a process of acquiring knowledge and skills by means of either study or experience.

From the interpretation of learning, it can be clearly perceived that the learning process is similar to the process of knowledge transfer, particularly the role of the knowledge recipient. In this study the recipient of knowledge needs to go through the learning process to absorb new knowledge. As a result, these findings open an opportunity to link cognitive style and knowledge, particularly tacit knowledge. From Kim's (1993) study, it was found that individual conception of 'know-how' and 'know why' is style-dependent. For that reason, it can be said that cognitive style is related to tacit knowledge. As previously mentioned, tacit knowledge transfer is difficult; therefore, it is the central focus of this study.

Cognitive style shows a significant correspondence with knowledge, as expounded earlier in this study, particularly with transfer of tacit knowledge. Hence, with the indication from prior research in the cognitive style domain, it provides a support to linkages between knowledge and cognitive style which meet the prerequisite test of mediated effect in this study (Baron and Kenny, 1986; Holmbeck, 1997). The underlying expectation is that similarity in cognitive style between supervisor and

subordinate will enhance the knowledge transfer and ease transfer stickiness (Suazo et al, 2008). This assumption is made due to increasing level of communication and interaction between them as these elements are a fundamental requirement in knowledge transfer. Moreover, intuitive supervisors will also assist managerial tacit knowledge transfer and decrease transfer stickiness because they tend to be more nurturing and less dominating (Armstrong, 1999; Allinson et al, 2001).

4.9 Hypotheses Development

4.9.1 Hypothesis for Research Question 1

Research Question 1: Is there a relationship between the ‘stickiness’ of knowledge transfer and managerial tacit knowledge between individuals?

Szulanski’s research (1996) stated that knowledge related-barriers consist of the absorptive capacity of the recipient, causal ambiguity and arduous relationships between the recipient and the source of knowledge. This result was supported by Porter (1985, p: 352) who believed that the recipient rarely searches for ‘know-how’ knowledge in the organisation, while the source lacks incentive to transfer ‘know-how’ knowledge. Knowledge transfer stickiness is related to tacit knowledge (Arrow, 1974; Cohen and Levinthal, 1990; Nonaka, 1994; Szulanski, 1996; Szulanski, 2000; Szulanski and Jensen, 2004; Inkpen, 2008). The transfer of tacit knowledge may be easier through face-to-face interaction (de-Alwis and Hartmann, 2008), proximity between two workers (Cavusgil et al, 2003) and body language and practical demonstrations (Leonard and Sensiper, 1998).

Murray and Hanlon (2010) found that tacit knowledge was difficult to articulate and this could be frustrating. Since previous studies have only provided theoretical support for an association, the following hypothesis will be tested in order to provide empirical support. Thus this study proposes the following hypotheses:

H1: *There is a negative relationship between knowledge transfer stickiness and managerial tacit knowledge of the supervisor and subordinate*

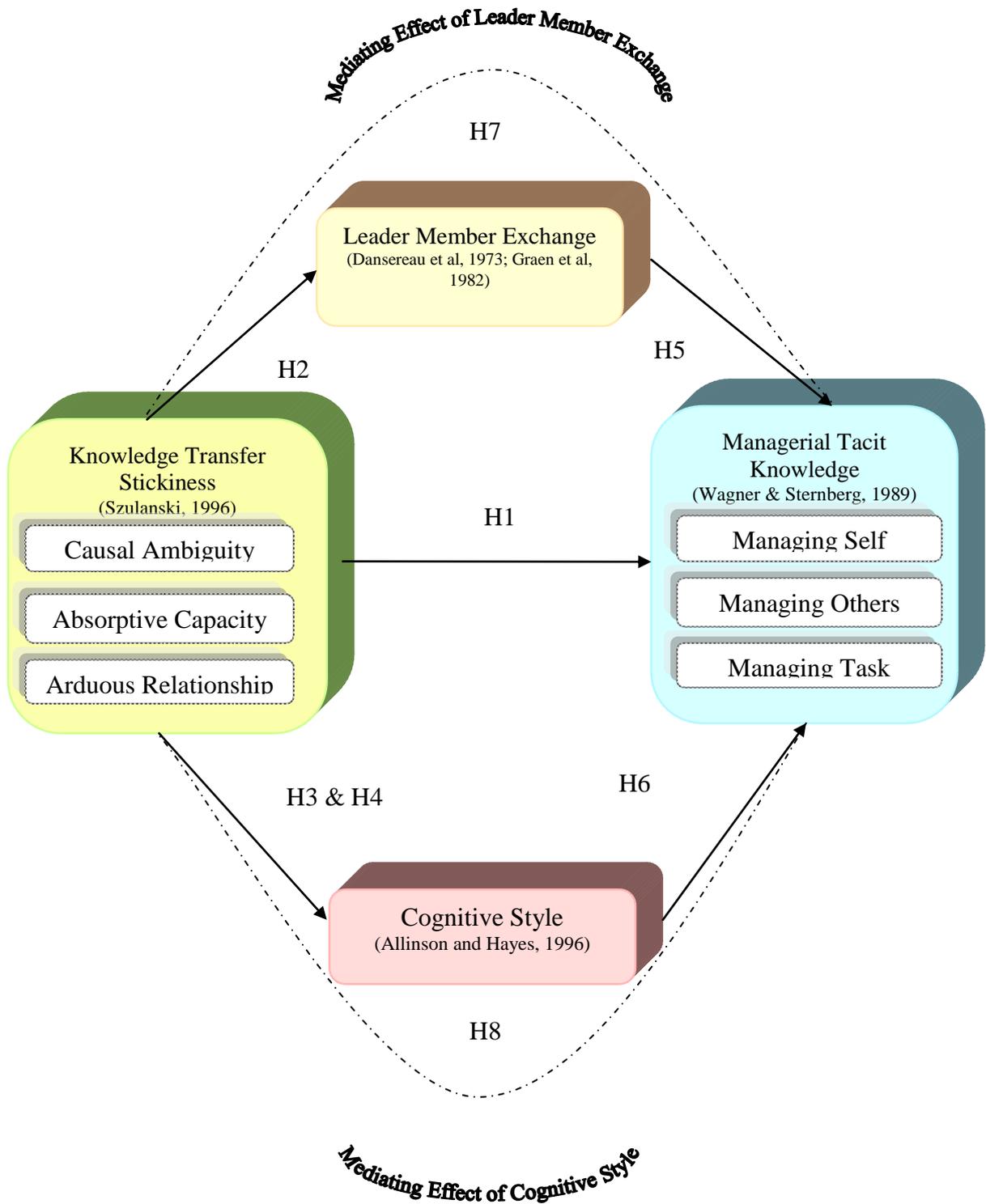
4.9.2 Hypothesis for Research Question 2

Research Question 2: Is there a link between the ‘stickiness’ of knowledge transfer and the quality of the leader member exchange relationship?

The success of knowledge transfer relies on competent leaders (Bryant, 2003), i.e., leaders who are responsible and able to motivate and take the lead in knowledge transfer activities. Bryant (2003) further adds that leaders have to create an organisational environment that will facilitate the transfer process.

Similarly, Cenusa (2005) noted that leaders must initiate the transfer action and create open communication. This notion was supported by others (for example Senge, 1990; Slater and Naver, 1995). These authors indicate that transformational leaders encourage network communication and promote transmission and knowledge sharing in the organisation. Szulanski and Jensen’s (2004) study on intra-firm knowledge transfer identified that the leaders’ role in facilitating knowledge transfer stickiness is more necessary during high transfer stickiness than during low transfer stickiness.

Figure 8: Research Framework



Effective tacit knowledge transfer interaction very much depends on mutual trust (Penley and Hawkins, 1985; Nonaka, 1994; Currall and Judge, 1995; Tsai and Goshal, 1998; Zaheer et al, 1998; Cross and Prusak, 2002; Cavusgil et al, 2003; Levin and Cross, 2004) and Graen and Uhl-Bien (1995) indicated that trust is crucial in LMX. Additionally, tacit knowledge transfer requires individual exchanges (Nonaka, 1994), ease of communication (Szulanski, 1996) and closeness in the entire relationship. This ease of communication and closeness of interpersonal relationships was also emphasised in LMX studies (Graen and Uhl-Bien, 1995). Based on these aforementioned premises, this study hypothesises that there is a significant relationship between knowledge transfer stickiness and LMX:

H2: *There is a significant negative relationship between the stickiness of knowledge transfer and the quality of LMX*

4.9.3 Hypothesis for Research Question 3

Research Question 3: Is there a link between the ‘stickiness’ of knowledge transfer in organisations and the cognitive style?

The definition of learning style (Sadler-Smith, 1996) is related to the process of knowledge transfer. Cognitive style is also related to the learning domain (Kolbs, 1985; Honey and Mumford, 1986; Allinson and Hayes, 1996). Cognitive style has been found to influence the individual information processing in order to understand and response according to the situation. Individuals use this understanding to process their mental model of how the world and their immediate situation is operating (Hayes and Allinson, 1998).

Hence, it is expected that due to individual differences in ways of processing information, knowledge transfer stickiness may be affected by differences in cognitive styles. Furthermore, Sternberg et al (2000) support the view of Goldberg (1983) that intuition is related to tacit knowledge. This particular study attempts to examine the association between knowledge transfer and cognitive style, particularly knowledge transfer stickiness. Additionally, from these findings, it can be assumed that cognitive style can also be linked to knowledge transfer stickiness because the learning process might be faced with causal ambiguity, absorptive capacity and arduous relationships resulting from similarities and differences in styles. Thus, this study proposes the following hypotheses:

H3: There is a significant difference between the cognitive styles of individuals who possess different levels of KTS.

H4: There is a link between different levels of KTS and cognitive style.

4.9.4 Hypothesis for Research Question 4

Research Question 4: Is there an association between the quality of the leader member exchange relationship and managerial tacit knowledge?

According to Wagner (1987), there are three kinds of tacit knowledge: managing oneself, managing others and managing tasks. The type of tacit knowledge that has been adopted in this particular study is associated with managers who are in the generic role of leader (Adair, 2005). Managers who are also regarded as leaders assume leadership accountability and have good management skills involving good leadership skills (Jaques and Clement, 1991; Bedein and Hunt, 2006).

Furthermore, Tan and Libby (1997) indicate that top managers show high managerial tacit knowledge when compared to other staff. In addition a study conducted by Hedlund et al (2003) shows that tacit knowledge is related to leadership behaviour. Informal knowledge transfer occurs through relationships with peers, colleagues, mentors and supervisors (Lahti et al, 2002). Therefore, the next hypothesis is as follows:

H5: *There is a positive association between the quality of LMX and managerial tacit knowledge.*

4.9.5 Hypothesis for Research Question 5

Research Question 5: Is there an association between cognitive style and managerial tacit knowledge?

With regard to matching people with their work situation, cognitive style also has its influence. This is due the individual differences in ways of processing information. Some people are comfortable working in a situation where there is ample time to think and consider every detail of a problem from every perspective and to consider how various elements correlate to each other prior to arriving at a careful decision (Hayes and Allinson, 1998). Conversely, different people prefer to work in circumstances where they are able to use their own opinion and make inspired guesses before assessing all the information. This condition suggests that there is a possibility that people will learn and perform best in the situation match between their information processing and cognitive style (Hayes and Allinson, 1998). This notion is also consistent with Kirton (1989), who noted that managers lean towards certain assignments which are congruent with their cognitive style.

Cognitive style and learning linkages can be clearly determined at the organisational level. Cognitive style represents distinctions in individuals' favoured means of giving out information which ultimately influences the mode by which those individuals employ and operationalise knowledge. Therefore, a person's behaviour might eventually be affected by their cognitive style (Woodman et al, 1993). Consequently, it should not be unreasonable to assume that an individual's conception of 'know-how' and 'know-why,' (Kim, 1993) may be style-dependent. As a link between cognitive style and managerial tacit knowledge has been found, this particular study wishes to test the association between cognitive style and managing oneself, managing others, and managing task. Thus, it offers the following hypothesis:

H6: There is an association between cognitive style and managerial tacit knowledge.

4.9.6 Hypothesis for Research Question 6

Research Question 6: To what extent do high quality leader member exchange relationships influence the successful transfer of managerial tacit knowledge in organisations?

Leaders initiate and drive activities aimed at creating, sharing and exploiting knowledge (Bryant, 2003). In their study context, knowledge refers to tacit and explicit knowledge. Since a previous study showed that transformational leadership is related to tacit knowledge (Bryant, 2003) this further implies that leadership is related to the creation, sharing and exploitation of tacit knowledge. Prior research suggests that leaders, who exhibit transformational leadership and cultivate high-quality leader member exchanges, fulfil an important role in the growth of subordinate relational identification and organisational identification, resulting in increased knowledge-sharing (Carmeli et al,

2011). In another study on social network perspective, particularly intra-firm knowledge transfer, it was found that an interpersonal relation, especially face-to-face interaction, mediates the transfer activities (Kase et al, 2009); leader member exchange also involves face-to-face interaction.

It was anticipated that LMX would mediate the relationship between knowledge transfer stickiness and managerial tacit knowledge, since positive LMX provides essential support elements; for example, the special information and preparation for challenging work assignments (Graen and Uhl-Bien, 1991; 1995; Northouse, 2007) that are necessary for knowledge transfer. It is assumed that LMX influences managerial tacit knowledge transfer through a reciprocal relationship between the supervisor and subordinate (Uhl-Bien et al, 2000; Maslyn and Uhl Bien, 2001; Uhl Bien and Maslyn, 2003). In other words, in a close relationship between supervisor and subordinate, the knowledge transfer process will be less sticky, and consequently, it may yield high managerial tacit knowledge transfer. Based on these findings, this study wishes to test the influence of LMX on managerial tacit knowledge transfer. Thus, it offers the following hypothesis;

H7: LMX will negatively mediate the relationship between the different levels of knowledge transfer stickiness and managerial tacit knowledge.

4.9.7 Hypothesis for Research Question 7

Research Question 7: To what extent does cognitive style influence the successful transfer of managerial tacit knowledge in the organisation?

As previously presented, the supervisor in the organisation is regarded as the initiator and the facilitator in knowledge management (Bryant, 2003). Each of these supervisors naturally exercises a certain cognitive style in their managerial role as well as in their leadership role. In the present study, it is assumed the supervisor's role in transferring knowledge most likely will be influenced by their cognitive style. It was found that similarities in cognitive style between supervisor and subordinate lead to high-quality leader member exchanges which consequently increase the level of interaction and communication (Suazo et al, 2008) and most likely will ease knowledge transfer stickiness. Furthermore, intuitive supervisors are preferred to and better respected than analytical supervisors (Allinson et al, 2001). Thus, this study offers the following hypothesis:

H8: Cognitive style will mediate the relationship between different level of knowledge, transfer stickiness and managerial tacit knowledge

4.10 Conclusion

This chapter explains in detail the linkages between variables; namely, the association between knowledge transfer and LMX, LMX and managerial tacit knowledge, cognitive style and knowledge transfer, as well as tacit knowledge. All of these variables are the central focus of the study. Drawing from these findings, the research framework of the study is outlined. Subsequently, 8 research hypotheses were developed on the premise of this framework. The following chapter will discuss the approach and methodology applied in data collection for the research and analysis techniques selected for hypotheses testing.

5 METHODOLOGY

5.1 Introduction

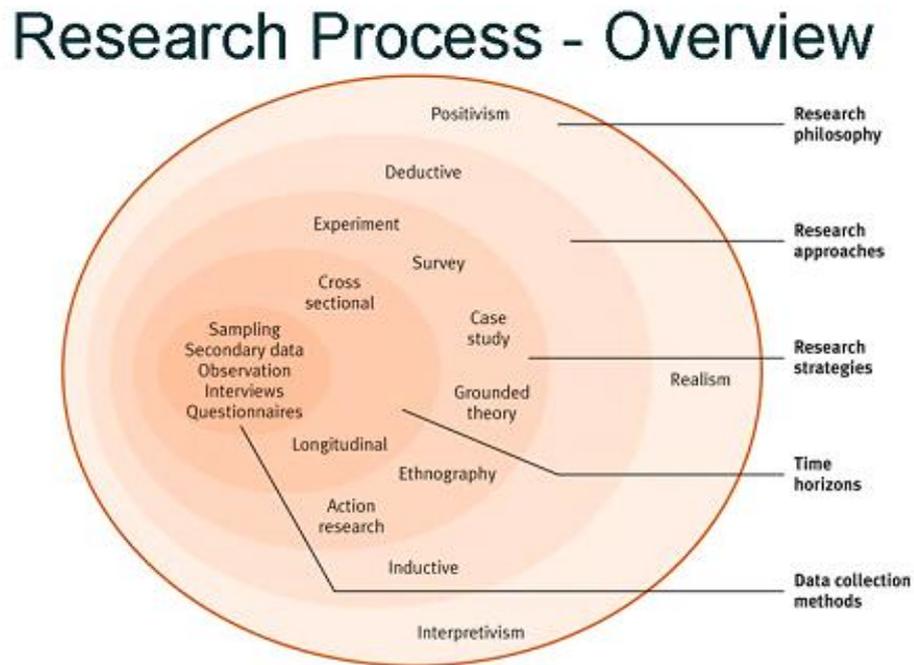
In order to form the theoretical basis for this research the previous chapters have reviewed the background literature of knowledge including tacit knowledge, knowledge transfer, leader member exchange and cognitive style. The objective of this chapter is to propose a research methodology that will emphasise the ways in which data will be collected, interpreted, structured and analysed in order to identify solutions to the research problem. This chapter should emphasise the empirical part of this research; however, the researcher must also account for philosophical issues such as the appropriate paradigm, the epistemological and ontological standpoint, the relevance of the study and the methodology selected. These are major factors to take into consideration when developing a systematic approach for the entire research design. The standpoint of this research is fundamentally descriptive and explanatory. It is consistent with the tradition of developing theoretical models which are then tested by examining hypotheses constructed on the basis of those models: this process is also termed hypothetico-deductive. The study can be regarded as deductive: arriving at logical conclusions based on premises and theories. To elaborate the methodology further, the discussion will adhere to the research process shown in Figure 9.

5.2 Epistemological Assumption

Epistemology is concerned with the nature of knowledge and the ways in which knowledge can be acquired. Epistemology has two extreme positions: positivist and interpretivist (Collis and Hussey, 2003).

Figure 9: The Research Process 'onion'.

(Adapted from Saunders et al, 2009, p. 102).



Epistemologically, this study takes the standpoint of Polanyi (1966) who considered knowledge as “justified true belief” that initiates from knowledge embedded in the mind. In this particular study, knowledge is regarded as objective and detached from the researcher: a positivist position. Therefore, this study will only accept research that is grounded on externally observable and measurable sources. Consequently, the study will attempt to disregard the feelings and interactions that appear throughout all the research (Collis and Hussey, 2003; Saunders et al, 2009).

Positivism is the appropriate paradigm for this study because the researcher intends to test hypotheses constructed from models. The aim of this research is to explore the research question using a natural science perspective. With reference to the research questions, this study will deal with the organisational process by acquiring the views and perceptions of respondents.

The researcher will adopt a detached and value-free manner of interpretation (Saunders et al, 2009; Fisher, 2004). The study results will be derived through collecting facts. Through this paradigm, the researcher attempts to test theories and to produce evidence for the progression of the field (Bryman and Bell, 2003) and also to postulate theories by means of modification (Trochim and Donnelly, 2007).

5.3 Ontological Assumption

Ontology is about the nature of reality and this study considers reality as external and objective to individuals (Collis and Hussey, 2003). Ontological perspectives view knowledge as what exists in the system and everybody, including individuals, groups or networks are allowed to learn and hold knowledge (Nonaka and Takeuchi, 1995). As presented in Figure 9, positivism uses a deductive approach and a survey strategy to test hypotheses. The literature refers to a positivist paradigm as quantitative and to qualitative study as phenomenological (Saunders et al, 2009).

5.4 Research Approach

The research approach is normally derived from the theory, proposition or framework of certain research. As shown in Figure 9, there are two fundamental research approaches: deductive and inductive. Based on the hypothetico-deductive method, this study will utilise a deductive approach to elaborate activities and to generate hypotheses from theoretical reflections (Bryman and Bell, 2003).

The underlying reasons for adopting a deductive approach in this research can be seen from different perspectives. Firstly, this approach is appropriate because this study seeks to portray the causal association between knowledge transfer stickiness and managerial tacit knowledge as well the mediating effect of LMX in the relationship.

Secondly, the researcher hopes that future researchers will replicate this study in order to validate its findings. If the results of this study are repeatedly supported this will demonstrate that the findings are a precise account of reality (Sekaran, 2003). Thirdly, if the researcher remains independent of what is being observed this will produce scientific rigour; specifically, it will ensure the researcher does not taint the results. It is easy to conduct data collection. Fourthly, this approach will allow the researcher to utilise the concept of variables as a measurable construct. As such, the research process will be conducted smoothly and systematically. Finally, the advantage of a deductive approach is that the findings can be generalised. This study aims to contribute a solution that will apply in a wide range of other settings (Sekaran, 2003).

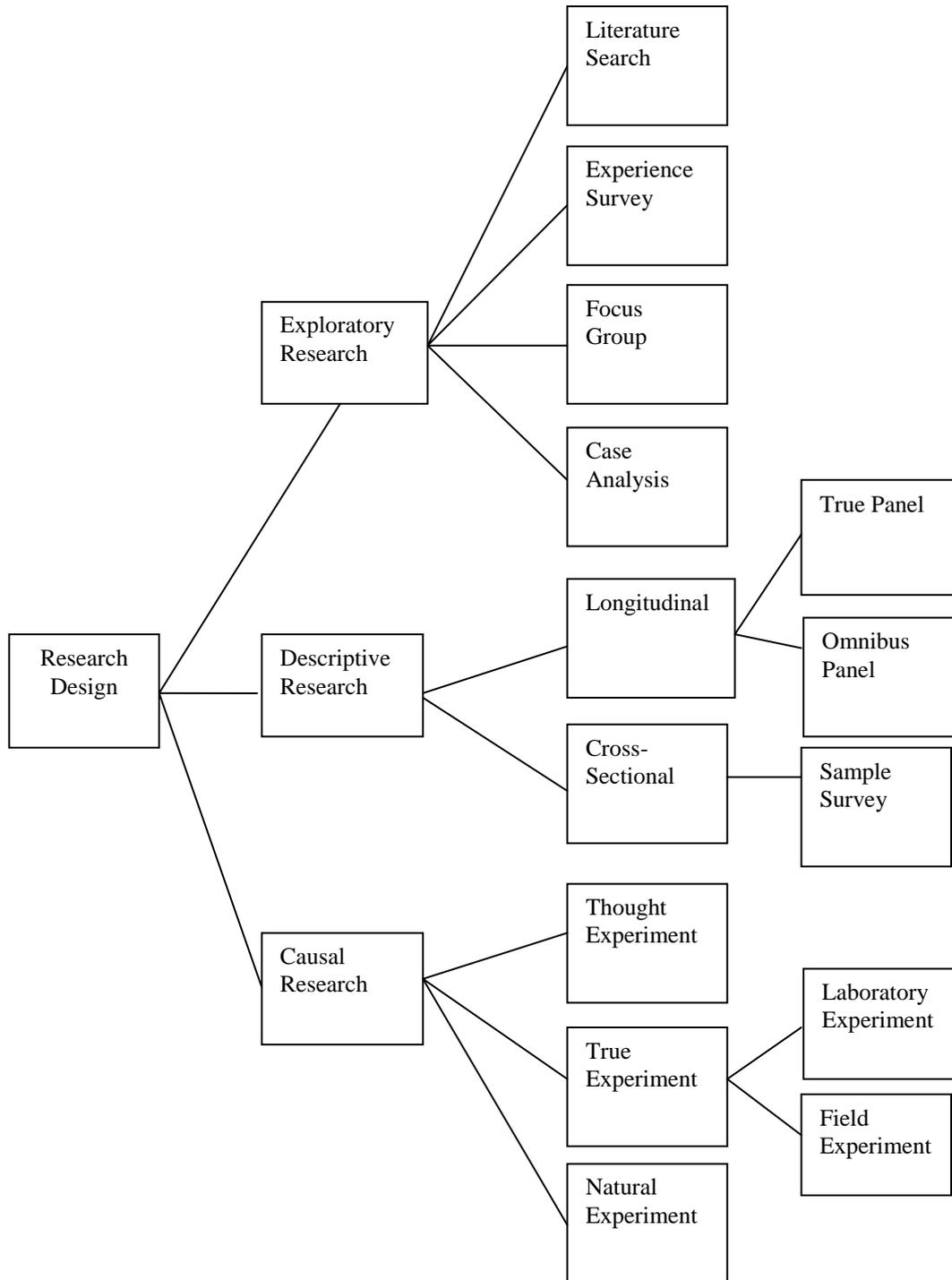
5.5 Research Design

A research design is “*simply the framework or plan for study used to guide in collecting and analyzing data*” (Churchill, 2001: p.104). Three of the major classifications of research design are exploratory research, descriptive research and causal research, which are shown in Figure 10.

Descriptive research is has been chosen because the major aim of this research is to describe a particular phenomenon by finding facts and measuring dimension systematically, evaluating individuals’ opinions or views and testing relationships. Descriptive research is conducted by applying a cross-sectional approach followed by a sample survey.

Figure 10: Types of Research Design

(Adopted and modified from Bernard 2000, pp. 123-133; Churchill, 2001, pp. 100-148).



5.6 Research Strategy

A research strategy is a way to find answers to research questions. Adopting a hypothetico-deductive method, this study has chosen a descriptive and explanatory research method. This strategy has been selected in order to identify the sources for data collection and to identify the research limitations in terms of data accessibility, time, location and financial resources (Saunders et al, 2009).

5.6.1 Previous Research Strategy

In deciding on the appropriate research design for this study, the researcher reviewed several methodologies used in prior research on knowledge transfer. Details of previous research are presented in Table 3.

5.6.2 Research Strategy

By reviewing the different types of strategies used, it is possible to identify a preponderance of theoretical studies and a dearth of empirical studies: the majority are qualitative in nature (for instance Darr et al, 1995; Carlsson et al, 2002; Kalling, 2003; Riusala and Suutari, 2004; Oshri et al, 2008). There are few quantitative studies currently in existence; therefore, there is a need to study this domain using a quantitative approach. Consistent with a quantitative approach, the research will use a survey strategy. Surveys are regarded as the most appropriate strategy because this study intends to collect large amounts of data from a sizeable population in an economical way. Data collection will be conducted using questionnaires.

Furthermore, the study will use a questionnaire that is recognised by the general public and perceived as authoritative. The researcher has more control over the research

process when using a questionnaire (Saunders et al, 2009). Furthermore, data that is collected using a survey strategy will be used to suggest possible models showing the linkages between selected variables. By using appropriate sampling techniques, the findings are representative of the whole population (Saunders et al, 2009). The details of questionnaire design and administration were discussed in Chapter 6.

Table 3: Summaries of Methodologies Used in Previous Studies

Authors	Major Areas	Sample Population	Data Gathering	Data Analysis
Zander and Kogut (1995)	An analysis of knowledge and the speed of the transfer and imitation of organizational capabilities.	20 Swedish companies; projects engineers	Questionnaire	Partial likelihood estimates of covariates, t-test
Wathne et al (1996)	Examine the factors affecting knowledge transfer in two or more co-operative partners: openness, channel of interaction, trust and prior experience	45 Nordic companies	Questionnaire	SEM, maximum likelihood-based estimation technique
Szulanski, 1996	An analysis of internal stickiness of knowledge transfer in the organization and the result shows that major barrier to knowledge transfer is related to lack of absorptive capacity, causal ambiguity and arduous relationship.	8 companies transfer best practice	Questionnaire	Canonical correlation analysis
Simonim (1999)	An analysis of the 'casually ambiguous' nature of knowledge in the process of knowledge transfer between strategic alliance partners	Cross sectional sample of 147 large and medium size companies in the USA	Questionnaire	Standard deviations, correlations matrix and multiple group analysis
Darr and Kurtzberg (2000)	Analysis of factors on how partner similarity enhances knowledge transfer between fast food franchises	11 franchise organizations in the UK	Questionnaire	Modelling using a learning curve framework coefficients
Szulanski (2000)	Examination of the stickiness of knowledge transfer in eight firms and how the characteristics of the source of knowledge, the context, the recipient and knowledge itself affected transfer	8 multinational companies	Questionnaire	Regression
Birkinshaw et al (2002)	Examination of the validity of knowledge as a contingency variable by looking into the thinking about the dimension of knowledge assets and how it influence the organization structure variables are associated with knowledge transfer	110 Research and Development (R&D) unit managers in 15 multinational firms in Sweden	Questionnaire	Pearson correlations coefficients, multi-variate Ordinary Least Square (OLS) regression
Cavusgil et al (2003)	Examine the effect of tacit knowledge transfer on firm innovation capability and innovation performance	182 manufacture and service firm in USA	Questionnaire	Three stage least square regression
Ko et al, (2005)	Examine the antecedents of knowledge transfer in the context of such an inter-firm complex information systems	96 ERP implementation projects	Questionnaire	SEM, PLS
Morales et al (2008)	Analysing theoretically and empirically how the leader's perceptions of different intermediate strategic variables related to knowledge (knowledge slack, absorptive capacity, tacitness, organizational learning)	408 Spanish organization	Questionnaire	SEM

5.7 Population and Sampling

Executives from the Malaysian Public Sector Administrative and Diplomatic Service (ADS) have been chosen to represent civil servants in this study. This is because they are very well known as government policy makers as well as being advisors to the government. Throughout the entire public service sector from federal down to district level, the ADS have been entrusted with the responsibility for most of the managerial work (Mahmud, 2006).

The population here can be defined as the ADS executives in the Malaysian Public sector. The detailed numbers of these executives according to grade are shown in Table 4. Since the lists of all ADS officers are kept in the Service Division, Public Service Department of Malaysia, the sample framework can be constructed. The respondents will be categorised into two groups. Firstly, senior managers who are the policy makers: this group is made up mainly of directors. For consistency in this study, they are referred to as supervisors. The second group is made up of managers in public organisations, where they are called subordinates. The respondents will be selected on a scale ranging from grade M 41 to JUSA. There is a total of 6780 of these executives throughout Malaysia. Supervisors are selected from Grade 52 to JUSA because they have in excess of 15 years working experience whilst subordinates have around five years working experience.

Although respondents were selected from various ministries, their work contexts are similar. All are performing management-related jobs regardless of which ministries they are attached to. Moreover, these particular managers can be transferred from one ministry to another as and when they are required, to perform similar jobs.

This research employs a disproportionate stratified random sampling method. This is appropriate in this study because more variability is suspected in a particular stratum (Sekaran, 2003), particularly that of supervisors. The supervisors might show variability in the quality of their relationships with the subordinates. Following Roscoe's (1975, cited in Sekaran, 2003), rule of thumb, the sample size is determined as more than 30 respondents in each stratum. Considering the disproportionate stratified random sampling method adopted, it is reasonable to propose greater than twenty percent (20%) of the population as the limit. Stratified random sampling, taking proportionate or disproportionate samples from strata, is more efficient than simple random sampling for the reason that for the same sample size, each important segment of the population is better represented, and more valuable and differentiated information is obtained with respect to each group (Sekaran, 2003).

Table 4: The Population Sample of Administrative and Diplomatic Service

Grade	Term Used	Number
JUSA	Supervisor	159
M54	Supervisor	543
M52	Supervisor	666
M48	Subordinate	1395
M44	Subordinate	3135
M41	Subordinate	882
TOTAL		6780

5.8 Dyadic Data Analysis

5.8.1 Definition

Dyad is defined as “*pair*” or “*two individuals maintaining a sociological relationship*” (Meriam Webster Dictionary online) and in this particular study dyad refers to the relationship between supervisor and subordinate. Dyad study focuses on the relationship and not the individual (Kenny et al, 2006). Therefore, dyadic measurement reflects the contribution of two persons, although the function of those contributions can be quite different (Bond and Kenny, 2002). Baker and Useem (1942) define dyad thus: “*two persons may be classified as a dyad when intimate, face to face relations have persisted over a length of time sufficient for the establishment of a discernable pattern of interacting personalities*” (p.13). As a result, a dyad is extended in time, there must be pattern mutual action and engaged personal elements of two participants (Thompson and Walker, 1982). They further add that dyadic research, concentrates on the patterned mutual action or attributes of two people or the interpersonal relationship.

The most essential concept in dyadic data analysis is *nonindependence* (Kenny et al, 2006, p. 4). Two dyad members are not simply independent individuals, they are *nonindependent*. Nonindependence can be understood as two independent individuals in a dyadic relationship who share something in common. *A formal conceptual definition of dyadic nonindependence is: in the situation where two scores from two members of the dyad are nonindependent, there is either more similarity or more difference between the two scores. These two scores, if compared to two scores from two individuals that are not from the same dyad, will show an obvious distinction* (Kenny et al, 2006, p. 4).

Basically, dyadic study focuses on the nonindependence and the heightened correspondence or variation of scores between dyad members (Kenny et al, 2006, p. 4). In earlier dyadic study, nonindependence is also known as interdependence (Kenny and Kashy, 1991). It is also known by several names:

“When speaking of attitudes it is called agreement or similarity, when speaking of affect it is called reciprocity or compensation, and when speaking of non-verbal behaviour it is called synchrony. Related terms are understanding, empathy, and inter-subjectivity”
(Kenny and Kashy, 1991, p. 275).

Another fundamental concept in dyadic data analysis is *distinguishability*. This concept is centrally discussed on the issue whether the two dyads member can be distinguish from one another; also known as distinguishable and indistinguishable dyads. Dyad members are considered distinguishable if there is an important effect that can be used to order the two (Olsen and Kenny, 2006). When the roles of two dyad members are different and one of the dyad members holds the responsibility of directing another member’s behaviour, then they are distinguishable (Gaudreau et al, 2010). Distinguishability is the key in determining the appropriate data-analytic techniques because both require different analysis (Kenny et al, 2006, p. 6).

5.8.2 Types of Variable in Dyadic Research

The appropriate data-analytic approach for dyadic data very much depends on the nature of independent variable. Hence, it is crucial for the researcher to determine which type of data they are going to analyse. According to Kenny (1988), Kashy and Kenny (2000) and Campbell and Kashy (2002), there are 3 types of dyadic data, which are between dyads, within dyads and mixed variables.

Between-dyad variables differ from dyad to dyad thus both members have identical scores on the variable. Within-dyads variables differ between the two members within the dyad, but averaging the scores from the two dyad members, each dyad has an identical average score. The third type of variable are mixed independent variables, because of the existence of both within-dyad and between-dyads variables. This present study used the mixed type of variables because the data consisted of both types of variables. For example, the age of the two dyad members may differ from one another and some dyads on average may be older than others. Additionally, two partners' scores differ and some dyads have higher average scores than others.

5.8.3 Level of Measurement and Level of Analysis

This study uses an interval level of measurement. Interval does not assume an absolute zero (i.e., where a score of 0 implies total absence of that variable) (Stevens, 1946). For the demographic data there is also some nominal data. The nature of this research requires analysis at a dyadic level because it examines the relationship between knowledge transfer stickiness and levels of managerial tacit knowledge in senior managers and middle managers. In addition, it examines the mediating role of leader member exchange which also calls for analysis at dyadic level. Furthermore, the LMX model is best viewed as a dyadic-level phenomenon (Graen and Uhl-Bien, 1995; Schriesheim et al, 2001).

The relationship study requires a dyadic level of analysis because evidence from one partner will lead to a biased measurement of relationship (Thompson and Walker, 1982). Scores from two dyad members are likely to be related, leading to underestimation of standard errors and raised level of Type I error if data are treated as independent (Newsom, 2002). Kenny (1988) in his work on the two-person relationship raised an

issue as to the unit of analysis by questioning whether the person or the dyad is treated as the unit of analysis. He argues that two scores within each dyad may not be independent, as he suggests that:

“If both members of dyad are measured, it is likely that their scores are correlated or not independent. If person is used as the unit of analysis and dyad is ignored in the analysis, the independence assumption is likely to be violated and significance test results are likely to be misleading. The error of using person as the unit of analysis when the data are non-independent is unfortunately quite common” (p.59).

Therefore, dyadic research depicts a combination of interdependence between members (Thompson and Walker, 1982). Additionally, researches on LMX describe the leadership relationship as part of a larger network of relationships and suggest that exchanges in one part of that network may affect relationships in other parts (Graen and Uhl-Bien, 1995). LMX quality linking between a leader and subordinates has a bearing on the relationship forged between those subordinates (Sherony and Green, 2002).

5.8.4 Dyadic Design

There are three types of design describe by Kenny and Winquist (2001). Firstly, the standard dyadic design; secondly, the Social Relations Model (SRM) design, and finally; the one-with many design. In dyadic design, the concept of *actor* and *partner*, *one-sided*, *two sided* and *reciprocal* are fundamental. ‘Actor’ refers to the person who generates data points, while ‘partner’ is the other dyad member. When only one member of the dyad is measured it is called one-sided design, whereas when both members are measured, the design is said to be *two-sided* and is also known as *reciprocal* (Kenny et al 2006).

It is said to be a standard design when each person is a member of one and only one dyad. In this design, both dyad members are measured on certain variables (Kenny et al 2006). The second design is SRM where each individual is paired with multiple others, and each of these others is also paired with multiple others, in which a group of persons relate or interact with each other. The final design is one-with-many design. In this design, each person is paired with multiple others; however, these other people are not paired with any others. This design can be either one-sided or reciprocal (Kenny et al 2006). This study falls into the category of reciprocal design, as data were collected from both dyad members.

5.8.5 Data Organisation

Dyadic data set should be structured properly in order to arrive at appropriate analysis (Kenny et al, 2006). In standard design, data can be organised as individual, dyad and pair-wise structures; however, individual structure is not suggested. In individual structure, the dyad is treated as a single unit. This means every n dyad would have $2n$ units in individual files and dyad level variables would have to be entered twice, once for each individual.

Dyad structure assumes each dyad is a single unit, where n dyads and $2n$ individuals will be considered as n records in the dyad file. The pair-wise structure is assimilation between individual and dyad structure. It consists of one record for each individual and at the same time, both partners' scores materialise on each record. This structure is also termed *double-entry* structure (Kenny et al, 2006). Other designs in dyadic research are the one-with-many design and the Social Relations Design (SRM). SRM design is relevant if each individual serves as actor and partner. Data in SRM design can be organised as a combination of a particular dyadic as one unit (Kenny et al, 2006).

One-with-many design is the integration between standard design and SRM. This is because each dyad is assumed to be a single unit; nevertheless, each actor is paired with more than one partner (Kenny et al, 2006). For the purpose of data organisation, it was recommended to double-enter the data from both dyad members and repeat the actor entry for each partner. In order to determine which scores are estimated, it is suggested that the researcher create a dummy code to specify a two-intercept model, so those separate estimates are computed (Marcus et al, 2009).

5.8.6 Dyadic Index

“Dyadic index is referring to two sets of scores that obtain from dyadic study and the determined measure of correspondent of these two sets of scores. Dyadic index commonly use to measure relationships concepts as such similarity, reciprocity, mutually, accuracy, understanding and sensitivity”

(Kenny et al, 2006, p.317).

This particular study is a nomothetic analysis in which a measure of a correspondent is measured across dyads. Consequently, a dyadic index can be conducted by one item at a time or by a combination of items and hence the summary of the score of the average can be computed for each individual (Kenny et al, 2006). Then, at the same time, the index of correspondence can be computed across the dyads. By using this approach, the dyad is the unit of analysis and correspondence can be computed using an ordinary correlation coefficient when dyad members are distinguishable (Kenny et al, 2006).

5.8.7 Measuring Nonindependence

In this study, information on two variables, knowledge transfer stickiness and leader member exchange, were collected from each individual supervisor and subordinate. These variables aim to measure perceptions of their relationships. Consequently, these data have to be treated as the dyadic unit of analysis. In order to treat the data as a

dyadic unit of analysis, it has been suggested that the procedure should commence with the collection of data from both partners in the relationship. Secondly, this should be followed by the analysis of the degree of interdependence between both partners. An interdependence index is derived from the correlation coefficient by correlating one person's score with his/her partners'. Then, a significance test should be conducted to identify if the degree of interdependence is significant (Armstrong, 1999).

Kenny and Kashy (1991) suggest that:

"...the test of interdependence should be quite liberal; that is, researchers should treat data involving low levels of interdependence as nonindependent data, and instead of using the conventional 0.5 level of significance, the .20 level should be used. The reason for this is that if, in fact, interdependence does exist, the p value of other statistical test will be distorted by the violation of the independence assumption," (p. 279).

They further suggest that the two scores should be averaged for each dyad before a comparison assessment is carried out between groups. If data are independent, then the person can be used as unit of analysis and the dyad can be mistreated. Hence, it is possible to pool these variables into a form of single index, the *overall within-partner correlations* or *overall cross-partner correlations* (Gonzales and Griffin, 1999). Overall within-partner correlations represent a correlation between two variables measured from supervisors or subordinates, while overall cross-partner correlations refer to the correlation between two variables from supervisors and subordinates.

"The purpose of overall within-partner correlation is to index the strength of the linear relation between two variables, across all individuals in the sample. With N dyads, the overall within-partner correlation involves 2N scores on each variable"

(Gonzales and Griffin, 1999, p. 451).

On the other hand, when each dyad is made up of two different individuals (e.g., supervisor and subordinate), further complications arise because of the likelihood of

between-partner differences in means, variances and covariances (Gonzales and Griffin, 1999). They further suggest that, in this case, pairwise methods or a structural equation modelling (SEM) program is relevant. The two approaches offer asymptotically equivalent significance tests under the null hypothesis. Furthermore, SEM provides considerable advantages in terms of flexibility and adaptability.

5.8.8 Design Issues in One-With-Many

There are three basic variants in one-with-many designs. Firstly, all the measurement is taken from the focal person, i.e., the supervisor in this particular study. This focal person generates data about each of his or her partners. A second variant is where all the measurement provided by partners and the focal person does not provide any data (Kenny et al, 2006). Kenny and Winquist (2001) define this variant as MP1T or many-perceivers-one-target. Finally, the third variant is a reciprocal design referred to as a 1PMT-MP1T by Kenny and Winquist (2001). This variant measures data from both the focal person and the partners (Kenny et al, 2006). In the present study, the reciprocal design was adopted and data were gathered from both the focal person and their partners.

5.8.9 One-With-Many Design Data Analysis

The study of interdependence or nonindependence is resistant to standard approaches of statistical analysis. This is due to its nature, in that it assumes the independence of the unit of analysis (Woody and Sadler, 2005). Therefore, it is fundamental to determine which approach is fitting in dyadic analysis.

Kenny et al (2006) discuss the one-with-many design and the appropriate analysis approach in analysing data from this design. They discuss several data analyses applicable to this reciprocal one-with-many design with distinguishable partners,

namely, ANOVA and MANOVA, Multilevel Analysis, and Structural Equation Modelling.

5.9 Individual Level Data Analysis

Apart from dyadic data, this study also collected variables that measure knowledge transfer stickiness, LMX, managerial tacit knowledge and cognitive style from an individual perspective from both supervisors and subordinates. This study employs regression analysis, one-way analysis of variance (ANOVA) and independent sample t-test techniques in analysing data. The selected analysis techniques are consistent with previous studies. For instance, Gardner et al (2010) suggest that the regression and ANOVA techniques were used predominantly in quantitative research, particularly in leadership studies between 2000 and 2009. Apart from that, Peng et al (1991) identified that from 1981 to 1987, among the top three analytical methods employed in management research were correlation, multiple regression and ANOVA.

5.9.1 Regression

Regression analyses are a set of statistical techniques that allow the assessment of the relationships among dependent variables and several independent variables. Regression techniques can be applied to a data set in which the independent variables are related with one another and with the dependent variables to varying degrees. This technique is helpful in experimental research, observational or survey research. The flexibility of this technique is particularly beneficial to the researcher who is interested in real-world or very complex problems that cannot be meaningfully condensed to laboratory design (Tabachnick and Fidell, 2001).

Multiple regression is an expansion of bivariate regression in which several independent variables instead of just one are combined to expect a value on a dependent variable for each subject. The result of regression is an equation that regresses the greatest prediction of a dependent variable from several continuous independent variables. Regression techniques comprise standard multiple regression, sequential (hierarchical) regression, and statistical (stepwise) regression (Tabachnick and Fidell, 2001).

The wide uses of multiple regression analysis can be related to two main objectives: prediction and explanation. For prediction, it aims to predict the single dependent variable by using known values from a set of independent variables. For explanation, it considers the individual contribution of each independent variable in explaining the variation in the dependent variable. This can be done by examining the regression coefficients, including their magnitude, direction (positive or negative), and statistical significance for each independent variable as well as developing substantive and theoretical grounds to explain the impacts of independent variables (Hair et al, 2006).

The primary goal of regression analysis is to investigate the relationship between the dependent variable and several independent variables, and the strength of the relationship as well as assessing the importance of each independent variable to the relationship (Tabachnick and Fidell, 2001). Consequently, this analysis technique is appropriate in this particular case in order to answer research questions concerning the relationship between the variables of interest; knowledge transfer stickiness, managerial tacit knowledge, LMX and cognitive style.

With regard to sample size, the minimum sample size required for multiple regression analysis is 50 cases; however in most research, 100 cases are more preferable (Hair et al,

2006). As a result, the sample size of this study (300 cases) is adequate and appropriate for the use of multiple regression techniques. The statistical tests in multiple regression analysis refer to both regression of determination (R^2), ‘which is a single measure of overall predictive accuracy’ (Hair et al, 2006, p.185), and the regression coefficient for each independent variable. The interaction among the sample size, the significance level (α), and the number of independent variables in detecting a significant R^2 is illustrated in Table 5.

Table 5: The Interaction among R^2 , N Size, Significance Level and IV

Sample Size	Significance Level (α) = .01				Significance Level (α) = .05			
	No of Independent Variables				No of Independent Variables			
	2	5	10	20	2	5	10	20
20	45	56	71	NA	39	48	64	NA
50	23	29	36	49	19	23	29	42
100	23	16	20	26	10	12	15	21
250	5	7	8	11	4	5	6	8
500	3	3	4	6	3	4	5	9
1000	1	2	2	3	1	1	2	2

NA = Not applicable
Source: Hair et al, (2006, p.195)

According to the interplay among sample size, the significance level (α), and the number of independent variables, the possible levels of significant R^2 which can be detected are identified. With the sample size of 300 cases, the significance level (α) at .05, and the number of independent variables varying from 3,4 and 5 variables, the relationships with R^2 values of approximately 4 to 5 can be detected reliably in this study.

Regarding the effect of sample size on the generalisability of the results, the ratio of cases to independent variables is important. The minimum rule is five cases for each independent variable (5:1). If the ratio is lower than the minimum rule of five cases for each independent variable, it may over-fit the regression model to the sample. A more desirable level is 15-20 cases to 1 independent variable (15:1 or 20:1). It is believed

that the result should be generalisable when this level of the ratio is met and the sample represents the population well (Hair et al, 2006). With the sample size of 300 cases and three independent variables used in this study the desirable ratio of cases to independent variables is met, with an actual ratio of 100:1. Consequently, the result from the current study should not be a case of over-fitting the sample, and should be generalisable.

Major Types of Multiple Regression

Three multiple regression strategies are standard multiple regression, hierarchical regression and stepwise regression. These three strategies are able to differentiate by overlapping variability due to correlated independent variables and identify the sequence of entry of independent variables into the equation. In standard or simultaneous regression, all the independent variable is entered at once into the regression equation, where each variable is assessed as if it had entered the regression after all other independent variables. Each of these independent variables is evaluated in terms of what it adds to the prediction of the dependent variable that is different from the predictability afforded by all the other independent variables (Tabachnick and Fidell, 2001). In the hierarchical regression, independent variables are entered into the regression equation according to the order identified by the researcher. These independent variables are assessed in terms of their variability prediction on the dependent variable at the point of its entry into the equation.

The researcher normally assigns the sequence of entry on the basis of theoretical considerations. The independent variables can be entered one at a time or in blocks. The analysis proceeds in steps, with information about variables both in and out of equation specified in computer output at each step. Lastly, after all variables are entered,

summary statistics are provided along with the information presented at the last step (Tabachnick and Fidell, 2001).

In stepwise regression, the independent variables are entered into the equation solely according to the statistical criteria. *“The meaning or interpretation of the variables is not relevant. Decisions about which variables are included and which are omitted from the equation are based solely on statistics computed from the particular sample drawn: minor differences in these statistics can have profound effect on the apparent importance of independent variables”* (Tabachnick and Fidell, 2001, p.133).

Choosing Among Regression Strategy

Standard multiple regression is an appropriate strategy to assess the relationships among variables and fulfil the basic question on multiple correlation (Tabachnick and Fidell, 2001). Thus, this strategy was applied in answering hypotheses 1 and 2, which investigate the relationship among the variables of interest, while hierarchical regression offers a control by the researcher on the advancement of the regression process.

The researcher is able to determine the importance of independent variables in the prediction equation according to logic or theory. The hypothesis testing is about assessing the proportion of variance attributable to independent variables after variance due to independent variables already in the equation being accounted for (Tabachnick and Fidell, 2001).

Mediation effect was suggested to be examined through a series of regression analyses following the procedure outlined by Baron and Kenny (1986) and Kenny et al (1998). Kenny et al (1998) define four conditions which must be met for mediation: the

independent variable must affect the dependent variable (Path *c*); the independent variable must affect the mediator (Path *a*); the mediator must affect the dependent variable when the independent variable is controlled for (Path *b*); full mediation will occur when the relationship between the independent variable and the dependent variable must be reduced to non-significance after the effect of the mediator is controlled for. Partial mediation occurs when condition 1-3 are met without condition 4. Moreover, Judd and Kenny (1981) and Newsome (2002) also suggest that regression is the appropriate analysis for testing mediation effect.

Therefore, hierarchical regression is chosen in this particular study to test the mediation effect (H7 and H8). This is because the researcher intended to control the sequence of independent variable entry into the regression equation. The control of the independent variables' sequence of entrance will allow the researcher to identify the variability prediction of particular independent variables on the dependent variable.

Regression Coefficient

The regression coefficient represents '*the slope of the relationship between the independent variable and dependent variable holding all other independent variables constant*' (Berry and Feldman, 1985, p.9). In other words, it represents '*the amount of change in the dependent variable due to the independent variable*' (Hair et al, 2006, p.180).

The type and the strength of the relationship between the independent variable and dependent variables can be accessed through regression coefficient. The sign of regression coefficient represents a positive and negative relationship. The magnitude of the regression coefficient indicates the amount of change in the dependent variable

when the independent variables change by one unit (Field, 2009). When there is no effect of the independent variables on the dependent variable, the coefficient of independent variables are all zero (Schroder et al, 1986).

The researcher decided to use standardised coefficient regression (β , also written as Beta) from the coefficient table instead of unstandardised coefficient regression because it is easier to interpret. Moreover, they are not dependent on the units of measurement of the variables. The standardized coefficient offers information on the number of standard deviations that the dependent variable will change as a result of one standard deviation change in the independent variable.

The Beta values are all measured in standard deviation units (Tabachnick and Fidell, 2001; Pallant, 2007; Field, 2009); therefore, it is directly comparable between the different units of measurement in the study scales. Thus, direct comparisons between several independent variables provide a superior insight into the significance of the independent variable in the model (Field, 2009). However, Pallant (2007) suggests that the unstandardised regression coefficient is used in constructing a regression equation. As result, during the discussion on the regression equation of the model, the researcher used the unstandardised regression coefficient, also known as *b*.

5.9.2 Correlation

A correlation is *'the rate of change (linear) in one variable per unit change in the other variable (and vice versa) which best fits the data in the sense of minimizing the squared discrepancies between the estimated and actual scores'* (Cohen and Cohen, 1983, p.50). Field stated that it is *'a measure of the linear relationship between the variables'* (2009, p. 177). The value of correlation coefficient ranges from -1 to +1, the value of +1 means

that there is a perfect positive relationship between two variables, when one variable changes, the other variable also changes in the same direction with a proportionate amount. Conversely, if the correlation coefficient is -1, there is a perfect negative relationship between two variables, meaning that when one variable changes, the other variable changes in the opposite direction in a proportionate amount. Thus, in a situation where the correlation coefficient is equal to 0, it indicates that there is no linear relationship between the two variables, which means when one variable changes the other variable remains the same or is stable (Field, 2009). The magnitude of the correlation coefficient is also crucial, where the coefficient of $\pm .1$ is considered to be a small effect, $\pm .3$ represents a medium effect, and $\pm .5$ indicates a large effect. A one-tailed test is selected according to the directional hypotheses (Field, 2009).

5.9.3 Independent Sample t-test

The independent t-test is an analysis technique used to test hypotheses about the value of population variance; in other words, to test whether the means of the two groups are different (Field, 2009). In the current study, the independent t-test was used to test hypothesis 1 in order to identify the differences between the groups of supervisor and subordinate managers.

5.9.4 Analysis of Variance (ANOVA)

Analysis of Variance (ANOVA) is an analysis technique use to determine mean differences between two or more groups of populations. Since t-test analysis is limited to a comparison of only two groups, ANOVA is able to compare two or more groups (Gravetter and Wallnau, 1996). This study employs ANOVA to compare three groups of managers which have different cognitive styles in hypothesis 3. Furthermore, ANOVA is also used in comparing the mean values of a range of dependent variables

between groups of dyad managers that match and mismatch according to their dyadic partners' cognitive styles. ANOVA is normally followed by a post-hoc test if the ANOVA result is significant. This is because ANOVA does not determine which groups differ from one another. A post-hoc test allows the comparison of the two groups at a time or pair-wise comparisons (Gravetter and Wallnau, 1996).

5.10 Ethical Consideration

Each participant was informed through the covering letter about the purpose and objective of the research. Information about privacy rights was also handed out before the questionnaires were administered; this gave respondents the choice of whether or not to participate. In addition, the respondents were informed that the results of the questionnaires would never be manipulated in order to fit a particular thesis or hypothesis (Remenyi et al, 1998; Churchill, 2001).

5.11 Conclusion

This chapter has presented the methods used in the present research, starting with an outline and explanation of the philosophical approach adopted for this study. The research employs a cross-sectional design, which is useful in analysing a large amount of data. Survey methods are used for data collection, particularly the questionnaire, which allows the collection of large amounts of data. The population and sample selected for the study was justified, as were the methods of sampling. This chapter has also presented the unit of analysis of the study, which involves dyadic and individual level data. Subsequently, the techniques employed for analysing the data were described. In the next chapter, the discussion centre on the questionnaire development and survey administration.

6 QUESTIONNAIRE DEVELOPMENT AND DATA COLLECTION

6.1 Introduction

The previous chapter discussed the methodology and study design. The central discussion of this chapter will be on the process of questionnaire development, pre-testing, pilot study and questionnaire administration.

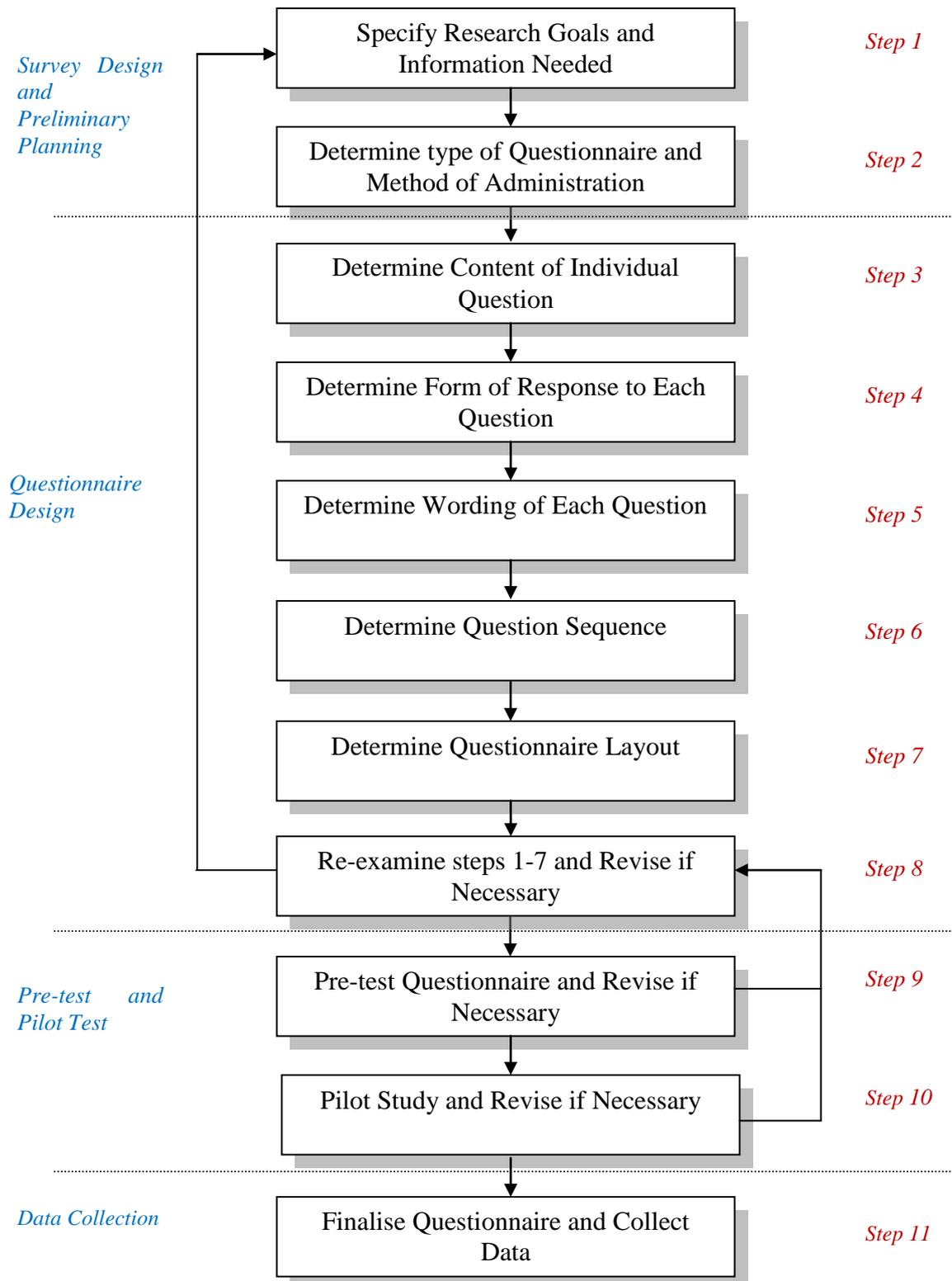
6.2 Framework of Developing the Questionnaire

In the process of developing the questionnaire for the study, the approach suggested by Churchill (2001) was followed. Even though this study will adapt a questionnaire from previous literature, the adaptation process will also develop the questionnaire according to this study setting. The adaptation is required in order to ensure that the questions asked are relevant and precisely answer the research questions. For the purpose of this study, the researcher adopted a framework developed by Syed Ikhsan (2005) originally from Czaja and Blair, (1996) and Churchill (2001). This framework comprises eleven steps to be carried out before the final data collection is done. The framework is shown in Figure 11.

6.2.1 Specify Research Goal and Information Needed

The procedure of questionnaire development begins with the specification of the information required for the study. The type of research guided by the specification of the information required. The research type is guiding the study by stating the hypotheses.

Figure 11: Framework for Developing the Research Questionnaire
 (Adopted and modified from Churchill, 2001 and Czaja and Blair ,1996)



An extensive and wide-ranging literature review on knowledge transfer, leader member exchange, tacit knowledge and cognitive style was carried out. From this, the researcher underlined several objectives to be achieved. The Administrative and Diplomatic Service in the Malaysian Public Sector has been selected as the main subject. As particular study attempts to test the relationship between the variables, the questionnaire should therefore ask about that relationship.

Therefore, on this premise, the researcher conducted an item check. The hypotheses guide the questionnaire in the sense of determining what information will be sought, from whom the information will be collected and by specifying what relationships are to be examined. Moreover, variables specified in the hypotheses will further clarify the information required and determine the appropriate people and units to gather the information from.

6.2.2 Determine the Questionnaire Type and Administration Method

After identifying the basic information required for the research, the next step is to determine the way information will be gathered. The questionnaire design is very much dependent on its administration. The selection of survey administration differs from mail administration, telephone interview or personal interviews. Churchill proposes that as grounds for deciding the type of questionnaire, the researcher must refer to the type of data to be collected and “*use the degree of structure and disguise as well as cost factors to determine the method of administration*” (Churchill, 2001, p.341).

Considering the nature of the study that requires data in dyadic relationships, the researcher administered the survey by personally distributing the questionnaire by hand. This was done in order to provide an opportunity for researcher to explain and guide the

respondents on the way to answer the questionnaire. This was necessary because of the uniqueness of the procedure of subordinates being appointed by supervisors. By giving them a preliminary briefing, they were able to fulfil the questionnaire requirements correctly and assist the researcher to collect the appropriate response.

6.2.3 Determine the Content of Individual Question

Churchill argues that the content of individual questions is crucial and is largely inspired by “*the decision of researcher regarding type of information required the structure to be imposed on its collection and the method for administering the questionnaire*” (Churchill, 2001, p. 319).

Therefore, determining the content of each individual item in the questionnaire is very important in order to obtain a good response. To ensure diligence, he further suggests that the researcher needs to ask additional questions: firstly, is the question necessary; secondly, are several questions needed instead of one; and thirdly, do respondents have the necessary information; and finally, will the respondents give the information? (Churchill, 2001, p.319) For this study, the questionnaire was adapted from previous study and it incorporated all variables discussed in Chapters 3 and 4. As a result, these four questions are irrelevant in this context.

Referring back to the unit of analysis of the study that is the dyadic relationship, the questionnaire was separated into two primary versions. The first version was specifically designed for supervisors, and was labelled ‘SM’. The second version was intended to be answered by subordinates. This second version was designed specifically for four subordinates that were appointed by the supervisor. As there were four of them,

the second version was separated into four sub-versions labelled 'MI-G1', 'MI-G2', 'MO-G1' and 'MO-G2'.

The first version was intended to measure the perceptions of supervisor of managerial tacit knowledge transfer stickiness and the leader member relationship between supervisors and their subordinates. This version was measured the level of managerial tacit knowledge and the cognitive styles of supervisors. Consistent with the requirement of responses in the first version, second version was considered to be a complement of the first version. This instrument was used to measure managerial tacit knowledge transfer stickiness and leader member relationship from the perspective of each subordinate. From the responses to both versions, the dyadic relationships could be formed and analysed. For the version that measures the perceptions of supervisor and their managerial tacit knowledge transfer an example item is "*the limits of knowledge transfer activities are fully understood between us*". While for the version that measures the perception of the subordinate an example item is "*informal knowledge transfers always assist us in performing tasks*".

Both versions of the questionnaire were divided into five sections, thereby ensuring that each item was "*specific and addresses only one important issue*" (Churchill 2001, p.341). The first part of the questionnaire is about the background of the respondent. This section offers general information about respondent's age, gender, qualifications and experience. In the second, third, fourth and fifth sections, the questionnaire focus on all the variables involved in hypothesis testing. For example, in section two, the respondents were asked to provide information regarding their tacit knowledge transfer stickiness in the organisation. Such data provide clear evidence on tacit knowledge transfer stickiness in the public sector.

The respondents were asked to mark their answers on a five-point Likert scale and a seven-point Likert scale. It is assumed that the distinction between the five-point and seven-point Likert scales were unlikely to raise any issue on the premise that it would show an equivalence result. Colman et al (1997) in comparing rating scales of different lengths, indicate that scores from five- point and seven-point scales show equivalent findings. This was also found in an earlier study by Cox (1980), who stated that “*it is ironic that the magic number seven plus or minus two appears to be a reasonable range for the optimal number of response alternatives*” (p.420). Moreover, Green and Rao (1970) clearly noted that 6- or 7-point scales were optimal, especially if a test battery is employed in which several different instruments are integrated. The full questionnaire is shown in Appendix, and details of its contents are discussed in the following discussion.

6.2.3.1 Questions on Section A (Respondent Profile)

This demographic section includes several control variables and measures of the dependent variable and independent variable. The demographic characteristics that will be accounted for in the questionnaire are age, gender, ethnic, department, employment grade, academic qualifications, working experience, subordinates under supervision and service excellent awards.

These demographic characteristics have been chosen in order to identify and target the appropriate respondents (supervisors and subordinates in ADS). The questions about age, gender and academic qualification were purposely asked in order to obtain general information about the respondents, while the question on ethnicity was asked in an attempt to identify any cultural effect on the responses. The questions related to department, employment grade, working experience and subordinates under supervision were intended to determine the respondent’s experience of ‘supervising’ members. They were also intended to determine the experience of subordinates working under the

‘supervision’ of leaders. Questions about the service excellence award were asked specifically in order to differentiate individuals defined as experts or as successful from those defined as expert-novices. Profiles of experts were needed to provide for the unique scoring system of TKIM (Sternberg et al, 2000). The details relating to the profile of expert is discussed in Chapter 7, section 7.3.3.

6.2.3.2 Questions on Section B (Tacit Knowledge Transfer Stickiness)

In this section the respondent was ask to provide information on the tacit knowledge transfer stickiness between themselves and their subordinate or vice versa. The independent variable of the study is knowledge transfer stickiness. It was measured using the questionnaire developed by Szulanski (1996), with a 5-point scale ranging from “Y” (Yes) to “N” (No) for most of the questions, although different choices were provided for some of the questions. The findings from Szulanski’s research (1996) showed that knowledge transfer stickiness was related to a lack of absorptive capacity in the recipient, causal ambiguity and an arduous relationship between the recipient and the source of knowledge. Therefore, this study will adopt the questionnaire from these three sub-scales. The definition of sub-scales of knowledge transfer stickiness is revealed in Table 6.

Table 6: Knowledge Transfer Stickiness Sub-scales (18 items)

Sub-Scales	Definitions
Causal ambiguity	Degree of conjecture on the utility of the transferred knowledge
Recipient lacks absorptive capacity	Ability of the recipient unit to identify, value and apply new knowledge
Arduous relationship	Ease of communication and intimacy of the relationship

Source: Szulanski (1996)

6.2.3.3 Questions on Section C (Leader Member Exchange)

This section was designed to measure the quality of the relationship between supervisors and their subordinates. In this study, the term ‘Leader Member Exchange’ has been altered into ‘Leader-Subordinate Relations’ to facilitate general understanding among the respondents.

Although there are many changes in the LMX leadership scale of measurement, 7 LMX items cite the central question ‘How effective is your working relationship with your leader?’ as the most appropriate and suggested measure of LMX (Graen and Uhl-bien, 1995; Graen et al, 1982b; Seers and Graen, 1984). Although many LMX measures exist, the Gerstner and Day (1997) meta-analysis and Schriesheim et al (1999) found that this measure contained the strongest psychometric properties of all the LMX instruments they examined. Researchers tried to add items to the 7 LMX items but the extended measures are highly correlated with 7 items. The Cronbach alphas for single measures were consistently in 80-90% range, and high correlations among the factor scales indicated that these factors were multi-measure inappropriate (Graen and Uhl-Bien, 1995). The dimension of LMX 7 is listed in Table 7. The LMX 7 uses a 5-point scale.

Table 7: Leader Member Exchange Dimension (7 items)

Dimension	Definitions
Respect	Mutual respect for the capabilities of others
Trust	The anticipation of deepening reciprocal trust with the other
Obligation	The expectation, that interacting obligation will grow over time as career-oriented social exchanges develop into partnerships

Source: Graen et al (1982b); Seers and Graen (1984)

6.2.3.4 Questions on Section D (Managerial Tacit Knowledge)

In this section, the respondents were required to respond to a series of work-place situations, based on a seven-point Likert scale. The questionnaire was adopted from a version of Wagner and Sternberg's instrument: the Tacit Knowledge Inventory for Managers (TKIM) by Wagner and Sternberg (1989). TKIM was constructed to measure managerial tacit knowledge (Wagner and Sternberg, 1990). The researchers created the nine work-related simulations in a series of responses to be ranked in the test; participants were directed to rank the appropriate solution to the simulation. TKIM has been tested in eight studies of tacit knowledge in the real world. The inventory focuses on three major categories: managing oneself, managing others and managing tasks (Forsythe et al, 1998). Sub-scales of managerial tacit knowledge are presented in Table 8.

Table 8: Managerial Tacit Knowledge Sub-scales (91 items)

Sub Scales	Definitions
Managing oneself	Self-motivational and self-organisational aspects of managerial performance
Managing others	Managing subordinates; how to interact and reward
Managing task	How to do specific tasks

Source: Wagner and Sternberg (1989)

6.2.3.5 Questions on Section E (Cognitive Style)

Cognitive style was assessed using a self report questionnaire, Cognitive Style Index. This instrument was developed by Allinson and Hayes (1996) to determine an individual's position on intuitive analytical dimension of cognitive style. Of the 38 items, 21 are representative of an analyst viewpoint (e.g. 'I am most effective when my work involves a clear sequence of tasks to be performed'), whilst remaining 17 represent an intuitive point of view (e.g 'I am inclined to scan through written documents rather than read them in detail'). Items are scored: true: 2; uncertain: 1; false,

0. Scoring for intuitive items is reversed, i.e. true: 0; uncertain; 1; false: 2. The instrument therefore has a theoretical maximum score of 76, and a minimum of 0. The higher the score, the more likely the respondent is analytical. The sub-scale of Cognitive Style Index is shown in Table 9.

Table 9: Cognitive Style Index Sub-scale (38 items)

Sub-scale	Definitions
Intuitive	Immediate judgment based on feeling and the adoption of a global perspective
Analytical	Judgment based on mental reasoning and focus on detail

Source: Allinson and Hayes, (1996)

6.2.4 Determine the Form of Response to Each Question

Questions can be asked as a close-ended, open-ended, multiple choices, and two choices or to represent a scale (Czaja and Blair, 1996; Churchill 2001). However Pallant (2007) choose to classify questions into two either closed or open-ended. Questions must be designed to reflect the appropriate levels of measurement, which are nominal, ordinal, interval and ratio (Balnaves and Caputi, 2001).

Since the aim of this study is to obtain an in-depth view of managerial tacit knowledge transfer and the mediating role of leader member exchange and cognitive style, the research questionnaire is quite lengthy. The questionnaire consisted of 163 items, inclusive of demographic items. Although most researchers argue that a lengthy questionnaire is likely to lead to an increased non-response rate, Champion and Sear (1969) and Dillman (1978) noted that there is no linkage between longer questionnaires and lower response rates. Conversely, they concluded that longer questionnaires are returned more frequently than shorter ones.

They showed that “*nine-page questionnaires were returned significantly more often than a shorter three-page questionnaire*” (Champion and Sear, 1969, p.339). This view is also supported by Dillman (1978), who found that a lengthy questionnaire usually has a high return rate. The adapted questionnaire conformed to the form of response suggested and the entire questionnaire consisted of closed-ended questions to enable respondents fill in the questionnaire easily and prevent them from becoming bored.

6.2.5 Determine Wording of Each Questionnaire

Since this particular study adopted and adapted the questionnaire from previous studies, it was clear that the wording used was appropriate for measuring the intended variables. However, the entire questionnaire was a combination of multiple scales from various studies; the questionnaire was reviewed by academicians and both potential respondents in pre-testing and a pilot test. This will be discussed in greater detail later.

6.2.6 Determine Question Sequence

The determination of question sequence is fundamental in designing a questionnaire. Churchill (2001, pp. 335-337) suggested five strategies for organising the questions; he suggests using simple and interesting opening questions. The first question is very crucial. If the respondent cannot understand the first question, this might affect the remainder of the questions.

Roberson and Sundstrom (1990) found that order of questions was important because they received a higher return rate when the easier questions were given first. Secondly he proposed to use a funnel approach, starting with broad questions and progressively narrow down the scope. He also advises the researcher to design branching questions with care, ask for classification information last, and place difficult or sensitive

questions late in the questionnaire. The “funnel approach” suggested by Churchill in the formation of the sequence of questions was adopted. The easiest questions were used as an introduction where the respondents were asked to give their demographic information. Following that was a slightly more difficult question where they were asked to respond about the work-related situation.

6.2.7 Determine Questionnaire Layout

When seeking clear responses, the appearance or the layout of the questionnaire must not be disregarded. A researcher must design a questionnaire that “*looks professional and relatively easy to answer*” (Churchill 2001, p.342). Unattractive questionnaires will lead to a low response rate, as respondents might have the impression that “*the study is unimportant, and hence refuse to cooperate*” (Churchill 2001, p.337). It was found that “*well formatted questions assist response rate and accuracy of answers*” (Balnaves and Caputi 2001, p.84). To ensure accurate responses, Sproull (1988) suggests that the questionnaire should be professionally typed and printed in order to show credibility and professionalism.

Apart from this, the questionnaire must underline a clear instruction and direction (Sproull, 1988). Therefore, the researcher paid close attention to that aspect to prevent any ambiguity. Specific definitions of ‘knowledge transfer’ and ‘tacit knowledge’ were explicitly given at the start of the questions. This was to ensure all respondents would focus on the same definition and guide them in providing accurate response.

Furthermore, as Czaja and Blair (1996) stated that a covering letter is essential in introducing the study to potential respondents, the researcher followed the suggestion by introducing herself and stating the purpose and benefit of the study. The researcher

also emphasised the confidentiality of response and requested the respondent to return the questionnaire to a certain appointed person within the allocated time-frame.

The format of the questions was clear and consistent with the instructions suggested by Balnaves and Caputi (2001). With regard to the layout, the researcher made every effort to ensure it appeared attractive and professional. Each section was given a topic heading to guide respondent and each item and each response were separated in different table rows and columns. Additionally, the items were shaded in order to differentiate them from each other. To ensure that the questionnaire was user-friendly, each of the scales was provided in each question or in each page heading.

6.2.8 Re-examine Step 1-7 and Revise if Necessary

Churchill (2001, p.340) argues that “*re-examination and revision are staples in questionnaire construction*”. By taking into account the necessity of this step, the researcher also re-evaluated the questionnaire by reading it repeatedly as well as reading it out loud in order to identify any mistakes and necessary changes were made to the spelling of several words and to the layout of the questionnaire.

6.2.9 Pre-test Questionnaire and Revise if Necessary

Before the real survey is conducted, it is vital for the questionnaire to be pre-test (Converse and Presser, 1986; Czaja and Blair, 1996). Pre-test is a necessary preliminary to pilot study, especially to detect potential flaws (Czaja and Blair, 1996). They noted that

“underlying the first questionnaire draft is our judgement about what respondent will know, what words they will understand, what sorts of information they can provide, and what response task they can perform”

(Czaja and Blair 1996, p.93).

Converse and Presser (1986) further suggest that the pre-test involve the test of questionnaire meaning, the flow and naturalness of the sections, the order of the questions, timing, respondent interest and attention and task difficulty. A pre-test was carried out among postgraduate students from Hull University Business School as well as some postgraduate students from the Department of Social Science, Hull University. The purpose of this pre-test was to ensure the comprehensiveness of the questionnaire particularly in the aspect of clarity of the instruction, ambiguity of the words, and the clarity of the covering letter and also to obtain feedback about the attractiveness of the layout or any uneasiness of answering any questions (Saunders et al, 2009).

The questionnaire was distributed to the respondents together with the feedback form. They were also encouraged to write down any other relevant comment to improve the questionnaire. During their submission of the completed questionnaire and the feedback form, the researcher took the opportunity to interview them personally in order to obtain their further comments. Upon receipt of their comments, a new revised version was then presented to Professor Steve Armstrong, an expert in the study field to obtain his insight on the questionnaire. After considering his view, some changes were made to the questionnaire. The comments and actions taken as a result of that pre-testing are shown in Table 10.

6.2.10 Pilot Study and Revise if Necessary

The pilot study, according to Edward and Talbot (1996, p. 158) “*is a test-run of a data collection instrument*” and involves testing the instrument on a small number of target respondents from the population (Hall and Hall, 1996). The aim of pilot study is to provide a ground for the questionnaire to be inspected in detail before the actual survey

is undertaken (Edward and Talbot, 1996). Conducting the pilot study was an approach to ensure that the questionnaire was appropriate for the actual survey.

Table 10: Comments and Actions Taken as a Result of Questionnaire Pre-testing

Comments	Actions taken
<u>Overall</u>	
<ul style="list-style-type: none"> • Time taken to complete the questionnaire is about 30-60 minutes • Explain the purpose of study in covering letter • It would be better to put the scale in landscape orientation • Label the scale in section D • Repeat table heading at every page for the scale • Unclear English terms such as ‘state-of-art’, • For scales that involve neutral choice, add instruction to advise respondent to use the neutral scale ‘sparingly’ 	<p>It is stated in the instruction that time taken to complete the questionnaire is ‘approximately 30 minutes’</p> <p>The purpose is further explained and confidentiality is clearly stated</p> <p>Changed</p> <p>Changed</p> <p>Changed</p> <p>The questionnaire is translated into Bahasa Malaysia</p> <p>Changed</p>
<u>Covering Letter</u>	
<ul style="list-style-type: none"> • Notes to SM need to be more detailed • Do not put word ‘voluntarily’, as people will tend to refuse to complete the questionnaire • Provide space for respondents to write their email and attach business card in covering letter • Reference number should be put somewhere discreet 	<p>Changed</p> <p>Changed</p> <p>Changed</p> <p>Changed</p>
<u>Page 2</u>	
<ul style="list-style-type: none"> • Instructions to submit the completed questionnaire in page need to be clearly stated 	<p>Changed</p>
<u>Page 3</u>	
<ul style="list-style-type: none"> • Section A, item 6, should add the word ‘highest’ in front of ‘Level of education’ 	<p>Changed</p>
<u>Page 4</u>	
<ul style="list-style-type: none"> • Instruction on page 4 should not refer back to page 2 	<p>Changed</p>
<u>Page 7</u>	
<ul style="list-style-type: none"> • Scale for section C should be reversed, going from 1-5. 	<p>Changed</p>
<u>Page 8</u>	
<ul style="list-style-type: none"> • Example in section D was too long 	<p>Deleted</p>

A pilot test for the survey questionnaire was conducted among the target respondents in the Ministry of Defence, one of the Malaysian public sector organisations. The pilot test was administered between 1 April and 16 April 2010. Forty questionnaires were distributed to the respondents (8 supervisors and 32 subordinates) and all 40 questionnaires were completed and returned. All 40 questionnaires were usable and entered into the SPSS and a reliability test of the scales was conducted and details of

which will be discussed in the reliability and validity part of the questionnaire section in this chapter. A summary of Self-Report and Variables from the questionnaire described in Table 11 was made. From the pilot test, the instruction to complete the questionnaire was developed in order to guide the respondents. This instruction was developed based on the comments received from the pilot test.

Table 11: Summary of Self-Report and Dyadic Exchange Variables

Abbreviation	Name of variable	Description/question	Scores
A1	Age	Respondent's age	Actual
A2	Gender	Respondent's gender	1-2
A3	Ethnicity	Respondent's ethnicity	1-4
A4	Department	Respondent's current department	Actual
A5	Employment grade	Respondent's employment grade	1-7
A6	Highest qualification	Respondent's highest qualification	1-4
A7i	Department experience	Number of years in department (working experience)	Actual
A7ii	Organisation experience	Number of years in organisation (working experience)	Actual
A7iii	Public sector experience	Number of years in public sector (working experience)	Actual
A8	Number of staff	Number of staff currently under supervision	Actual
A9	Awards	Received excellence award in the past	1-4
A9i	Expert	Excellence award received	1-2
B1-B18	Knowledge Transfer Stickiness	Knowledge transfer stickiness items	1-5
C1-C7	Leader Member Exchange 7 (LMX 7)	LMX 7 items	1-5
DA1-DI11	Tacit Knowledge Inventory for Managers (TKIM)	TKIM items	1-7
E1-E38	Cognitive Styles Index (CSI)	CSI items	0-2

6.3 Translation Process

Malay is the official language in Malaysia, where the survey was conducted. Nevertheless, English is an essential medium and regarded as a second language. As a multi-ethnic country that comprises 3 major races, each with a distinct language, English is a useful medium.

Conducting a survey using the English language is acceptable in Malaysia (e.g Chan and Pearson, 2002; Le and Koh, 2002); however the questionnaire was translated into Malay with the aim of avoiding ambiguity as well as increasing response rate. Furthermore, the purpose of translation is to obtain a high response rate and elicit accurate responses. This was suggested by Berry (1980), who argues that translation will convey similar meanings to members of various groups.

It was recommended that translation of the questionnaire adopt four procedures (McGorry, 2000): one-way translation, double translation, committee translation and decentering. The simplest way of translation is one-way translation, where the translator was asked to review the questionnaire in the original language and translate it into the target language. One-way translation does not involve back-translation. This procedure was criticised because information could be lost through literal translation, although it involves less time and expenditure (McGorry, 2000).

Double translation, which is also known as back-translation, involves at least two translators who work independently. The translation process involves a sequence of activities wherein the first translator will translate the original questionnaire into the target language, followed by the second translator's translating the translated version of questionnaire into English. Here, the researcher will have two versions of the

questionnaire and is able to compare them to ascertain whether there are any inconsistencies, mistranslations, ambiguous meanings, or missing words. At this point, the researcher can consult with the translators and seek their advice on how to revise. Finally, the investigator will also check any inconsistency of the questionnaire (McGorry, 2000).

The third procedure is committee translation. The procedure involves two translators who are familiar with both languages of the study and asking them to conduct the translation (Marin and Marin, 1991). Following this step, they are asked to reach a consensus as to the best translation or a third translator is asked to decide. This procedure also has several drawbacks, such as some information maybe missed because the translators might not reveal each other's mistake (McGorry, 2000). Decentering was proposed by Werner and Campbell (1970) as an appropriate method of developing the instrument, particularly when conducting cross-cultural research. Since this procedure is somewhat lengthy, it was impossible to consider this option in this study.

In this particular study, the researcher adopted the back-translation procedure. Firstly, two professional translators were appointed to work on the translation independently. The first translator reviewed the questionnaire and translated it into Malay. The Malay version of the questionnaire was sent to the second translator. She then translated it into English. When the researcher received both versions, a comparison between them was made to discover any inconsistencies, mistranslations, ambiguous meanings, or missing words made and both translators were contacted to obtain their advice on revision. Finally, the researcher asked two colleagues to act as investigators and was satisfied that the questionnaire versions were almost identical.

6.4 Reliability of the Questionnaire

Reliability can be defined as the extent to which data collection techniques or analysis procedures yield consistent findings (Easterby-Smith et al, 2002; Sekaran, 2003). Collecting data in a survey involves three major steps, as identified by Thietart et al (1999). These three steps are the initial drafting of the survey and choosing scales, pre-testing to check the validity and reliability of the survey, and the actual administering of the final version. All steps need to follow certain procedures to obtain the maximum amount of relevant and usable data. Most measures of reliability and validity are expressed as correlation coefficients. Although in general their interpretation follows the standard rules of correlation, the main emphasis must be on substantial common variance (high correlation) rather than statistical significance.

Generally, there are four types of reliability of measures. There are test-retest reliability, parallel-form reliability, inter-item consistency reliability (internal consistency reliability), split-half reliability, and inter-rater or inter-observer reliability (Sekaran 2003). In order to ensure the reliability of the questionnaire, firstly the researcher examined evidence of the reliability of the four questionnaires adopted from previous literature. For the knowledge transfer stickiness questionnaire, the reported Cronbach's alphas were 0.86, 0.83 and 0.71 for causal ambiguity, absorptive capacity and arduous relationship respectively (Szulanski, 1996). Therefore, the questionnaire was judged sufficiently reliable because the alpha values were greater than 0.70 (Pallant, 2007). The LMX 7 selected to measure leader member exchange was reported to be highly reliable with Cronbach alpha ranging from 0.78 to 0.93 (Tse et al, 2006; Kacmar et al, 2007; Huang et al 2008; Hooper and Martin, 2008 and Golden and Veiga, 2008). Research using TKIM noted that it was a reliable measurement and internal consistency scores on

TKIM are 0.77 (Mahmud, 2006), 0.85 (Colonia-Wilner, 1998), 0.79 (Wagner, 1987), 0.65 (Wagner and Sternberg, 1985) (Table 12).

The CSI self-report instrument was reported to be show a favourable internal consistency and test-retest reliability (Murphy et al, 2001; Murphy et al, 1998 and Sadler-Smith et al, 2000). Reliability of the CSI is good, with test-retest correlations ranging from 0.78 to 0.90 and Cronbach alpha coefficients ranging from 0.86 to 0.92 (Allinson and Hayes, 1996; Murphy et al, 1998; Armstrong, 1999) for various managerial, professional and student groups (Table 12).

Secondly, the researcher will make use of the statistical data tests from the pilot study and final survey. The main issue of interest concerning the questionnaire is whether it is internally consistent. Consistency is defined by the homogeneity of a measure in terms of how the items of an instrument group together into factors. This was assessed by computing Cronbach's alpha (Cronbach, 1951) reliability coefficients. Furthermore, internal consistency is appropriate in this study because it uses measurements that were administered to a group of people on one occasion.

Sekaran (2003, p. 206) suggests, "*in almost all cases, Cronbach's alpha can be considered a perfectly adequate index of the inter-item consistency reliability*". Cronbach's reliability coefficient alpha indicates the degree to which variance is present in scale. Cronbach's alpha varies between 0 and 1, with higher numbers indicating greater reliability. However, Sekaran stresses that in most literature, the lowest cut-off point for a sufficient coefficient lies between 0.60 and 0.70. Furthermore, Sekaran (2003, p.312) argues that "*reliability less than 0.60 are considered poor, those in the 0.70 range, acceptable, and those over 0.80 good*".

However, according to Pallant (2007, p. 85) values for Cronbach alpha greater than 0.70 are preferred. The test of reliability for the questionnaire was carried out by performing the SPSS reliability analysis test for the 40 respondents who participated in the pilot study. The reliability between statements in the 154 items using the Likert scale was analysed by computing Cronbach's alphas. The results of the item analysis showed that the Cronbach alphas ranged from 0.872 to 0.898 for knowledge transfer stickiness, LMX 7 and TKIM. Therefore, in this study Cronbach's alphas of 0.872 to 0.898 are an authoritative source to justify that the items in the questionnaires were reliable (Table 13).

Concerning the Cognitive Style Index, the Cronbach's alpha was 0.566, which is considered low. However, it is assumed that this value was affected by the small sample size and it would be likely to increase if the sample size had been bigger. Moreover, this instrument had been found to be reliable instrument in previous research. Therefore, this Cognitive Style Index was maintained. The details of the internal consistency of the test are presented in Table 13.

Table 12: Comparison of Cronbach's alpha (α): Previous Studies and Pilot Study

Scale	Previous Studies (α)	This Study (α)
Knowledge Transfer Stickiness (18 Items)		.872
Causal Ambiguity	.86	.569
Absorptive Capacity	.83	.878
Arduous Relationship	.71	.574
Leader Member Exchange 7 (LMX 7)	.78 - .93	.899
Tacit Knowledge Inventory For Managers	.65- .85	.898
Cognitive Styles Index	.86 - .92	.566

Table 13: Internal Consistency Reliability of the Measurement (Pilot Test)

	Mean	SD	α
Causal Ambiguity	13.47	4.012	.569
Absorptive Capacity	17.63	7.953	.878
Arduous Capacity	2.98	1.031	.574
Knowledge Transfer Stickiness	34.8	11.38	.872
LMX7	24.75	5.801	.899
Managing self	162.03	15.438	.811
Managing others	137.08	14.835	.722
Managing tasks	160.39	15.465	.849
TKIM	459.50	37.404	.898
CSI	41.583	6.44849	.566

6.5 Validity of the Questionnaire

Validity can be defined as the agreement between a test score or measure and the quality it is believed to measure. Basically, validity can be grouped under three broad headings that are content validity, criterion validity and construct validity (Sekaran 2003, p. 207). Criterion validity can be divided into predictive and concurrent validity, while construct validity includes convergent and discriminant validity.

According to Sekaran (2003, p. 207) content validity "*ensures that the measures includes an adequate and representative set of items that tap the concept.*" He further stresses that content validity "*is a function of how well the dimensions and elements of a concept have been delineated*". In other words, it is the extent to which a scale measures the concept it is intended to measure. It is largely a logical process that does not require statistical analysis. The questionnaires included in this study have content validity since

they were derived from instruments that had been tested repeatedly in exhaustive literature.

For instance, the construct validity of LMX 7 has been repeatedly confirmed in previous studies (Graen et al, 1982; Scandura and Graen, 1984; Ferris 1985; Scandura et al, 1986 and Tierney, 1999). Similarly, cognitive style index construct validity is indicated by items loading on a single factor in most previous studies, and significant correlations with various personality dimensions (Allinson and Hayes, 1996), job level (Allinson and Hayes, 1996; Armstrong, 1999; Allinson et al, 2001) and national culture (Allinson and Hayes, 2000).

In the development of TKIM, Sternberg et al (2000) presented the construct validity by stating that they firstly interviewed job incumbents on their personal experience. Secondly, these job incumbents were required to rank the quality of tacit knowledge items. *“These ratings (i.e, items and variances) may provide evidence regarding the relevance of tacit knowledge items to underlying construct”* (Sternberg et al, 2000, p.139). Apart from that, they also interviewed experts in the domain at various stages of development to judge the significance of items to the tacit knowledge construct. In term of convergent validity, TKIM was shown to have a significant relationship with the performance criterion (Sternberg et al, 2000).

With regard to the knowledge transfer stickiness questionnaire, Szulanski (1996) noted that *“Multi-item scales were developed for all constructs to ensure the reliability and validity of the measurement system”*. He developed the items of this measurement by conducting a broad and thorough literature review followed by an in-depth clinical test in order to refine the selected construct as well as to determine the most relevant items.

The items selected were also obtained from the pilot test as well as refined using a full data set.

6.6 The Administration of the Questionnaires

The final questionnaires in booklet layout were sent to respondents in two waves of data collection. This booklet consisted of the official covering letter as well as the whole set of questionnaires. These questionnaires were pre-packed in one envelope to be distributed to the respondents.

The senior manager was instructed to choose 2 subordinates under his/her supervision whom he/she considered to be among the best performers, or in-group, and 2 subordinates under his/her supervision that he/she considered to be among the poorest performers, or out-group. The difference between better performers and poorer performers is basically dependent on the perspective of the leader who supervises them. Normally their assessments will be based on job performance. The rationale of this differentiation was to distinguish between the in-group team and the out-group team. This approach was adopted from Schriesheim et al (2001).

The “in-group” subordinates were referred to as ‘MI-G1’ and ‘MI-G2’, while those who are referred to as the “out-group” were referred as ‘MO-G1’ and ‘MO-G2’. All questionnaires were coded accordingly to ensure that the dyadic relationship between the supervisor and subordinate was properly matched.

6.6.1 Questionnaire Distribution

The questionnaire pack consisted of 5 sets of questionnaire. Each of the packs contained a set of question for supervisors and four sets of questions for subordinates. This

questionnaire pack was distributed to the supervisor. This supervisor was asked to appoint four subordinates under their supervision. The appointed subordinates had to fulfil the criteria stated in the instructions given in the questionnaire. Each pair of these subordinates had to represent the *in-group* subordinates or the *out-group* subordinates. The supervisor then distributed the questionnaire to the appointed managers.

The distribution of the questionnaire was conducted in two waves. The aim of this distribution strategy was to obtain the maximum number of responses. Since the nature of the study required dyadic units of analysis, the researcher made every effort to ensure that the data collected was sufficient for the study.

The first wave of data collection was conducted with the senior managers who participated in training courses in INTAN from June to December 2010. The participants were requested to complete the questionnaires during training. However, the distribution of questionnaires to their subordinates was assisted by the researcher due to their training schedule. The participants only had to write down the names of their appointed subordinates on the prepared form.

The second wave of data collection was conducted in the offices of the respondents. The questionnaire was distributed to 27 ministries in the Malaysian public sector located in Putrajaya and Lembah Klang. The centre for distribution was the Human Resource Department of each ministry, where the human resource manager (HRM) was appointed as the contact person for the researcher. To ensure full coverage of respondents, the researcher obtained the list of supervisors and subordinates in that particular ministry from the HRM. The researcher then approached the supervisors in the ministries and delivered the questionnaire packs to them by hand. The researcher also briefed the

respondents on the study in general and the methods of questionnaire completion. This list of senior managers was then used in guiding the researcher in the follow-up meetings and phone calls.

6.6.2 Data Collection

Two weeks after the questionnaires were distributed, the researcher contacted all the respondents by e-mail and telephone as well as by reminder letters on various occasions in order to increase the response rate. This strategy was suggested Larson and Chow (2003), who asserted that follow-up by mail will raise the response rate.

6.7 Scoring

6.7.1 Knowledge Transfer Stickiness

This measurement with 16 items used a 5-point Likert Scale, and 2 items used 4-point scale. According to Szulanski (1996) the score is derived by totalling up all the items. Therefore, the minimum score is 18 and the maximum score is 88. The score that is nearest to the maximum 88 is considered to represent a high level of barriers to transferring knowledge, and vice versa. In the situation where analysis was conducted according to the level of knowledge transfer stickiness, the total score was split into two using the median split procedure. Thus, the low level of knowledge transfer is between 0-31 score, while the high level of knowledge transfer stickiness is between the score of 32-88. The median split was conducted in order to analyse the data according to low and high levels of stickiness because according to Szulanski and Jensen's (2004) study, it was found that the leaders role is required during high levels of knowledge transfer as compared to low levels of knowledge transfer.

6.7.2 LMX7

This measurement with 7 items used a 5-point Likert Scale. According to Trukenbrodt (2000), the score is derived by totalling up all the items. Therefore, the minimum score is 7 and the maximum score is 35. The score that is nearest to the maximum 35 is considered to represent a high quality of leader member exchange and the score nearest the minimum 7 is considered to represent a low quality of leader member exchange.

6.7.3 Tacit Knowledge Inventory for Managers

TKIM consisted of 91 items, with a 7-point Likert scale. The TKIM scoring was done using the criterion expert-novice differences as discussed in Chapter 7, section 7.3.3. Following Wagner and Sternberg's (1991) TKIM scoring instructions, participants' scores on the TKIM were derived by subtracting their answers on an item from the mean expert profile answer for that item, and then taking the absolute value of the difference. All these absolute values were then combined to create a total sum score (Menkes, 2002). This *difference score* procedure gives rise to a score for the level of managerial tacit knowledge for every novice group. The relative level of managerial tacit knowledge obtained from the respondents ranged from 0 to 5.19. Sternberg and Grigorenko (2001) stated that a small range of scores was derived in most research involving difference scoring, such as in expert-novice comparison study.

6.7.4 Cognitive Style Index

This measurement, with 38 items used 2, 1 and 0 scales. Therefore, the minimum score is 0 and the maximum score is 76. The score that is nearest to the maximum 76 is considered to represent high level of analytical style and the score nearest the minimum 0 is considered to represent a high level of intuition (Armstrong et al, 2002). The total

score of cognitive styles was suggested to be split using median split in order to differentiate between analytic and intuitive styles (Allinson et al, 2001). However, in this study, the total score was divided into three using 33% percentile due to high median that is 50. Thus, the range of these 3 styles are firstly from 0-38 score (Intuitive), 39-48 score (Integrative) and 49-76 score (Analytic). This approach was conducted in Priola and Armstrong (2001).

6.8 Conclusion

This chapter has thoroughly discussed the questionnaires' development, reliability and validity, as well as the administration of questionnaire. The discussion emphasised the steps taken to ensure that the questionnaire was developed in an appropriate approach with due regard to the reliability and validity of the instrument. The development process was systematically designed according to an academic approach. Hence, the questionnaire went through a rigorous process in which it was pre-tested followed by a pilot test with the aim of arriving at a highly reliable and valid instrument. In the chapter, the second main focus was on the administration of the questionnaire. The administration of the survey involved two waves of distribution to enhance response rates. In the following chapters, the central discussion will be on the treatment data and the descriptive analysis of the data collected.

7 DATA TREATMENT

7.1 Introduction

This chapter presents a treatment of data from responses gathered in the survey. This treatment is important in order to prepare the data for statistical analysis techniques in the subsequent chapter. All of the results were generated from the Statistical Package for Social Sciences (SPSS) version 18.0 for Windows.

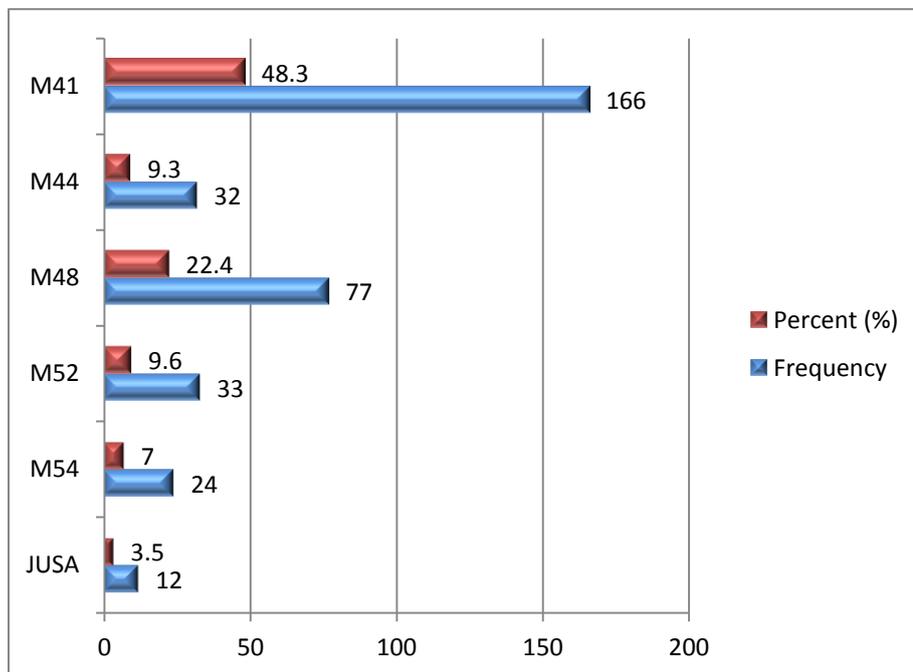
All forms of statistical analysis assume sound measurement and data which is free from coding errors. It is therefore good practice to run descriptive statistics on the data so that one can be confident that data are generally as expected in terms of means and standard deviations. Thus, before performing any data treatment, a range of descriptive analyses using frequencies, mean, standard deviation and graphs to examine the distribution of the responses was conducted. Firstly, data treatment involved data screening; namely, assessing the accuracy of data entry; determining outliers, estimating normality, and multicollinearity. Next, the data were examined in an attempt to arrive at the reliability of the measurement by means of Cronbach's alpha. Secondly, the data gathered for leader member exchange measurement were analysed by measuring the nonindependence of the data for dyadic treatment. Thirdly, the data were treated by developing the expert profile of managerial tacit knowledge in the development of the difference score of this variable. The cognitive style of the respondents was also intensified into a score of difference between the supervisors and subordinates.

7.2 Data Description

7.2.1 Responses to Survey

The target population of this study consisted of Administrative and Diplomatic Services in the Malaysian public sector. The survey was distributed to 1200 respondents, and 344 questionnaires were completed and returned to the researcher, which is a 28.7% response rate. The survey was administered to a stratified random sample of members of the Services, who are divided into 6 different grades, namely Grade JUSA, Grade M54, Grade M52, Grade M48, Grade M44 and M41. Figure 12 shows that highest response rate (48.3%) was received from Grade M41, which reflects the nature of Services, which have a wide base and a large number of executives at the lower level.

Figure 12: Response Rate Based on Job Grade



7.2.2 Respondents' Profiles

This section provides the background of the respondent who participated in the survey. The characteristics examined include age, gender, ethnicity, job grade, highest academic qualification, working experience in public sector and service excellent award received.

Figure 13: Ages of Respondents

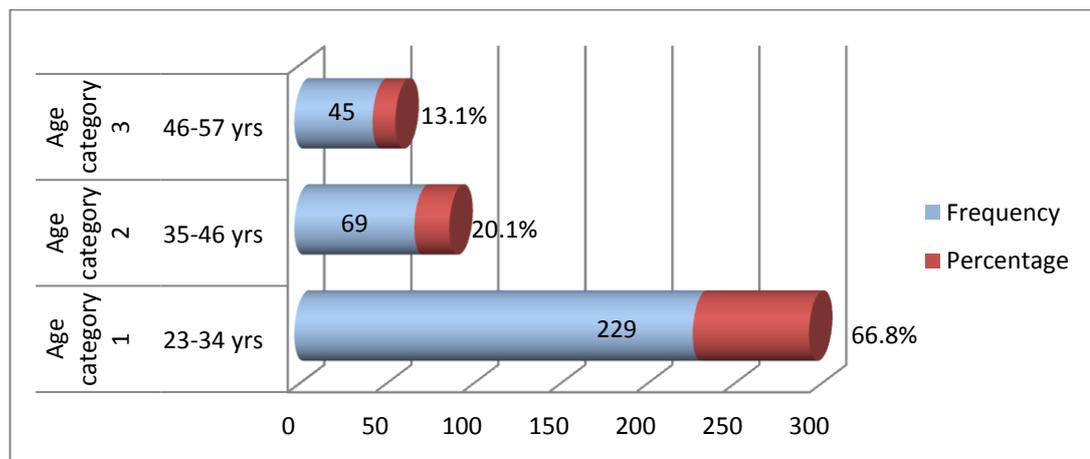
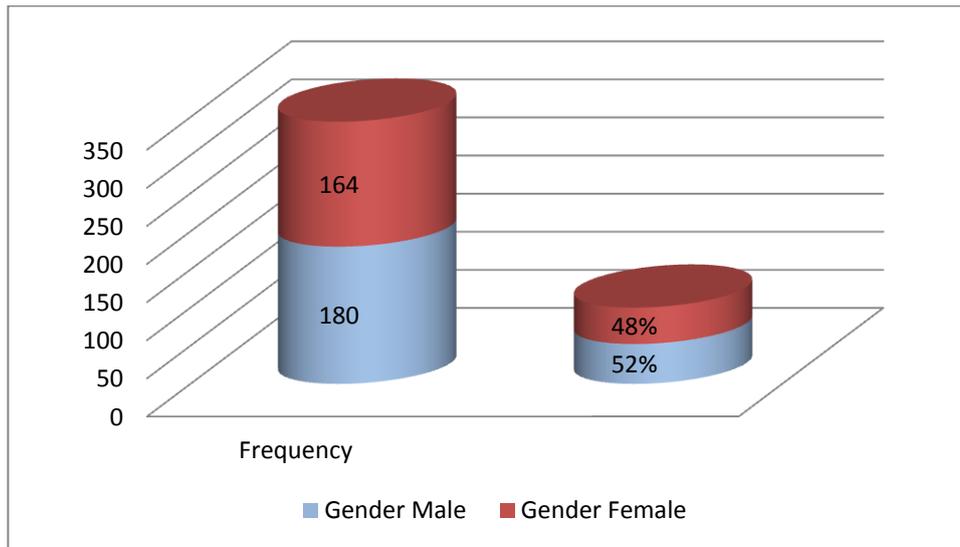


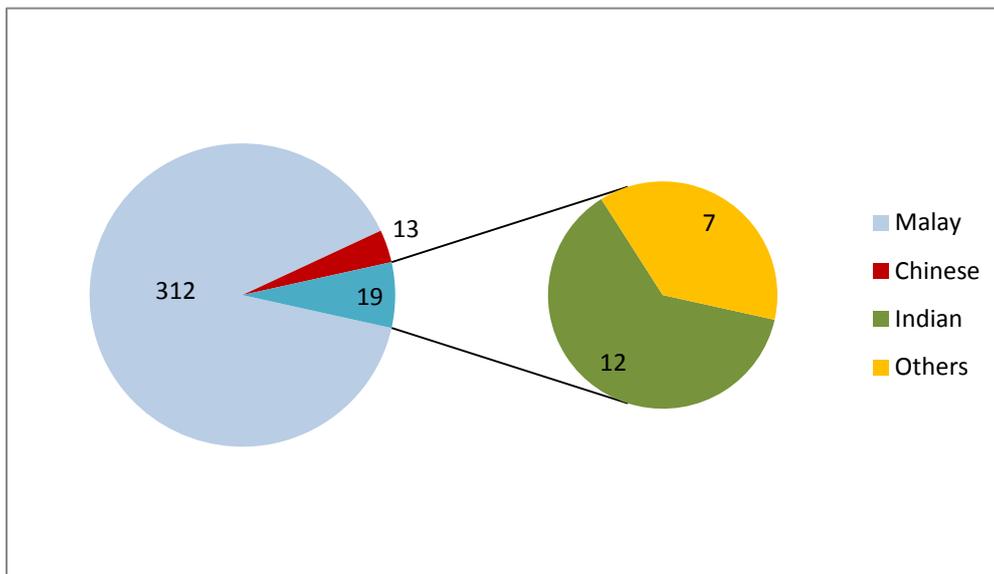
Figure 13 presents the ages of the respondents in three categories. Firstly, category one represents the age group from 23 to 34. In the second category, there are 69 respondents whose ages range from 35 to 45, while the third category consists of respondents aged between 45 and 57. It can be seen from Figure 13 that the respondents' ages are consistent with their job grades (Figure 16) and working experience (Figure 18). This is reasonable because the older the respondents are, the more likely they are to have served longer in the public sector and as a consequence, their job grade is also likely to be higher. Only a small percentage of the respondents aged 46 or over have a job grade and working experience which are not as expected due to their having joined the public sector later in life.

Figure 14: Gender of the Respondents



In relation to gender, it is almost equally balanced between males (52 %) and females (48%), showing that the Administrative and Diplomatic Service in the Malaysian public sector consists of an approximately equal number of officers from both genders.

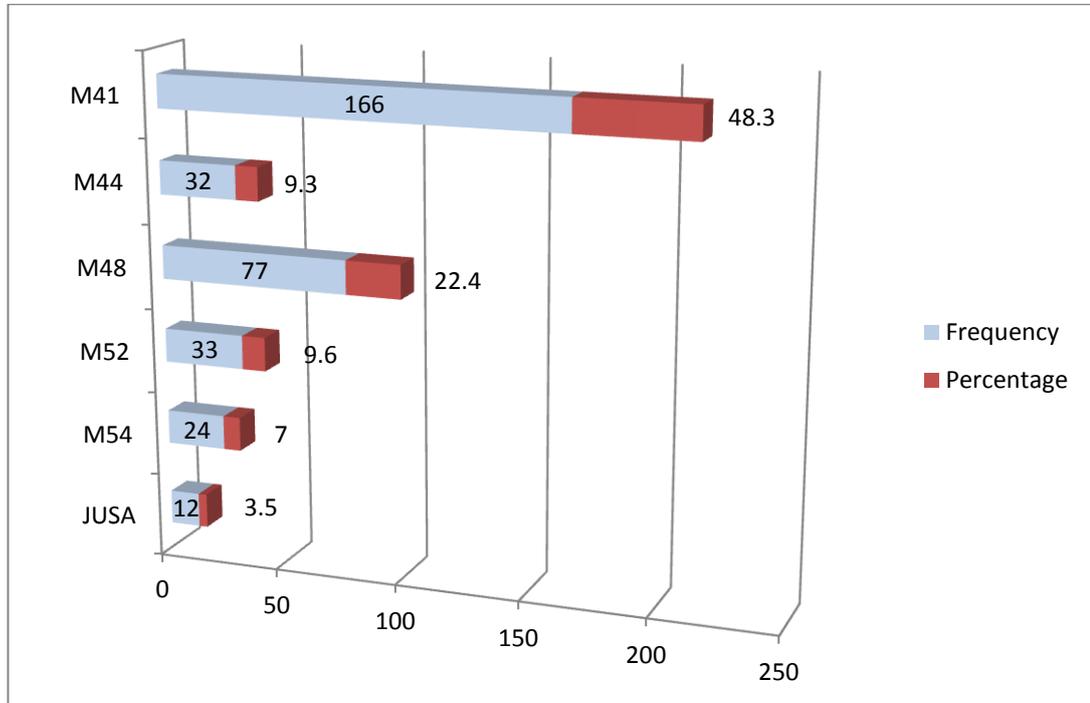
Figure 15: The Ethnicity of Respondents



The percentages of respondents' ethnicity reflected the fact that this service attracted mainly Malays ethnic (90.7%), followed by Chinese with 3.8 %, Indians with 3.5 % and

others with 2%. This is not representative of the Malaysian population as a whole, as described in Chapter 2.

Figure 16: The Grades of Respondents

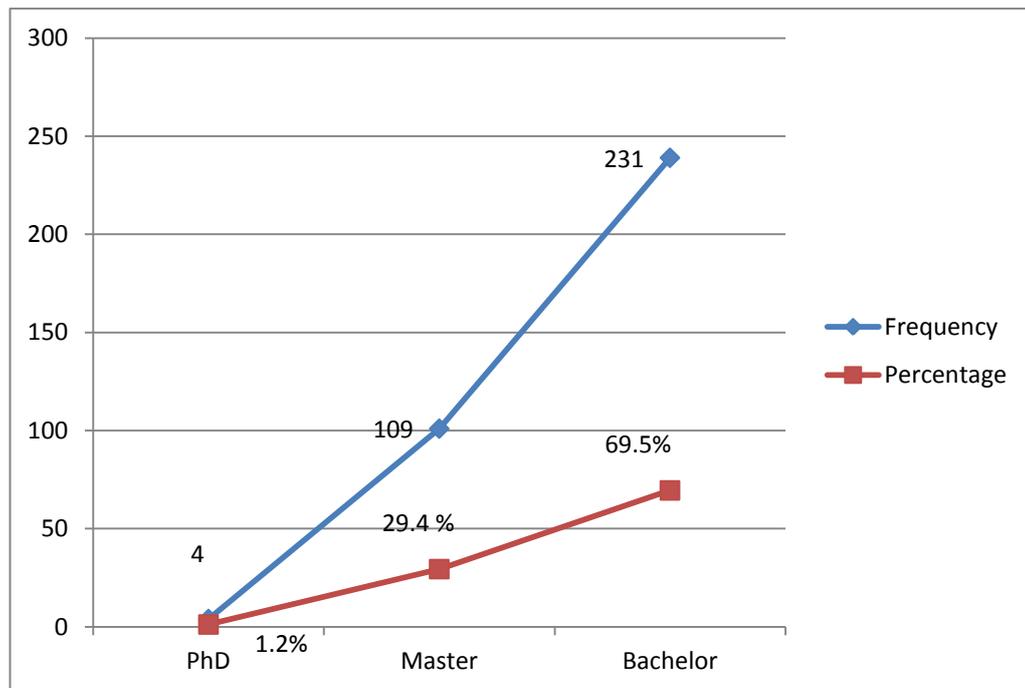


By examining the respondents' job grades (Figure 16), it can be seen that the fewest responses were collected from senior managers (JUSA, M54 and M52) with a cumulative percentage of 20.1%. These senior managers were regarded as the supervisors in this study while the remaining respondents from grades M48, M44 and M41 were treated as the subordinates.

The respondents were also requested to state their highest academic qualification in order to investigate their formal education. The result is illustrated in Figure 17. Among all the respondents, only 4 had a PhD qualification, while 109 respondents had a Master's degree and the rest held a Bachelor's. The information on age group indicates that most of the respondents were aged between 23 and 34 (63 % or 217 respondents).

As mentioned previously, this is likely to be consistent with the profile related to job grade and working experience. Working experience is one of the most important background variables in this study (Figure 18).

Figure 17: The Educational Background of the Respondents

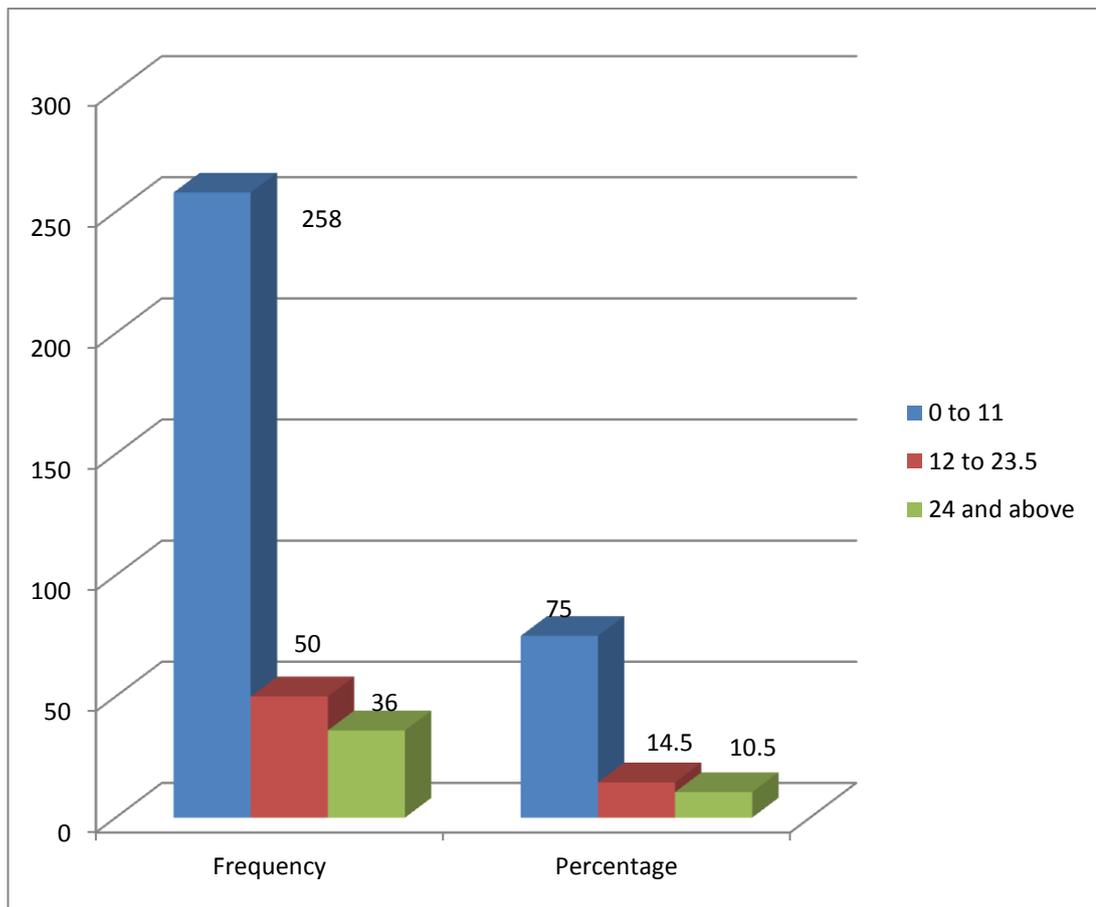


It shows the duration of respondents' service in the public sector and it is highly related to their experience. Experience is regarded as crucial in tacit knowledge study. From Figure 18, it can be seen that 75% or 258 respondents have worked for less than 11 years, while only 14.5% of respondents (50 respondents) have working experience of more than 12 years but less than 24 years. Moreover, 36 respondents (10.5%) have been working for more than 24 years in public sector.

Similarly, the data related to service excellence award were collected to assist the creation of the expert profile. A detailed explanation of expert profile is discussed in section 7.3.3 in this chapter. As illustrated in Figure 19, 199 managers, or 57.8%, have

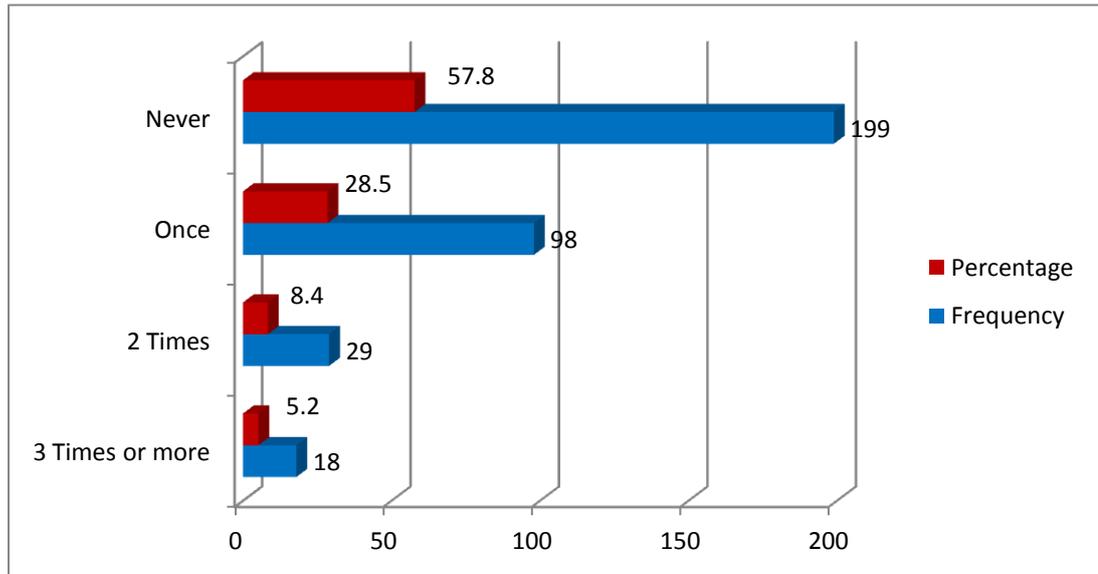
never been awarded for service excellence. This number mostly consists of respondents from grade M41. They are newcomers in the public sector; consequently, they have never been awarded the service excellent award.

Figure 18: Working Experience of the Respondents



It is noted that only 98 respondent have received the award only once. The remaining respondents have received the award twice (29 respondents), and 18 of them have received the award more than 3 times award in the course of their service.

Figure 19: The Record of Service Excellent Award Received by Respondent



7.3 Descriptive Statistics

Descriptive statistics are used to describe the characteristics of the sample and assess any violation of the assumption underlying the statistical techniques. Descriptive statistics involve mean, standard deviation and range of scores. The descriptive statistics are shown as follows.

Table 14: Descriptive Statistics of the Variables

		N	Range	Mean	Std. Deviation
Knowledge	Transfer	344	18-59	32.21	7.8
Stickiness					
Leader Member Exchange		621	17-35	26.38	3.7
TKIM		344	53-124	87.5	17
Cognitive Style		344	35-63	49.49	5.9

Tables 14 and 15 summarise the descriptive statistics for the variables and their subscale.

The summaries of descriptive statistics are based on a total sample of N = 344. These figures are from the original data, before treatment. Generally all the figures, namely

range, mean and standard deviation of the variables and their subscale is reasonable, particularly if compared to the scale and number of items in the survey.

Knowledge transfer stickiness is the instrument with 18 items whose minimum score is 18 and maximum, 88. From the descriptive statistics in Table 14 it can be seen that the range of the scores is between 18 to 59, which is somewhat low and this is consistent with the low mean ($M = 32.21$). From this figure, it can be understood that most of the respondents have a low score for knowledge transfer stickiness. Second comes LMX 7, with 7 items using a 5-point scale Likert scale. The minimum score is 7 while the maximum score is 35. Table 14 illustrates that the scores for leader member exchange ranges from 17 to 35, which is slightly higher, with $M = 26.38$.

Table 15: Descriptive Statistics According to Sub-scale

	N	Range	Mean	Std. Deviation
KNOWLEDGE TRANSFER STICKINESS				
Causal Ambiguity	344	7-22	12.1	2.9
Absorptive Capacity	344	9-35	17.3	6.04
Arduous Relationship	344	2-8	2.83	.94
TKIM				
Managing Self	344	10-49	27	6.8
Managing Others	344	15-57	32	8.4
Managing Task	344	13-57	27	6.8
COGNITIVE STYLE				
Intuitive	7	35-37	36.3	.75
Integrated	144	38-48	44.5	2.8
Analytic	193	49-63	53.7	3.5

TKIM consist of 91 items with a 7-point Likert scale. The scores of TKIM are on the basis of the difference in scores of the expert group and the novice group, as discussed in this Chapter, section 7.3.3. The responses for TKIM range from 53-124, with a mean

score of $M = 87.5$. The cognitive style index contains 38 items, utilising 2, 1 and 0 scales, where the minimum score is 0 and maximum score is 76. Table 14 shows that the score for cognitive style is inclined to be fairly high (range from 35-63), with the $M = 49.49$. The responses imply that most of the respondents are analytical.

7.4 Internal Reliability

The internal reliability for the various instruments used in this study was tested using Cronbach's alpha. The results shown in Table 16 reveal that the internal reliability analysis conducted for instruments are acceptable, being above .7 (Nunnally, 1978; Sekaran, 2003; Hair et al, 2006) except cognitive style index. The values of Cronbach's alpha (α) range from 0.77 to 0.83 for knowledge transfer stickiness, LMX7 and TKIM. This indicates that these respective measures are proven to be good. Furthermore, Cronbach's alphas for all 154 items represent a very good internal consistency in measuring the reliability of the questionnaire as a whole with α 0.77. With regard to internal consistency of cognitive style index, which is considerably lower, this will be discussed in a later part of this section.

Responses to specific questions were analysed and differences between questions which combine to form a single construct examined. It is the most common form of internal consistency reliability coefficient (Hair et al, 2006). The purpose of Cronbach's alpha is simply to provide an estimate of consistency across all items. Moreover, the coefficient alpha (α) is appropriate for items that are not scored as right or wrong. Thus, it is used for all items of scales from Section B to Section E of the questionnaire. Each of the scales used was measured in a range representing (1) strongly disagree to (5) or (7) strongly agree, and (3) or (4) represented indifference. Apart from that, the cognitive style index was used for the scales in a range representing (0) true to (2) false, and (1)

demonstrating uncertain. The negative worded items in this questionnaire, particularly cognitive style index were reversed before performing the reliability test. The reliability of the questionnaire in this study, particularly for Knowledge Transfer Stickiness, LMX7 and TKIM, is sufficiently strong to support the study results.

The coefficient alpha (α) of Cognitive Style Index in this study is 0.45, which is rather low. Even though this result is not consistent with most of the previous research conducted, it is similar to the internal reliability reported in comparative study of cognitive style in Egypt, Greece, Hong Kong and United Kingdom (Savvas et al, 2001). Savvas et al (2001) reported a low coefficient alpha in both studies conducted with the Egyptian respondents, with a coefficient ranging from 0.32 to 0.43.

As the results from prior studies (Allinson and Hayes, 2000; Sadler-Smith et al, 2000; Savvas et al, 2001) indicate that cognitive styles are affected by cultural differences, it is reasonable to note that this particular study is also affected by cultural differences, as Malaysia one of Asian countries. Additionally, the findings from study 2 are supported in another cross-national study (Allinson and Hayes, 2000), which revealed that UK managers were more intuitive than their counterparts from Hong Kong.

It was further added that cognitive processes are not universal (Nisbett et al, 2001). Moreover, Hui and Triandis (1985) assert that some concepts are universal while others are only meaningful at a certain location or time. They point out the example of ability, which is broadly defined as life-sustaining skills in an electronic-technological age, which might be as specific as the knowledge of using computer, as it is clear that certain people have higher abilities than others. Therefore, a similar logic could be applied in psychological domain, such as with cognitive style in this context.

Table 16: Reliability Test of the Variables

		N	N of items	Std. Deviation	Mean	α
Knowledge Stickiness	Transfer	344	18	7.8	32.2	.79
Leader Exchange	Member	621	7	3.8	26.4	.78
TKIM		344	91	17.2	87.5	.83
Cognitive Style Index		344	38	5.9	49.5	.45
All items		344	154	19.8	195.2	.77

A study examining measurement equivalence in cross-national research by Mullen (1995) indicated that one type of measurement equivalence is metric equivalence. He stated that there were two threats to metric equivalence in cross-national research: inconsistent scoring across populations and scalar inequivalence. He agreed with Davis et al (1981), Douglas and Craig, (1983) and Parameswaran and Yaprak (1987), who report that respondents in some countries may not be as familiar with various scaling and scoring formats as those in other countries. This may result in inconsistent scoring which poses a threat to the reliability of the measurements. This may be the case in the cognitive style index in this study.

Mullen (1995) further added that scalar inequivalence issues refer to whether the scores obtained from respondents in different countries have the same meaning and interpretation. He argued that scores may differ due to cultural characteristics, such as social desirability, acquiescence, evasiveness, or humility which may influence respondents scoring. Mullen (1995) cited the research conducted by Lee and Green (1991) where they questioned the metric equivalence of their seven-point scales across Korean and U.S samples because Koreans, who tend to avoid extremes, prefer responding around the mid-points on the scales. Consequently, it is reasonable to

suggest that the low reliability of cognitive style in this study is affected by scalar inequivalence due to cultural differences. It is possibly the case that Malaysian people are also inclined to respond around the mid-points, which is 'uncertain' in the Cognitive Style Index.

Additionally, in a study on diversity in organisational groups, Miliken and Martins (1996) found that diversity affects outcomes such as turnover and performance through its impact on affective, cognitive, communication and symbolic processes. They listed a number of types of diversity, but the study is concerned with age and organisational tenure. They found that subordinates who were dissimilar from their supervisor in age appeared to experience higher level of role ambiguity and lower level of positive affect and indirectly, lower performance evaluations. They also added that individuals who were different from others in their job classification on tenure were more likely to leave, and varying in organisational tenure from the members of one's work unit was positively related to psychological commitment and intention to stay, and negatively related to frequency of absences.

In this particular study, it was found that there was a significance difference in cognitive style among different age groups, with the significant F value, $F = 3.741$, $p < .05$. The LSD multiple comparison asserts that those in the age group of 23-34 ($M = 48.9$) are convincingly different from members of the age group of 47 to 57 ($M = 51.09$). Therefore, in this study, the age differences might influence cognitive styles of the respondents.

At the supervisor-subordinate dyad level, similarity in job tenure was positively related to supervisor affect for the subordinate (Tsui and O'Reilly, 1989; Judge and Ferris,

1993) and to performance ratings by supervisors (Tsui and O'Reilly, 1989). Tsui and O'Reilly (1989) also found that similarity in job tenure related negatively to subordinates' role ambiguity. This findings suggests that supervisors may identify with subordinates who have been with the company a similar amount of time, and this level of identification may influence behaviours such as how long they spend explaining the work as well as their evaluations of subordinates.

Again, in this particular study it was found that respondents with different working experiences were significantly different in terms of their cognitive style. The analysis of variance performed produce a significant $F = 5.340$, $p < .01$. Subsequently, the LSD multiple comparison suggested that there was a significant difference between the group of newcomers whose working experience was 0 to 11 years ($M = 48.92$) and the group of those with 12 to 23.5 years of working experience ($M = 51.68$).

This present study also used test re-test reliability specifically to examine the consistency and stability of the Cognitive Style Index over time (Sekaran, 2003). The result of the test re-test reliability ranged from 0.45 to 0.578. The result achieved during the pilot test is also consistent with the coefficient alpha of .566. The result implies that Malaysian managers consistently responded to the cognitive style index, which suggests that there is no effect of a lengthy questionnaire. It might also offer an insight that the Cognitive Style Index in the Malaysian context is affected by cultural differences, as previously discussed.

7.5 Data Treatment

Prior to any analysis, it is recommended that the data be screened (Tabachnick and Fidell, 2001). The accuracy of data files in this particular study was ensured by

proofreading the original data against the computerised data file in the SPSS programme as well as by an examination of descriptive statistics. Besides, graphic examination of the variables such as by histogram, stem and leaf diagram, scatter-plot and box-plot was also used.

The data treatment involved three different activities. Firstly, treatment of the whole dataset, which involved data screening for any possible errors, assessing outliers, assessing multicollinearity, checking for missing values and testing for data assumptions. Secondly, it involved dyadic types of data. Thirdly, it was related to the data preparation for managerial tacit knowledge transfer, particularly the formation of an expert profile and the creation of the difference score for cognitive style.

7.6 Treatment of Individual Datasets

7.6.1 Checking For Errors

Checking for errors refers to seeking for values that fall outside the range of possible values. An inspection of the frequencies of each variable and all the errors were corrected. Categorical data as such gender, ethnic, education, job grade was checked by an analysis of descriptive statistics, particularly frequencies, while continuous variables were analysed using descriptive statistics as well as frequency.

7.6.2 Outliers

An outlier is *'a case with such extreme value on one variable (a univariate outliers) or such a strange combination of scores on two or more variables (multivariate outlier) that it distorts statistics'* (Tabachnick and Fidell, 2001, p.72). Outliers have also been defined as *'observations with a unique combination of characteristics identifiable as*

distinctly different from the other observations' (Hair et al, 2006, p.73). Outliers can have a substantial impact on analysis. They can be beneficial or problematic depending on the context of the analysis. The outliers may be beneficial when they indicate the characteristics of the population while they may be problematic when they do not represent the population, and thus distort the analysis. It is recommended to check the outliers and mitigate their effect prior to the main analysis (Hair et al, 2006).

To identify the outliers in this study, the standard scores, which have a mean of 0 and a standard deviation of 1, were examined for all variables. Cases with standard scores of 3 or 4 are regarded as outliers (Hair et al, 2006) for a large sample size. Therefore, considering the large sample size in the study (N=344), the cut-off point for identifying outliers was 3. Apart from this, the box-plot and casewise diagnostic were also used to identify the outliers. The results of this analysis indicate similarity. Consequently, it was decided that all the cases that exceeded the standard scores of 3 would be deleted.

Following the step, the multivariate outliers were assessed by the Mahalanobis D^2 measure. This method measures each observation's distance in multidimensional space from the mean centre of all observations, providing a single value for each observation (Hair et al, 2006). From this measure, no multivariate outlier was determined.

Outliers can be classified into four classes (Hair et al, 2006). Firstly they arise from procedural error, data entry error or coding mistake. This type of outlier should be eliminated or recoded as a missing value. Secondly, they occur as a result of extraordinary event, such as a hurricane in a daily rainfall tracking. In this situation, the researcher could decide to delete or retain the data on the basis of their research question. Thirdly, there are outliers that consist of extraordinary observations without

any explanation and finally those that fall within the ordinary range of observation. This type of outlier is not exactly high or low, but unique in their combination. In these circumstances, the outliers should be retained unless specific evidence is available that discounts them outliers as valid members of the population (Hair et al, 2006). The outliers in this particular study fall into the fourth class. Since deletion of the outliers offers a better analysis result, it was decided to delete them.

7.6.3 Assessing Multicollinearity

Multicollinearity represents “*the degree to which any variables effect can be predicted or accounted for by the other variables in the analysis. As multicollinearity rises, the ability to define any variables effect is diminished. The addition of irrelevant or marginally significant variables can only increase the degree of multicollinearity, which makes interpretation of all variables more difficult*” (Hair et al, 2006, p. 24).

Multicollinearity was checked with variance inflation factor (VIF) values, using SPSS to assess its possibility. The VIF values, which were well below the common cut-off threshold of 10.00, indicate the absence of multicollinearity (Hair et al, 2006). The results revealed that, in all cases, the VIF statistic was well below the cut-off of 10.00, ranging from 1.010 to 1.594. The results were consistent with the rule of thumb recommended by Hair et al (2006). Multicollinearity is therefore unlikely to threaten parameter estimates.

7.6.4 Assessing the Assumptions

Testing for the assumptions underlying the statistical bases for multivariate analysis is the final step in examining data. It is an important process to establish the foundation for multivariate techniques from which statistical inferences and results are drawn. When the assumptions are violated, the results may be distorted and biased in

multivariate analysis due to the complexity of the relationships. Some techniques are robust and less affected by assumption violation; however, successful analysis may derive from meeting some of the assumptions. The assumptions are tested for two levels; the test for an individual variable (univariate), and the collective test for all the variables (multivariate) (Hair et al, 2006).

Normality is the most fundamental assumption in multivariate analysis. It refers to '*the shape of the data distribution for an individual metric variable and its correspondence to the normal distribution, the benchmark for statistical methods*' (Hair et al, 2006, p.79). 'Normal' is used to describe a symmetrical, bell curve, with the greatest frequency in the middle, and smaller frequencies towards the extremes (Gravetter and Wallnau, 1996). It is claimed that the departure from normality may lead to invalid statistical results; thus, the normality test must be addressed. Univariate normality for an individual variable can easily be tested by assessing the graphs including histogram and normal probability plot, and statistical test for normality, particularly the Kolmogorov-Smirnov and Shapiro-Wilk tests (Tabachnick and Fidell, 2001).

Data assumption can be assessed by looking into the skewness and kurtosis of the data distribution, calculating trimmed mean and producing histogram, normal Q-Q plots, detrended normal Q-Q plots and boxplot. The most reliable test of normality is Kolmogorov-Smirnov (Pallant, 2007, p.62) stated that a non-significant result (significant value of more than 0.05) indicates normality.

In assessing the normality of distribution, 4 techniques discussed earlier were used. The test shows that the data was non-normally distributed, particularly in Knowledge Transfer Stickiness (KTS), Leader Member Exchange (LMX), Tacit Knowledge

Inventory for Managers and Cognitive Style Index (CSI). The result of the Test of Normality seen in Table 17 shows that Kolmogorov-Smirnov of KTS, LMX, TKIM and CSI are significant, with values of less than 0.05. Therefore, the distributions of the scores of these variables are non-normal.

Table 17: Test of Normality

Variables	Kolmogorov-Smirnov			Shapiro-Wilk		
	Stat	df	sig	Stat	df	Sig
Knowledge Transfer Stickiness	.064	344	.002	.977	344	.000
Leader Member Exchange	.060	621	.000	.988	621	.000
Tacit Knowledge Inventory	.055	344	.016	.981	344	.000
Cognitive Style Index	.052	344	.028	.990	344	.017

To remedy non-normality, data transformations were conducted several times by trial and error. The distributions of variables were immediately reassessed after all of the transformations in order to check normality. Squared transformations were performed for negative skew while logarithm and square root were undertaken to transform positive skew. Inverse was used to transform flat distribution (Pallant, 2007). Unfortunately, none of the data transformations were successful; hence, transformations are not helpful for this study. It is claimed that the negative effects of non-normality are serious with a small sample size that is fewer than 50 cases (Hair et al, 2006).

However, according to Hair et al (2006), sample size has the effect of increasing statistical power by reducing sampling error with the result that larger sample size reduces the detrimental effects of non-normality. “*Significant departure from normality can have a substantial impact on results if the sample size is less than 30, conversely sample size more than 200 or more, these same effects can be negligible*” (Hair et al,

2006, p.72). Since the sample size of this study is 344, i.e. more than 200, therefore this non-normality can be negligible. Further analyses are thus provided on this basis.

7.6.5 Summated Score

The score of each individual item in each scale was summated in order to create a total score of each key variable. The scoring of the each items and variables is discussed in section 6.7 of Chapter 6. Following Spector (1992), a summated rating scale for four characteristics was used in this study. The scale used in this particular study contains multiple items and the term ‘summated’ implies that multiple items are combined or summed. Secondly, each item measures the same underlying, quantitative measurement continuum, which measures concepts that can vary quantitatively. The third characteristic, which is the response to the items, which have and has no right or wrong answers, is also satisfied. Finally, each item in a scale used in this study is a statement, and respondents are asked to give a rating about each statement.

The reason for using multi-item measures instead of a single item for measuring psychological attributes was to reduce measurement error, lack of precision and items lack scope (McIver and Carmines, 1981; Spector, 1992; Nunnally and Bernstein, 1994). It is argued that the most fundamental problems with single item measures is that they tend to be less valid, less accurate, and less reliable than their multi-items equivalents, thus their degree of validity, accuracy, and reliability is often unknowable (McIver and Carmines, 1981; Spector, 1992; Nunnally and Bernstein, 1994).

7.7 Dyadic Data Treatment and Organisation

Data organisation is crucial in a dyadic study because it will lead to difficulties in selecting an appropriate statistical technique. There are three fundamental methods of

data organisation in a dyadic study namely individual, dyad and pairwise structures (Kenny et al, 2006). The data collected was analysed using PASW version 18.

7.7.1 Pairwise Approach

In a pairwise dataset, also known as *double-entry structure*, each record consists of the person's scores on each of the variables, as well the person's partner's scores on each of the individual-level variables (Kenny et al, 2006). Among the advantages of this is that it simplifies the complexity of multivariate analysis followed by straightforward arrive at significance test (Gonzalez and Griffin, 2000).

7.7.2 One-With-Many Approach

A One-with-Many dataset treats each dyad member as a different variable; therefore, the score of each dyad member is entered as a different variable (Kenny et al, 2006; Marcus et al, 2009). There are two records for each dyad, one for the focal person and one for the partner. “**Focalcode**” and “**Partcode**” were purposely entered in order to differentiate between the score of each dyad member. The “**Focalid**” is an identification number that specifies the focal person.

7.7.3 Specifying Type of Dyad

Dyads can be distinguishable or indistinguishable, also known as “exchangeable” (Gonzalez and Griffin, 1999) or “interchangeable”, or “noninterchangeable” respectively (Kenny, 1996). A distinguishable dyad occurs when the two dyad members can be differentiated from one another by one or more variables (Kenny et al, 2006, p.6) and they can be tested empirically (Gonzalez and Griffin, 1999). For instance, members of married couples can be distinguished by their gender or by their role, such

as dyad couples in this study, who can be distinguished by their roles as supervisor and subordinate.

7.7.4 Measuring Nonindependence

Nonindependence exists when two dyad members share something in common. Conceptually, it has been defined as the similarity in the scores of both dyad members score or differences in both of them (Kenny et al, 2006). For example, knowledge of the first score tells us something about the second (if one scores above mean, the other also scores above mean; Kenny and Judd, 1986). Nonindependence is also conceptually defined as *interdependence, reciprocity, bidirectional influence and synchrony* (Kenny et al, 2006, p. 418).

Measuring nonindependence for distinguishable dyads should be correlated while controlling for the independent variable; in other words, partial correlation (Kenny et al, 2006). Therefore, this dyadic data, specifically LMX from the perspective of supervisors, were partially correlated with the LMX from the perspective of their subordinates. The result shows that there was no significant correlation between the two dyad members (refer to Table 18). Consequently, it is clear that the data from LMX should be treated as individual data (Kenny et al, 2006).

Table 18: Correlation between Supervisor LMX and Subordinate LMX

	r	p-value
LMX Supervisor & Subordinate	-.047	.220

7.8 Expert Profile

As discussed in Chapter 6, the TKIM requires the identification of an expert profile. This expert profile was developed on the basis of previous studies. The selection of this expert profile was made by the integration of 2 methods: on the basis of so called established experts or long-serving, very experienced managers (e.g. Horvath et al, 1999; Nestor-Baker and Hoy, 2001) and also by selecting respondents that had received a Service Excellence Award (Mahmud, 2006). A Service Excellence Award is an award that is given by the Malaysian public sector to encourage good performance and excellent civil servants.

The respondents who received this award undergo a rigorous selection process based on nomination by a superior as an exemplary manager, and have received a score of greater than 90% for 3 consecutive years in their annual appraisal. Subsequently, this respondent will be assessed by a committee comprising senior staff in the organisation (Government of Malaysia, 2002a). In this study, the expert profile was selected from among the respondents who had been working for more than 10 years in the Malaysian public sector, and had received a Service Excellence award in the course of their service.

7.9 Cognitive Similarity

In addition to the total score, the Cognitive Style Index was also generated into score difference in order to assess the match and mismatch between the supervisors and subordinates. The logical method of measuring the similarity between supervisors' and subordinates' cognitive styles is to calculate difference in score by subtracting the score of subordinates from that of their supervisor.

From the signed algebraic differences, the group of supervisors were more analytic than the group of subordinates and supervisors were also found to be more intuitive than subordinates (Allinson et al, 2001). For simplicity, the respondents were partitioned according to the signs of the differences and analyses were conducted within each subgroup separately (Allinson et al, 2001).

Moreover, the cognitive style group that consisted of supervisor and subordinate was also created. A similar group is formed after matching similar cognitive styles of supervisor and subordinate. There were 3 similar groups, namely: Group 1: analytic supervisor and analytic subordinate; Group 5; integrative supervisor and integrative subordinate; Group 9; intuitive supervisor and intuitive subordinate. Nonetheless, group 9 could not be created because no respondent falls into that group.

Subsequently, the dissimilar groups were formed after matching the different cognitive styles between supervisors and subordinates. The dissimilar groups are analytic supervisor and integrative subordinate; analytic supervisor and intuitive subordinate; integrative supervisor and analytic subordinate; integrative supervisor and intuitive subordinate; intuitive supervisor and analytic subordinate, and lastly; intuitive supervisor and integrative subordinate. A detailed description of these groups is illustrated in Table 39, Chapter 8.

7.10 Conclusion

This chapter has presented the description of the data collected in the questionnaire survey. The treatment of the data involved three steps related to the whole dataset, dyadic data and difference scores. The treatment of the whole dataset included assessing missing values, outliers, multicollinearity and testing the data distribution assumption.

While dyadic data treatment revealed that the data collected for LMX were not nonindependent. Finally, the data were prepared into expert profile and cognitive similarity. The next chapter will present the data analysis and the findings of this study.

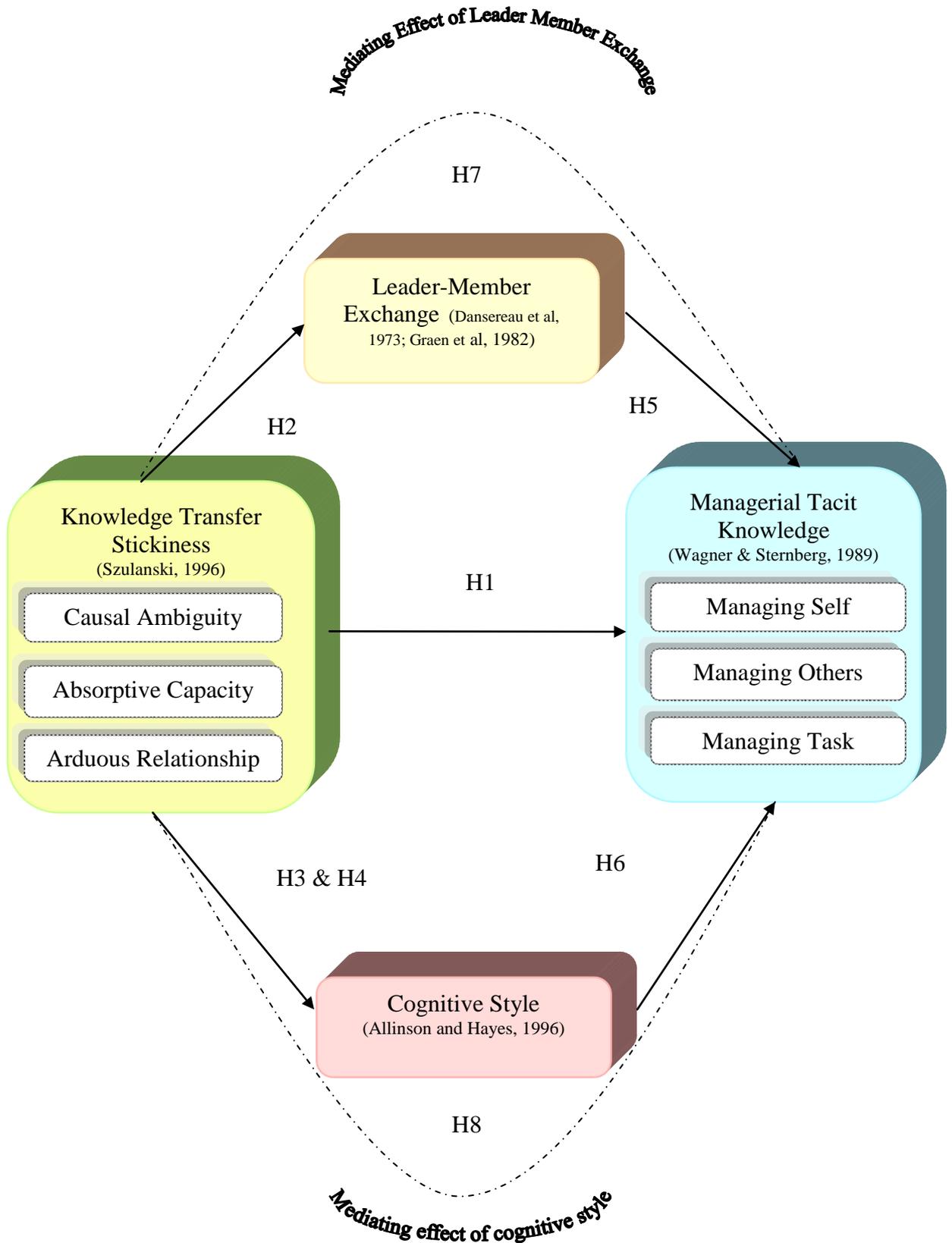
8 DATA ANALYSIS AND FINDINGS

8.1 Introduction

This chapter examines the relationship among variables with respect to the hypotheses specified in Chapter 4 and summarised in Figure 20 to Figure 25. The dependent variable of interest was managerial tacit knowledge, which can be divided into three subscales: managing self, managing others, and managing task. The primary hypothesised independent variables were knowledge transfer stickiness, quality of leader member exchange (LMX) and cognitive style. LMX and cognitive style were also hypothesised as mediating variables. Furthermore, additional analyses were conducted by testing for effects of similarity and dissimilarity among supervisor and subordinate cognitive styles. Finally in this chapter the summary of findings is presented.

For ease of presentation, the hypotheses and analysis presentation are logically grouped into four sets. Firstly, there is the relationship between independent variable and dependent variables that involve direct outcomes of knowledge transfer stickiness (KTS) on managerial tacit knowledge (TKIM), Leader Member Exchange (LMX) and Cognitive Style Index (CSI); and the direct outcome of LMX and CSI on TKIM; secondly, the mediating effect of LMX and thirdly the mediation effect of CSI; fourthly, cognitive similarity testing. The analytical techniques used were independent sample t-test, correlation, multiple regression for the test of direct outcomes, hierarchical multiple regression for the tests of mediation and correlations and analysis of variance for the cognitive similarity test.

Figure 20: Hypothesised Model (H1-H8)



Hypotheses are usually tested in the form of null hypothesis, symbolized by H_0 . For simplicity of understanding, this author has chosen to report findings using the alternate hypotheses. The researcher will decide either to reject or refute the hypothesis depending on the result of the hypothesis test on the observed data. This result is determined by the significance of the difference (or no difference, as is the usual test proposition of the null hypothesis) between the observed value of statistics and the hypothesised value of the parameter. The significance level is determined at either the 0.05, 0.01 or 0.001. These can be considered to represent acceptable significance, strong significance, and high significance respectively.

8.2 The Relationship between IV and DV

In this study, there are three independent variables, namely, KTS, LMX and CSI. The dependent variable is TKIM. Thus, this section will assess the relationship of KTS, LMX and CSI with TKIM.

8.2.1 The Direct Effect of KTS on TKIM (H1)

H1: There is a negative relationship between knowledge transfer stickiness and managerial tacit knowledge of the supervisor and subordinate

Before assessing the relationship between KTS and managerial tacit knowledge, an independent sample t-test was conducted in order to identify the differences of the managerial tacit knowledge scores for supervisor and subordinate. There was a significant difference in scores for supervisors ($M = 46.57$, $SD = 6.36$) and subordinates ($M = 211.7$, $SD = 28.44$); $t(300) = -82.074$, $p < .001$ (two-tailed). The magnitude of the differences in the means (mean difference = -165.15) was very high. From the result

(Table 19) it can be seen that the supervisors have higher managerial tacit knowledge than the subordinate.

Table 19: Comparison of TKIM Scores of Supervisor and Subordinate

Group	N	Mean	Std Deviation	t	p-value
Supervisor	61	46.57	6.36	-82.074	.001
Subordinate	239	211.7	28.44		

Subsequently, H1 was examined according to the groups of supervisor and subordinate. Specifically, these hypotheses are as follows:

H1(a): There is a negative relationship between knowledge transfer stickiness and managerial tacit knowledge of the supervisor

H1(b): There is a negative relationship between knowledge transfer stickiness and managerial tacit knowledge of the subordinate

The hypothesis tests the relationship between knowledge transfer stickiness and the managerial tacit knowledge. Bivariate Pearson correlations between KTS as an independent variable and managerial tacit knowledge as the dependent variables were performed and the result is demonstrated in Table 20.

Correlation between KTS and TKIM of the Supervisor (H1a)

The correlation between the supervisor knowledge transfer stickiness and managerial tacit knowledge is not significant; however when the correlation was conducted between both variables' subscales, there were significant relationships.

There is a moderate negative correlation between knowledge transfer stickiness and managing others ($r = -.303, p < .01$), causal ambiguity and managing self ($r = .218, p$

< .05), and a significant moderate negative association between absorptive capacity and managing others ($r = -.341, p < .01$). The result also indicates a significant negative correlation between arduous relationship with managerial tacit knowledge, managing others and managing task ($r = -.248, p < .05$; $r = -.243, p < .05$; $r = -.255, p < .05$ respectively). From these findings, it can be concluded that the supervisor stickiness of knowledge transfer and managerial tacit knowledge is related in certain subscales; thus the hypothesis (H1a) is **partially supported**.

Table 20: Correlation between KTS and TKIM

		N	TKIM	M-Self	M-Others	M-Task
Supervisor	KTS	61	-.029 (.411)	.160 (.108)	-.303** (.009)	-.013 (.459)
	Causal Ambiguity	61	.113 (.192)	.218* (.045)	-.114 (.192)	.065 (.309)
	Absorptive Capacity	61	-.073 (.289)	.118 (.182)	-.341** (.004)	-.024 (.427)
	Arduous Relationship	61	-.248* (.027)	-.051 (.348)	-.243* (.029)	-.255* (.023)
Subordinate	KTS	239	-.282*** (.000)	-.268*** (.000)	-.242*** (.000)	-.216*** (.000)
	Causal Ambiguity	239	-.239*** (.000)	-.230*** (.000)	-.196** (.001)	-.194** (.001)
	Absorptive Capacity	239	-.244*** (.000)	-.220*** (.000)	-.218*** (.000)	-.185** (.002)
	Arduous Relationship	239	-.117* (.035)	-.191** (.002)	-.060 (.177)	-.073 (.131)

N= 300 ; ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

Regression between KTS and TKIM of the Supervisor

In order to test supervisor knowledge transfer stickiness as a predictor of managerial tacit knowledge, multiple regression was conducted. The overall model fit can be assessed through the coefficient of determination (R^2), adjusted coefficient of determination (adjusted R^2), and F statistical test.

From the regression conducted, the adjusted R^2 is .079, which means 7.9% of the possible variation in the managerial tacit knowledge is explained by causal ambiguity, absorptive capacity and arduous relationship (KTS). It is found that the regression model is statistically significant with the F value of 2.715 ($p < .05$) (refer to Table 21). The regression model or estimated equation is shown as follows.

Table 21: Multiple Regression Result-Supervisor

Multiple regression equation 1 : $TKIM = \beta_0 + \beta_1 CA + \beta_2 AC + \beta_3 AR + \varepsilon$						
						.125
						.079
						6.11
						.125
						.026
						2.715
						.026
		Unstandardised Coefficients		Standardised Coefficients		
	Variable	B	SE	Beta	t-value	Sig
Model 1	Constant	47.739	2.979		16.025	.000***
Model 2	CA	.466	.241	.286	1.932	.029*
Model 3	AC	-.008	.136	-.010	-.062	.475
Model 4	AR	-2.784	1.154	-.371	-2.411	.009***

***Significant at the .001 level (1- tailed); * Sig at the 0.05 level (1-tailed)

$$TKIM = 47.739 + (.466) CA + (-.008) AC + (-2.784) AR$$

The regression coefficient of absorptive capacity (AC) is not statistically significant. It implies that absorptive capacity has no generalisable effect on TKIM beyond this sample; hence they should not be used for prediction or explanation purposes. Conversely, the regression coefficient of causal ambiguity (CA) of .466 is found to be significantly different from zero with the t value of 1.932 ($p < .05$). Moreover, arduous relationship (AR) of -2.784 is also found to be significantly different from zero with the t-value of -2.411 ($p < .01$).

It can be concluded that CA and AR have a statistically significant effect on the regression model with a high degree of certainty (95%); thus, it should be included in the regression equation. The regression coefficient of CA is .466, which represents the relationship between managerial tacit knowledge and CA. It implies that if the individual experiences higher causal ambiguity (for one unit for example), it is likely that they will accumulate higher managerial tacit knowledge (for the equivalent of .466 units).

The regression coefficient of AR is -2.784, which represents the negative relationship between managerial tacit knowledge and AR. It implies that if the individual experiences more arduous relationships (for one unit for example), they will as a consequence accumulate lower levels of managerial tacit knowledge (for the equivalent of 2.784 units). From these findings, H1a can be further explained by analysing the subscales and their relationships in more detail.

Correlation between KTS and TKIM of the Subordinate (H1b)

With regard to the relationship between subordinate knowledge transfer stickiness and managerial tacit knowledge, another Pearson correlation was performed. The subordinate knowledge transfer stickiness was found to be correlated with managerial tacit knowledge ($r = -.282, p < .01$). Further analysis was conducted on the subscale of the two variables and most of the subscales indicate a negative relationship (Table 20). In particular, subordinate causal ambiguity is significantly correlated with managing self, managing others and managing task ($r = -.230, p < .001$; $r = -.196, p < .01$; $r = -.194, p < .01$ respectively). Similarly, absorptive capacity of the subordinate shows significant linkages with managing self, managing others and managing task ($r = -.220, p < .001$; $r = -.218, p < .01$; $r = -.185, p < .01$ respectively).

However, the subordinate arduous relationship shows negative correlation with only one subscale of TKIM, managing self ($r = -.191, p < .01$). From the results, it can be concluded that there is a negative relationship between subordinate knowledge transfer stickiness and managerial tacit knowledge, and the hypothesis of a negative relationship between subordinate KTS and TKIM is **supported**.

Regression between KTS and TKIM of the Subordinate

Subsequently, multiple regression was conducted in order to test subordinate knowledge transfer stickiness as a predictor of managerial tacit knowledge. From the regression conducted, the adjusted R^2 is .071, which means 7.1% of the possible variation in the emphasis placed on the managerial tacit knowledge is explained by causal ambiguity, absorptive capacity and arduous relationship. It is found that the regression model is statistically significant with the F value of 7.086 ($p < .001$), refer to Table 22. The regression model or estimated equation is shown as follows.

Table 22: Multiple Regression Result-Subordinate

Multiple regression equation 2 : $TKIM = \beta_0 + \beta_1 CA + \beta_2 AC + \beta_3 AR + \varepsilon$						
						.083
						.071
						27.40
						.083
						.000
						7.086
						.000
			Unstandardised	Standardised		
			Coefficients	Coefficients		
	Variable	B	SE	Beta	t-value	Sig
Model 1	Constant	244.93	8.028		30.510	.000***
Model 2	CA	-1.422	.613	-.162	-2.319	.010**
Model 3	AC	-.732	.302	-.169	-2.420	.008**
Model 4	AR	-.702	1.818	-.026	-.386	.350

***Significant at the .001 level (1- tailed); * *Sig at the 0.01 level (1-tailed); * Sig at the 0.05 level (1-tailed)

$$\text{TKIM} = 244.93 + (-1.422) \text{CA} + (-.732) \text{AC} + (-.702) \text{AR}$$

The regression coefficient for arduous relationship (AR) is not statistically significant. It implies that this sub-scale has no generalisable effect on managerial tacit knowledge beyond this sample; hence they should not be used in prediction or explanation purposes. Conversely, the regression coefficient of causal ambiguity (CA) of -1.422 is found to be significantly different from zero with the t value of -2.319 ($p < .01$). Moreover, absorptive capacity (AC) of -.732 is also found to be significantly different from zero with the t value of -2.420 ($p < .01$). It can be concluded that CA and AC have a statistically significant effect in the regression model with a high degree of certainty (95%); thus, they should be included in the regression equation.

The regression coefficient of CA is -1.422, which represents the relationship between managerial tacit knowledge and CA. It implies that if individuals experience greater causal ambiguity (for one more unit for example), they are expected to accumulate less managerial tacit knowledge (for the equivalent of 1.422 units). The regression coefficient of AC is -.732, representing the negative relationship between managerial tacit knowledge and AC. It implies that if the individual experiences greater lack of absorptive capacity (for one unit for example), they are expected to accumulate less managerial tacit knowledge (for the equivalent of .732 degree). From these findings, the hypothesis H1b can be further explained by analysing the sub-scale and their relationship in more detail.

8.2.2 The Direct Effect of KTS on LMX (H2)

H2: There is a significant negative relationship between the stickiness of knowledge transfer and the quality of LMX

In assessing the relationship between KTS and LMX, the analysis was examined according to the total score of the variables as the tests involved LMX that naturally measures interpersonal relationship between supervisor and subordinate. Therefore, it is appropriate to apply the data that concern both supervisors' and subordinates' perspectives.

Table 23: Correlation between KTS and LMX

	r	p-value
Knowledge Transfer Stickiness	-.394***	.000
Causal Ambiguity	-.248***	.000
Absorptive Capacity	-.320***	.000
Arduous Relationship	-.590***	.000

N=300; ***Significant at the .001 level (1- tailed)

Pearson correlation was conducted in order to determine the relationship between KTS and LMX. From the correlation, it was indicated that there was a significant negative relationship between KTS and LMX ($r = -.394, p < .001$). Causal ambiguity, absorptive capacity and arduous relationship and LMX show a negative moderate and highly significant correlation ($r = -.248, p < .001, r = -.320, p < .001$ and $r = -.590, p < .001$ respectively). The result of the correlation analysis is illustrated in Table 23.

Subsequently, multiple regression was performed in order to demonstrate the prediction of KTS on LMX. The adjusted R^2 is .356 which means 35.6% of the possible variation in the emphasis placed on LMX is explained by KTS. It is noted that the regression model is statistically significant with the F value of 56.181 ($p < .001$). The estimated regression equation is demonstrated as follows.

$$LMX = 38.327 + (-1.511) CA + (-2.935) AC + (-16.894) AR$$

The regression coefficient of causal ambiguity (CA) is not statistically significant. However, the regression coefficient of absorptive capacity (AC) of -2.935 and arduous relationship (AR) of -16.894 are found to be significantly different from zero with the t-value of -2.075 ($p < .05$) and -10.690 ($p < .001$) respectively. Therefore, it can be positively concluded that AC and AR have a statistically significant effect in the regression model with a high degree of certainty (95%); thus they should be included in the regression equation. The regression coefficient of AC is -2.935, representing the negative relationship between LMX and absorptive capacity. This implies that if the individual experiences more lack of absorptive capacity (for one unit for example), they are expected to decrease the quality of LMX (for the equivalent of 2.935 unit, see Table 24).

Table 24: Multiple Regression Result-Hypothesis 2

Multiple regression equation 2 : $LMX = \beta_0 + \beta_1 CA + \beta_2 AC + \beta_3 AR + \epsilon$						
						.363
						.356
						.060
						.363
						3.527
						56.18
						.000
		Unstandardised		Standardised		
		Coefficients		Coefficients		
	Variable	B	SE	Beta	t-value	Sig
Model 1	Constant	38.327	2.071		18.505	.000
Model 2	CA	-1.511	1.993	-.040	-.758	.449
Model 3	AC	-2.935	1.414	-.111	-2.075	.039*
Model 4	AR	-16.894	1.580	-.539	-10.690	.000***

***Significant at the .001 level (1- tailed); *Significant at the .05 level (1- tailed)

Similarly, the regression coefficient of AR is -16.894, which represents the negative relationship between LMX and arduous relationship. It implies that if the individual experiences increase in arduous relationship (for one unit for example), this is expected to decrease the quality of LMX (for the equivalent of 16.894 units).

Therefore, this hypothesis, H2: *There is a significant negative relationship between the stickiness of knowledge transfer and the quality of LMX* is fully supported.

8.2.3 The Direct Effect of KTS on CSI (H3 and H4)

8.2.3.1 The Difference between Managers' Cognitive Styles (H3)

Hypothesis 3: There is a significant difference between the cognitive styles of the individuals who possess different levels of KTS.

One-way analysis of variance was applied to evaluate whether the difference between the cognitive styles in the low level KTS group is statistically significant. The descriptive statistics in Table 25 show the mean and standard deviation of cognitive styles for those who possess low level of KTS. From the table it is indicated that there is a mean difference between the score of integrative style (M = 24.95, SD = 4.2) and analytic (M = 27.2, SD = 3.4), where analytic-style individuals show higher mean scores than those with integrative and intuitive styles.

Table 25: Descriptive Statistics for Cognitive Style in Low Level of KTS

Cognitive Style	N	Mean	Std Dev	df	F
Intuitive	2	23.5	7.7	2,151	6.807***
Integrative	70	24.95 ²	4.2		
Analytic	82	27.2 ¹	3.4		
Total	154	26.13	4		

***Significant at the .001 level

Superscript to a mean refers to a group whose mean is significantly different (LSD multiple comparison test)

Consequently, one-way analysis of variance revealed that there is a significant difference between the cognitive styles ($F = 6.807, 2,151, p < .001$). The LSD Multiple comparison test suggested that this difference is between integrative and analytic styles (refer to Table 25). From the result, it can be concluded that there is a significant difference between cognitive styles in the group of low level KTS, particularly between the integrative and analytic style managers.

The descriptive statistics in Table 26 show the mean and standard deviation of cognitive styles by high level of KTS. From the table it is indicated that there is a mean difference between the score of intuitive style ($M = 48.5, SD = 11.26$), integrative style ($M = 41.4, SD = 6.58$) and analytic ($M = 40.58, SD = 6.19$) where those with intuitive styles show higher mean score compared to integrative and analytic styles.

Table 26: Descriptive Statistics for Cognitive Style in High Level of KTS

Cognitive Style	N	Mean	Std Dev	Df	F
Intuitive	4	48.5	11.26	2,143	2.950
Integrative	56	41.4	6.58		
Analytic	86	40.58	6.19		
Total	146	41.13	6.58		

In order to test the difference between the cognitive styles of the individual in high level KTS, the one-way analysis of variance was performed. ANOVA revealed that there is no significant difference between the cognitive styles among high level KTS individuals ($F = 2.950; 2,143; n.s$; refer to Table 26). Therefore, it can be concluded that the research hypothesis 3 that there is a significant difference between cognitive styles in the managers that possessed different level of KTS is **partially supported**.

8.2.3.2 *The Relationship between Cognitive Styles and the Level of KTS (H4)*

In order to investigate the linkages between the construct of knowledge transfer stickiness and cognitive style, Pearson product-moment correlation coefficients were employed. This linkage was examined by the level of KTS and hypothesis 4 is as follows:

H4: *There is a link between different levels of KTS and the cognitive style*

Table 27 displays the result of the Pearson correlation analysis that was conducted on the level of KTS and cognitive style. From table 27, it can be seen that there is a significant positive correlation between low level of knowledge transfer stickiness and cognitive style, $r = .306$, $p < .001$ (1-tailed). Further analysis on the subscale of the variables show some disagreement, as a positive correlation was found between low KTS and integrative style ($r = .221$, $p < .05$ (1-tailed) while other the subscale does not indicate any significant correlation.

Table 27: Correlation between KTS and Cognitive Style

	N		R	p-value
Low Level of KTS	154	CSI	.306***	.000
	2	Intuitive	-	-
	70	Integrative	.221*	.033
	82	Analytic	.059	.300
High Level of KTS	146	CSI	-.016	.426
	4	Intuitive	.030	.485
	56	Integrative	.206	.064
	86	Analytic	.203*	.030

***Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

Pearson product-moment correlation was again carried out in order to investigate the association between a high level of KTS and cognitive style. The result in Table 27 demonstrates the correlation result. A high level of KTS is not significantly related to

total score cognitive style, $r = -.016$, n.s. The correlation between a high level of KTS and analytic style is significant, $r = .203$, $p < .05$. Therefore, this hypothesis that predicts that there is a link between different level of KTS and cognitive style is only **partially supported**.

8.2.4 The Direct Effect of LMX on TKIM (H5).

H5: There is a positive association between the quality of LMX and managerial tacit knowledge

As Pearson product-moment correlation coefficient is the most appropriate technique for examining the relationship between the variables, it was used to test the relationship between LMX and managerial tacit knowledge. Bivariate correlation comprising LMX as an independent variable and managerial tacit knowledge as a dependent variable was conducted. As predicted, the result showed highly significant positive correlation between LMX and managerial tacit knowledge, $r = .190$, $p < .001$ (1-tailed). Particularly, the correlation between LMX and managing self, managing others and managing task indicated positive significant correlations ($r = .189$, $p < .001$; $r = .204$, $p < .001$; $r = .199$, $p < .001$). The result is shown in Table 28. Therefore, this hypothesis predicting a positive association between LMX and managerial tacit knowledge is **fully supported**.

Table 28: Correlation between LMX and TKIM

	R	p-value
TKIM	.190***	.000
Managing Self	.189***	.000
Managing Others	.204***	.000
Managing Task	.199***	.000

N= 300; ***Significant at the .001 level (1- tailed)

8.2.5 The Direct Effect of CSI on TKIM (H6)

H6: There is an association between cognitive style and managerial tacit knowledge

Again this hypothesis was investigated using Pearson product-moment. From the analysis conducted, the result is presented in Table 29. It was found that there is no significant relationship between cognitive style total score with managerial tacit knowledge; conversely, the correlation between the cognitive styles according to individual cognitive style indicates a promising result. It was confirmed that there is a positive though low correlation between integrative styles and managerial tacit knowledge, $r = .152$, $p < .05$ (1-tailed).

There was also a significant negative correlation between analytic styles and managerial tacit knowledge, $r = -.215$, $p < .01$ (1-tailed). The intuitive style does not show any correlation with managerial tacit knowledge; this is thought to be because the N number of intuitive respondents is very small. Therefore, the hypothesis stating that there is relationship between cognitive style and managerial tacit knowledge is **partially supported**.

Table 29: Correlation between Cognitive Style and TKIM

	N		r	p-value
CSI	300	TKIM	-.095	.050
Intuitive	6	TKIM	-.546	.131
Integrative	126	TKIM	.152*	.044
Analytic	168	TKIM	-.215**	.003

**Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

8.3 The Mediation Test (H7 and H8)

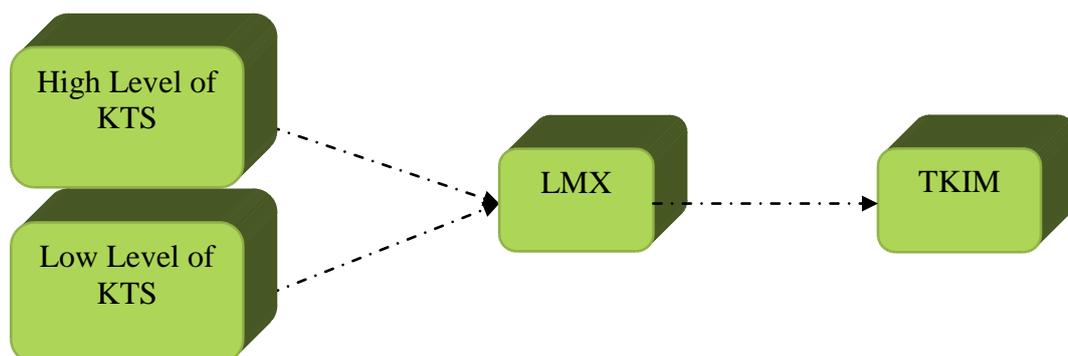
8.3.1 The Mediating Effect of LMX (H7)

Hypothesis 7 attempts to provide an explanation for why knowledge transfer stickiness relationship would have an enhancing effect on managerial tacit knowledge based on the perception of the quality of leader member exchange in the workplace. This hypothesis will be examined according to the level of knowledge transfer stickiness, as described in Chapter 4 (section 4.9.3). The categories of high and low levels of KTS are determined using a median split on the KTS variable. Therefore, hypothesis 7 is as follows:

H7: LMX will negatively mediate the relationship between the different levels of knowledge transfer stickiness and managerial tacit knowledge

This is illustrated in Figure 21. In this regard, the level of KTS was used as independent variable, LMX as a mediator and managerial tacit knowledge as a dependent variable. There are 2 levels of KTS, namely, high level and low level; thus the mediation tests were performed according to the level of KTS in two pathways.

Figure 21: LMX as Mediator between KTS and TKIM



Mediation effects were examined through a series of regression analyses following the procedure outlined by Baron and Kenny (1986) and Kenny et al (1998). Kenny et al (1998) define four conditions which must be met for mediation: the independent variable must affect the dependent variable (Path *c*); the independent variable must affect the mediator (Path *a*); the mediator must affect the dependent variable when the independent variable is controlled for (Path *b*); full mediation will occur when the relationship between the independent variable and the dependent variable must be reduced to non-significance after the effect of the mediator is controlled for. Partial mediation occurs when conditions 1-3 are met without condition 4.

Table 30: LMX as a Mediator between High KTS and TKIM

Predictors	Beta	T	F	df	R ²	Sobel
Model 1						
High KTS	-.139	-1.658	2.840	1,144	.019	
Model 2						
LMX	-.315	-3.794			.109	
High KTS	-.237	-2.852	8.749	2,143	.090	2.576 (0.009)**

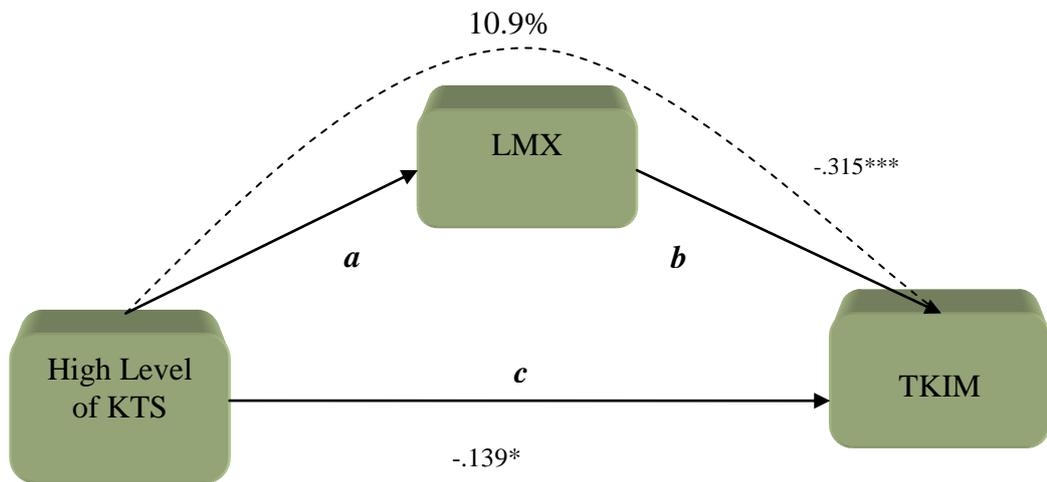
N= 300. **Significant at the .01 level (1- tailed)

Several hierarchical regression analyses were conducted in order to test whether LMX mediates the relationship between high KTS and managerial tacit knowledge. The first test was whether LMX will mediate the relationship between high level of knowledge transfer stickiness and managerial tacit knowledge.

In testing the mediation, a series of analyses were conducted (Figure 22) to examine the relationship between high KTS on managerial tacit knowledge (Path *c*); the relationship between high KTS and LMX (Path *a*); the relationship between LMX and managerial

tacit knowledge while controlling for high KTS (Path *b*). Table 30 provides the regression equation results. It was found that high KTS fulfils the first three conditions for the test of mediation.

Figure 22: The Mediation Effect of LMX between High Level of KTS and TKIM



As the hierarchical regression method was selected, each set of summary statistics are repeated for each stage in the hierarchy. Model 1 in Table 30 refers to the path *c* in the hierarchy when only high KTS is used as predictor of managerial tacit knowledge, with a significant relationship between them (Beta = $-.139$, $t(300) = -1.658$, $p < .05$).

The regression from Model 2 (path *b*) is the result when both predictors are used, particularly high KTS and LMX, in predicting managerial tacit knowledge. The result from model 2 is the affect of LMX on managerial tacit knowledge when high KTS is controlled. The result shows a significant coefficient for LMX (Beta = $-.315$, $t(300) = -3.794$, $p < .001$) with $R^2 = .109$ or 10.9% variance. This fulfils the first three conditions for the test of mediation.

Furthermore, the result in the second line of model 2 is the effect of high KTS on managerial tacit knowledge when LMX is controlled. The mediating effect of LMX was examined by the change in R^2 and the value of beta coefficient for high KTS and LMX. The coefficient for LMX declined. It was found that high KTS was negatively related to managerial tacit knowledge (Beta = -.237, $t(300) = -2.852$, $p < .001$). Although the result at this stage is still significant, the regression result fulfils the first three conditions for a mediation test. It can be concluded that LMX partially mediates the relationship between high KTS and managerial tacit knowledge (refer to Figure 22). Furthermore, the Sobel test result shows that the mediation effect is significant ($Z = 2.576$, 0.009). Therefore, the assumption that LMX will negatively mediate the relationship between different level of KTS, particularly high level of knowledge transfer stickiness (in these circumstances), and managerial tacit knowledge is **supported**.

Subsequently, mediation tests for a low level of KTS were conducted through a series of analyses in order to examine the relationship between low KTS on managerial tacit knowledge (path *c*); the relationship between low KTS and the LMX (path *a*); the relationship between LMX and managerial tacit knowledge while controlling for low KTS (path *b*). For the diagram of this mediation test, refer to Figure 23.

Table 31: LMX as a Mediator between Low KTS and TKIM

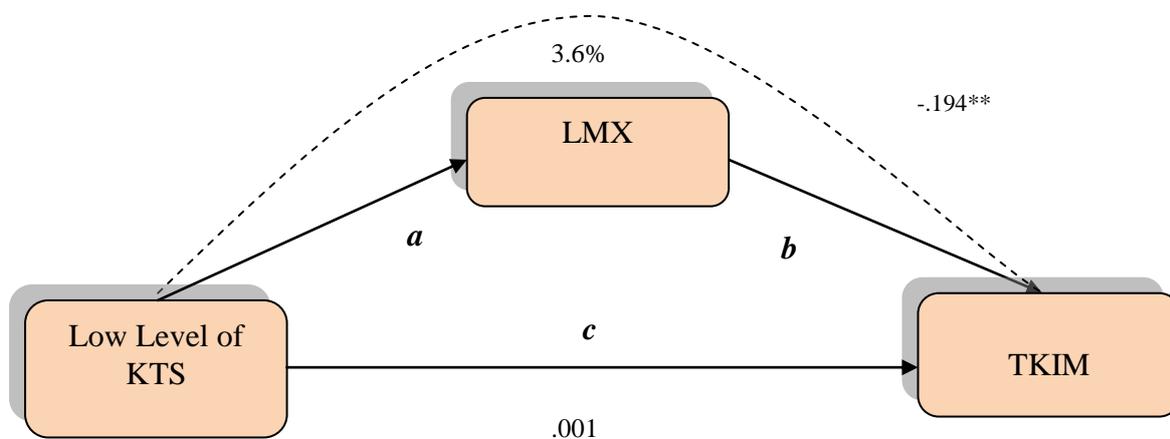
Predictors	Beta	t	F	df	R ²	Sobel
Model 1						
Low KTS	.001	.007	.000	1,152	-.007	
Model 2						
LMX	-.194	-2.379	2.831	2,151	.036	
Low KTS	-.038	-.469	.319	2,151	.043	1.773(0.08)

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

Model 1 in Table 31 refers to path *c* in the hierarchy when low KTS is used as predictor of managerial tacit knowledge, with a non significant relationship between them (Beta = .001, $t(300) = .007$, n.s). The regression from Model 2 is the result when both predictors are used, specifically low KTS and LMX, in predicting managerial tacit knowledge. The result in the first line of model 2 is the effect of LMX on managerial tacit knowledge when low KTS is controlled (path *b*). The result shows a significant coefficient for LMX (Beta = -.194, $t(300) = -2.379$, $p < .01$) with $R^2 = .036$ or 3.6% variance.

Despite the first condition not being fulfilled, the mediation test proceeded and a Sobel test was conducted. However, the Sobel test result shows that the mediation effect is not significant. As a result of these tests, it can be summarised that LMX mediates the relationship between high level of KTS and managerial tacit knowledge, whereas LMX does not mediate the relationship between low level of KTS and managerial tacit knowledge. Thus, hypothesis H7 is **partially supported**.

Figure 23: The Mediation Effect of LMX between Low Level of KTS and TKIM

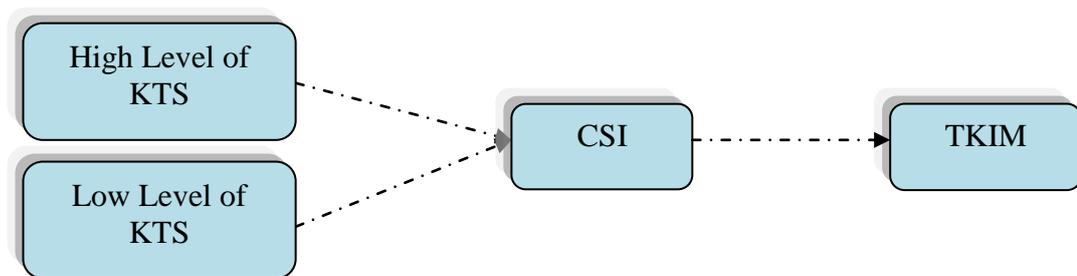


8.3.2 The Mediating Effect of CSI (H8)

H8: Cognitive style will mediate the relationship between different levels of knowledge transfer stickiness and managerial tacit knowledge

This hypothesis attempts to provide an explanation for why knowledge transfer stickiness would have a negative effect on managers' level of accumulated tacit knowledge and this effect might be further mediated by cognitive style. This is demonstrated in Figure 24.

Figure 24: CSI as a Mediator between KTS and TKIM



Hypothesis 8 examines the mediating effect of CSI on the relationship between KTS on managerial tacit knowledge. In order to test hypothesis 8 at least four conditions must be met: there should be a direct relationship between the level of KTS and managerial tacit knowledge, there should be direct relationship between the level of KTS and CSI, there should be direct relationship between CSI and managerial tacit knowledge after controlling the level of KTS; and finally, there should be significant incremental variance after the introduction of CSI with a decline in the coefficient of the level of KTS.

Table 32: CSI as a Mediator between High KTS andTKIM

Predictors	Beta	t	F	df	R ²	Sobel
Model 1						
High KTS	-.139	-1.737	2.840	1,144	.019	
Model 2						
LMX	-.171	-2.097	3.652	2,143	.049	
High KTS	-.142	-1.737	3.652	2,143	.049	0.185(0.852)

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

A hierarchical regression method was selected, where in each set of summary statistics is repeated for each stage in the hierarchy. Model 1 in Table 32 refers to path *c* in the hierarchy when only high KTS is used as predictor of managerial tacit knowledge, with a non-significant relationship between them (Beta = -.139, t(300) = -1.685, n.s). Model 2 is the result when both predictors are utilised, specifically high KTS and CSI in predicting managerial tacit knowledge. In the first line of Model 2 is the effect of CSI on managerial tacit knowledge when high KTS is controlled (path *b*). The result shows a significant coefficient for CSI (Beta = -.171, t(300) = -2.097, p < .05) with R² = .049 or 4.9% variance.

The results conveyed that the first 3 conditions of the mediation test were not fulfilled; however the mediation test was still carried out by conducting Sobel test. Similar to the first 3 condition of mediation test result, the Sobel test also indicated that the mediation effect was not significant. Hence it can be concluded that CSI does not mediate the relationship between high KTS and managerial tacit knowledge.

Table 33: CSI as a Mediator between Low KTS and TKIM

Predictors	Beta	t	F	df	R ²	Sobel
Model 1						
Low KTS	.001	.007	.000	1,152	.000	
Model 2						
CSI	-.050	-.589	.168	2,151	.002	
Low KTS	.016	.184	.168	2,151	.002	-0.57(0.566)

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

Model 1 in Table 33 refers to the first stage in the hierarchy when low KTS is used as predictor of managerial tacit knowledge, with a non-significant relationship between them (Beta = .001, t(300) = .007, n.s). The regression from Model 2 is the result when both two predictors are used, specifically low KTS and CSI, in predicting managerial tacit knowledge.

The result in the first line of model 2 is the affect of CSI on managerial tacit knowledge when low KTS is controlled (path *b*). The result show a non significant coefficient for CSI (Beta = -.050, t(300) = -.580, n.s). This does not fulfil the first three conditions for the test of mediation (refer to Figure 24).

Although the first three conditions were not met, a Sobel test was conducted. A similar result was found indicating that CSI does not mediate the relationship between the level of KTS and managerial tacit knowledge. As a result, it can be established that CSI does not mediate the relationship between high level of KTS or low level of KTS and managerial tacit knowledge; accordingly H8 is **refuted**.

8.4 Further Analysis

8.4.1 Mediation Effect of LMX According to Individual Cognitive Style.

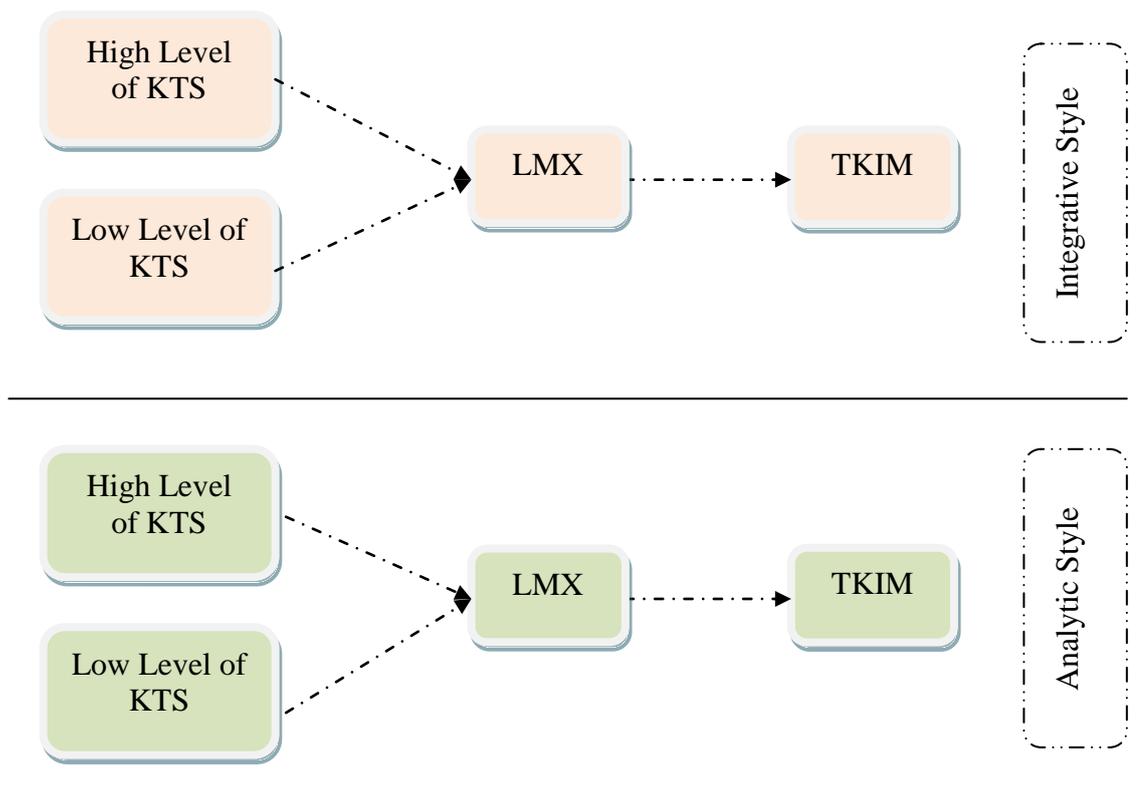
This further analysis is an attempt to explain the mediating effect of LMX on the relationship between KTS and managerial tacit knowledge by looking at the cognitive style of the respondents, particularly the mediating effect among the integrative and analytic style respondents. This analysis was conducted on the basis that hypothesis 8 indicated that there is no mediating effect of CSI on the relationship between the level of KTS and managerial tacit knowledge, as well as the result from hypothesis 3 that noted a significant difference between the cognitive style of the respondent and high level of KTS. This result is an indication that cognitive style may need to be analysed according to individuals' styles.

Following the approach in hypothesis 7, this analysis also examined according to the level of KTS. The mediation test for the level of KTS was conducted for those among the integrative and analytic style managers only because the intuitive group contained a very small number of individuals, ($N = 2$). This mediating test was initiated by conducting the split file of the SPSS dataset according to the cognitive style. Then the mediation test was performed as suggested by Baron and Kenny (1986) and Kenny et al (1998).

A series of regression analyses was generated with the aim of identifying the mediation effect by examining the four mediation conditions outlined: Path *c*: the affect of KTS on managerial tacit knowledge among the integrative and analytic managers; Path *a*: the effect of KTS on LMX among the integrative and analytic managers; Path *b*: the effect of LMX on managerial tacit knowledge when KTS level is controlled for among the

integrative and analytic managers; and finally, the effect of KTS on managerial tacit knowledge after the LMX is controlled, on the integrative and analytic managers (refer to Figure 25). Figure 25 shows the mediation pathways in identifying the mediation effect of LMX among the integrative and analytic style managers. The first diagram shows the mediation effect of LMX on the relationship between high and low level of KTS on TKIM among the integrative style managers. The second diagram shows the mediation effect of LMX on the relationship between high and low level of KTS on TKIM among the analytic style managers.

Figure 25: LMX as a Mediator among the Managers with Different Cognitive Style



The result for testing the mediation effect of LMX among the integrative managers is presented in Table 34. Model 1 shows a significant association between high level KTS and managerial tacit knowledge (Beta = -.327, $t(300) = -2.539$, $p < .01$). Moreover,

model 2 shows that LMX is related to managerial tacit knowledge after controlling for high level KTS (Beta = -.259, $t(300) = -1.979$, $p < .05$). The following mediation test for integrative managers also indicates a significant relationship between high level KTS and managerial tacit knowledge after controlling for LMX (Beta = -.401, $t(300) = -3.068$, $p < .01$).

Table 34: Integrative Managers and LMX as a Mediator (High KTS)

Predictors	Beta	T	F	df	R ²	Sobel
Model 1						
High KTS	-.327	-2.539*	6.448	1,54	.107	
Model 2						
LMX	-.259	-1.979*	5.357	2,53	.168	
High KTS	-.401	-3.068**	5.357	2,53	.168	1.477(0.139)

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

From the regression result, a Sobel Test was performed and it was found that the mediation effect among the integrative individual is not significant ($Z= 1.477$, n.s). Even though the Sobel test is not significant, Baron and Kenny (1986) and Judd and Kenny (1981) suggest that if the mediation test fulfils the first three mediation conditions, then it is argued that the mediator partially mediates the relationship. Thus, we can conclude that LMX does partially mediate an association between a high level of KTS and managerial tacit knowledge among the integrative managers in this study.

The regression analysis was further utilised in investigating the mediation effect of LMX on the analytic managers. Table 35 demonstrate this regression analysis result. Model 1 indicates that there is no significant relationship between high level of KTS and managerial tacit knowledge (Beta = -.036, $t(300) = -.333$, n.s). However, model 2

noted a significant linkage between LMX and managerial tacit knowledge after controlling for high level KTS (Beta = -.337, $t(300) = -3.113$, $p < .01$).

Table 35: Analytic Managers and LMX as a Mediator (High KTS)

Predictors	Beta	T	F	df	R ²	Sobel
Model 1						
High KTS	-.036	-.333	.111	1,84	.001	
Model 2						
LMX	-.337	-3.113**	4.908	2,83	.106	
High KTS	-.131	-1.213	4.908	2,83	.106	2.033(0.041)*

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

Furthermore, when the association between high level KTS and managerial tacit knowledge was examined after controlling for LMX, it was found that there is no relationship between them (Beta = -.131, $t(300) = -1.213$, n.s). Although the first condition of mediation is not met (no relationship between high level KTS and managerial tacit knowledge), the Sobel test indicates that there is significant mediation effect of LMX between high level of KTS and managerial tacit knowledge among the analytic managers ($Z = 2.033$, $p < .05$). It can therefore be concluded that LMX partially mediates the relationship between high level of KTS and managerial tacit knowledge among the analytic style managers.

Table 36 depicts the result of regression analysis in testing the mediation effect of LMX between low level of KTS and managerial tacit knowledge among integrative style managers. Model 1 (path *c*) noted that there is no significant relationship between low KTS and managerial tacit knowledge (Beta = -.147, $t(300) = -1.225$, n.s).

Table 36: Integrative Managers and LMX as a Mediator (Low KTS)

Predictors	Beta	t	F	df	R ²	Sobel
Model 1						
Low KTS	-.147	-1.225	1.502	1,68	.022	
Model 2						
LMX	-.165	-1.368	1.696	2,67	.048	
Low KTS	-.169	-1.403	1.696	2,67	.048	0.854(0.392)

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

The following regression analysis between LMX and managerial tacit knowledge controlling for low level KTS (path *b*) also indicates that there is no significant relationship (Beta = -.165, t (300) = -1.368, n.s). The first three mediation conditions are not met; thus it can be concluded that there is no mediation effect of LMX on the relationship of low level KTS and managerial tacit knowledge among the integrative style managers.

Table 37: Analytic Managers and LMX as a Mediator (Low KTS)

Predictors	Beta	t	F	df	R ²	Sobel
Model 1						
Low KTS	.175	1.594	2.541	1,80	.031	
Model 2						
LMX	-.200	-1.787*	2.902	2,79	.068	
Low KTS	.129	1.155	2.902	2,79	.068	1.372(0.169)

N= 300. ***Significant at the .001 level (1- tailed); **Significant at the .01 level (1- tailed); *Significant at the .05 level (1- tailed)

The regression analysis resulting from examining the LMX as a mediator among the analytic managers is shown in Table 37. Similar to the prior test involving the low level KTS, this test also indicates that there is no mediation effect of LMX on the relationship.

The result suggests that the first three mediation conditions were not met because none of the relationships was significant. Model 1 provides the result that demonstrates there is no relationship between low level KTS and managerial tacit knowledge (Beta = .175, $t(300) = 1.594$, n.s), while model 2 provides evidence that there is a relationship between LMX and managerial tacit knowledge after controlling for low level KTS (Beta = -.200, $t(300) = -1.787$, $p < .05$). As a result of mediation conditions not being met and after confirmation by the Sobel test, the mediation effect is not significant. Thus the assumption suggesting that LMX mediates the relationship between low level of KTS and managerial tacit knowledge among the analytic style managers is refuted.

8.5 Assessing Cognitive Style Similarity

This complementary analysis involved examining the relationships between the KTS, LMX and TKIM and the CSI difference score between the supervisors and subordinates. These demonstrate the effect of the magnitude of similarity and dissimilarity, also known as match and mismatch, between supervisors' and subordinates' cognitive styles on supervisor-subordinate relationship outcomes. The detailed procedure for achieving the difference score is described in Chapter 7.

Table 38: Correlations between the CSI Difference Score and Other Variables

Variables	Difference between CSI score of Supervisor and Subordinate			
	Supervisor Lower(Intuitive)		Supervisor Higher(Analytical)	
	N	r	N	r
Low KTS	101	.245*	122	.037
High KTS	101	-.140	122	.107
LMX	101	-.134	122	.021
TKIM	101	.011	122	-.067

*Significant at the .05 level (1- tailed)

Table 38 has been constructed to show correlations between KTS levels, LMX, TKIM and CSI difference scores, where the difference scores were grouped into two, referring to supervisor high intuitive and supervisor high analytic. A positive correlation is shown for cases in which the supervisor's score is lower (more intuitive) with a low level of KTS ($r = .245, p < .05$). Conversely, in cases where the supervisor's CSI is higher (more analytical), there was no significant correlation with any other variables.

Table 39: Descriptive Statistics of CSI Group (Difference Score)

CSI Group	N	M	SD	Range
Analytic supervisor/Analytic subordinate	82	3.79	3	.0-12
Analytic supervisor / Integrative subordinate	57	10.26	5.17	.0-23
Analytic supervisor / Intuitive subordinate	2	15	.00	15
Integrative supervisor /Analytic subordinate	43	8.5	4.85	1-19
Integrative supervisor/ Integrative subordinate	40	2.25	1.93	.0-6
Integrative supervisor / Intuitive subordinate	3	8	4.36	5-13
Intuitive supervisor /Analytic subordinate	7	21.71	6.2	12-28
Intuitive supervisor / Integrative subordinate	5	15.4	3.2	11-20

This CSI difference score was also divided into nine groups on the basis of the cognitive styles of supervisor and subordinates. CSI scores were again designated low (intuitive), moderate (integrative) and high (analytic). The ninth group (Intuitive supervisor/Intuitive subordinate) was not included in the analysis due to no respondents falling into that group. The correlation analysis conducted between CSI difference score group representing the similarity and dissimilarity group of supervisor-subordinate with KTS is shown in Table 40.

Groups 1 and 5 which represent similarity between supervisors and subordinate (analytic supervisor/analytic subordinate and integrative supervisor/integrative subordinate) show no correlation with KTS and its subscale. On the contrary, dissimilar groups show negative correlations with KTS. This is particularly the case for the group of integrative supervisor/analytic subordinate which shows a negative correlation with arduous relationship ($r = -.283, p < .05$); while integrative supervisor/intuitive subordinate shows a high negative correlation with arduous relationship ($r = -.993, p < .05$). Additionally, the group of intuitive supervisor/analytic subordinate indicates a high negative correlation with KTS ($r = -.810, p < .05$).

The findings indicate that the similar supervisor and subordinate dyads do not relate to knowledge transfer stickiness or its subscales, while some dissimilar groups, namely integrative supervisor and analytic subordinate; integrative supervisor and intuitive subordinate are related to arduous relationships. In addition, intuitive supervisor and analytic subordinate are related to knowledge transfer stickiness.

The groups of CSI difference scores are again correlated with LMX and TKIM. Table 41 illustrates the correlation results. It was found that only one dissimilar group (intuitive supervisor and analytic subordinate) is correlated with LMX ($r = -.750; p < .05, n = 7$), whereas other groups do not yield significant results. For the correlation between CSI groups and TKIM and its subscale, the similar group that consist of analytic supervisor and analytic subordinate is negatively related to managing others ($r = -.219; p < .05, n = 82$) and TKIM itself ($r = -.214; p < .05, n = 82$), while other similar groups do not show any significant result.

Table 40: The Correlation between CSI Groups and KTS

CSI Group	N	1	2	3	4
Analytic supervisor/	82	-.073	-.073	.181	-.060
Analytic subordinate		.258	.257	.052	.295
Analytic supervisor /	57	-.013	.118	.064	.088
Integrative subordinate		.462	.191	.319	.257
Analytic supervisor /	2	-	-	-	-
Intuitive subordinate					
Integrative supervisor /	43	-.038	.038	-.283*	-.019
Analytic subordinate		.404	.404	.033	.451
Integrative supervisor /	40	-.087	.110	-.050	.047
Integrative subordinate		.297	.250	.379	.386
Integrative supervisor /	3	-.771	-.803	-.993*	-.803
Intuitive subordinate		.220	.203	.037	.203
Intuitive supervisor /	7	.283	-.168	.439	.027
Analytic subordinate		.269	.359	.162	.477
Intuitive supervisor /	5	-.459	-.680	-.597	-.810*
Integrative subordinate		.218	.103	.144	.048

*Significant at the .05 level (1- tailed); 1= Causal Ambiguity; 2= Absorptive Capacity; 3= Arduous Relationship; 4= KTS;

The dissimilar groups also reveal a consistent result with TKIM and its subscale. Firstly, the group of intuitive supervisor and analytic subordinate shows a significant positive correlation with managing others, managing task and TKIM itself ($r = .886, p < .01$; $r = .932, p < .01$; $r = .835, p < .01$ respectively). Secondly, the group of intuitive supervisor and integrative subordinate has a sound positive correlation with managing others ($r = .932; p < .05$).

Table 41: The Correlation CSI Groups with LMX and TKIM

CSI Group	N	1	2	3	4	5
Analytic supervisor / Analytic subordinate	82	-.004 .486	-.170 .064	-.219* .024	-.159 .077	-.214* .027
Analytic supervisor / Integrative subordinate	57	.002 .493	-.091 .250	.188 .081	-.044 .373	.054 .345
Analytic supervisor / Intuitive subordinate	2	-	-	-	-	-
Integrative supervisor / Analytic subordinate	43	-.083 .298	-.076 .315	-.174 .132	-.011 .472	-.116 .230
Integrative supervisor / Integrative subordinate	40	-.121 .229	-.095 .279	-.139 .196	-.135 .203	-.141 .193
Integrative supervisor / Intuitive subordinate	3	.397 .370	.228 .427	.780 .215	.210 .433	.467 .345
Intuitive supervisor / Analytic subordinate	7	-.750* .026	.175 .354	.886** .004	.932** .001	.835** .010
Intuitive supervisor / Integrative subordinate	5	.360 .276	.219 .362	.932* .013	.552 .167	.754 .071

*Significant at the .05 level (1- tailed); 1= LMX; 2= Managing Self; 3= Managing Others; 4= Managing Task; 5=TKIM

The analysis is extended using the one-way analysis of variance to compare the eight CSI groups in terms of their mean scores on the dependent variables. The result is reported in Table 42. A significant F ratio confirms overall variation across groups. Table 42 shows that there was a significant variation across groups in knowledge transfer stickiness ($F = 2.134, df = 7,231, p < .05$).

Table 42: Interaction between Cognitive Similarity the Other Variables

Variables	Group 1			Group 2			Group 3			Group 4			Group 5			Group 6			Group 7			Group 8			DF	F
	N	M	SD																							
Causal Ambiguity	82	12.7	2.8	57	12.5	3.4	2	16.5	6.4	43	12.7	3.2	40	11.7	3.8	3	12.3	5.5	7	11.1	1	5	13.4	2.5	7,231	1.116
Absorptive Capacity	82	19.3	6.8	57	17.4	6.5	2	24	12	43	18.7	5.4	40	16.2	6.2	3	18	9	7	15.6	3.6	5	24.2	8.8	7,231	2.047
Arduous Relationship	82	3.02	1.1	57	2.8	.87	2	3.5	2.1	43	3	.82	40	3.1	1.3	3	2.67	.57	7	3.29	.95	5	3.2	1.09	7,231	.416
KTS	82	35	8.3	57	32.6	8.9	2	44	21	43	34.5	7.6	40	30.7	9.6	3	33	15	7	30	3.9	5	40.8	9.6	7,231	2.134*
LMX	82	24.9	4.3	57	25.2	4.5	2	25	7.0	43	24.6	4.4	40	26.2	3.6	3	24	5.2	7	24.3	3.2	5	25.6	6.6	7,231	.534
Managing Self	82	68.8	10	57	67.5	8.2	2	69.2	2.1	43	68	9	40	68	9.3	3	64.9	7.2	7	71.5	7.8	5	65.8	8.2	7,231	.324
Managing Others	82	74.9	12	57	74.5	13	2	75.2	1.8	43	70	9.9	40	75.9	18	3	76.6	10	7	80.5	15	5	70.2	9.4	7,231	.932
Managing Task	82	70.3	10	57	68.4	9.6	2	63.6	.17	43	66.4	8.3	40	71.5	10	3	68.5	8.8	7	73.5	13	5	67	2.4	7,231	1.308
TKIM	82	214	29	57	210	26	2	208	4.2	43	204	21	40	215	35	3	210	25	7	225	32	5	203	15.6	7,231	.896

*Significant at the .05 level: Group 1: Analytic Supervisor/Analytic Subordinate; Group 2: Analytic Supervisor /Integrative Subordinate; Group 3: Analytic Supervisor /Intuitive Subordinate; Group 4: Integrative Supervisor /Analytic Subordinate; Group 5: Integrative Supervisor /Integrative Subordinate; Group 6: Integrative Supervisor /Intuitive Subordinate; Group 7: Intuitive Supervisor /Analytic Subordinate; Group 8: Intuitive Supervisor /Integrative Subordinate

Table 43: Post-Hoc Comparison Using LSD Test (KTS)

CSI Group	1	2	3	4	5	6	7
Analytic supervisor/ Analytic subordinate	-						
Analytic supervisor / Integrative subordinate	2.36	-					
Analytic supervisor / Intuitive subordinate	-8.95	-11.316	-				
Integrative supervisor / Analytic subordinate	.584	-1.781	9.535	-			
Integrative supervisor / Integrative subordinate	4.299*	1.934	13.25*	3.715	-		
Integrative supervisor / Intuitive subordinate	2.049	-.316	11	1.465	-2.250	-	
Intuitive supervisor / Analytic subordinate	5.049	2.684	14*	4.465	.750	3	-
Intuitive supervisor / Integrative subordinate	-5.751	-8.116*	3.2	-6.335	-10.050*	-7.8	-10.80*

*Significant at the .05 level (1- tailed)

Subsequently, multiple comparison analysis using LSD was performed. Table 43 presents the result of multiple comparisons among the groups in relation to knowledge transfer stickiness. The LSD test indicates that the similar group, which is group 5: Integrative supervisor/Integrative subordinate (N = 40; M = 30.7; SD = 9.6) is significantly different from the similar group 1 of Analytic supervisor/Analytic subordinate (N = 82; M = 35; SD = 8.3) in knowledge transfer stickiness. Additionally, group 5 (M = 30.7; SD = 9.6) is also significantly different from group 3, which is a dissimilar group, consisting of integrative supervisor/analytic subordinate (N = 2; M = 44; SD = 21) and group 8 (intuitive supervisor/integrative subordinate) (N = 8; M = 40.8; SD = 9.6) in knowledge transfer stickiness. In view of N sizes for groups 3 and 8, these two results may be questionable.

Group 7, containing intuitive supervisors and analytic subordinates (N = 7; M = 30; SD = 3.9) is significantly different from group 3, which is also a dissimilar group, with analytic supervisors and intuitive subordinates (N = 2; M = 44; SD = 21). Interestingly, group 8 which is also a dissimilar group (intuitive supervisor and integrative subordinate (N = 5; M = 40.8; SD = 9.6) is different from group 2, analytic supervisor/integrative subordinate (N = 57; M = 32.6; SD = 8.9), group 5, integrative supervisor/integrative subordinate (N = 40; M = 30.7; SD = 9.6) and group 7, which is intuitive supervisor/analytic subordinate (N = 7; M = 30; SD = 3.9). From the results, it can be seen that groups with similarity between supervisor and subordinate do not show a difference from the other groups, either the similarity groups or the dissimilarity groups, with the exception of groups 1 and 5. On the contrary, the dissimilar groups show a convincing and significance difference among their groups.

8.6 Conclusion

The hypothesised relationships between the theoretical constructs were tested, as depicted in Figure 20. A summary of the results is presented in Table 44. Out of 8 main hypotheses in the conceptual model, 2 hypotheses were found to be fully supported, 5 hypotheses were partially supported, and 1 hypothesis was refuted.

Table 45 demonstrates the findings derived from further analysis performed in order to test mediation effects of LMX among different cognitive styles of the managers. It was found that LMX mediates the relationship between high level of KTS and managerial tacit knowledge among the integrative and analytical style managers.

Table 44: Summary of Hypothesis Testing

Supported/Refuted of Conceptual Model Hypotheses				
Code	Constructs	Result	Sig. level	Outcome
H1	KTS and TKIM	r = -.029 r = -.282	.05	Partially supported
H2	KTS and LMX	r = -.394	.001	Supported
H3	Difference between CSI in KTS	F = 6.807 F = 2.950	.001	Partially supported
H4	KTS and CSI	r = .306 r = -.016	.001	Partially supported
H5	LMX and TKIM	r = .190	.001	Supported
H6	CSI and TKIM	r = .095 r = -.215	.01	Partially supported
H7	Mediation Effect of LMX	Beta = -.315 Beta = -.194	.01	Partially supported
H8	Mediation Effect of CSI	Beta = -.171 Beta = -.050	n.s	Refuted

Key: r = correlation result; Beta = standardized beta from regression result; F= one way analysis of variance (ANOVA) result

Table 45: Summary of Further Analysis (Mediation Effect of LMX among Different Cognitive Style)

Code	Constructs	Result (Beta)	T-value	Sig. Level	Outcome
Integrative	High KTS – LMX -TKIM	-.259	-3.068	.05	supported
Analytic	High KTS – LMX -TKIM	-.337	-1.213	.05	supported
Integrative	Low KTS – LMX -TKIM	-.165	-1.403	n.s	Refuted
Analytic	Low KTS – LMX -TKIM	-.200	1.155	n.s	Refuted

Note: Not Hypothesized; beta = standardized beta from regression analysis

In addition to the hypotheses testing and further analyses, this study also analysed the difference scores between the supervisors and subordinates by forming matched and mismatched groups, also known as similar and dissimilar groups. There were potentially nine matched and mismatched groups in total. However, no respondents fell into the ninth group, which is intuitive supervisors and intuitive subordinates. This is because there were only a small number of respondents who fell into the intuitive grouping.

A summary of these analyses is presented in Tables 46. Table 46 indicates the result from correlation analyses between the CSI difference score groups with the other variables. The first line of the correlation result in Table 46 presents an association between intuitive supervisor and low level KTS. Subsequently, the correlation between CSI groups and KTS, LMX, TKIM and its subscale is revealed.

Table 46: Summary of Additional Findings (Similarity and Dissimilarity Testing)

CSI Groups (Difference Score)	Constructs	Result	Sig. level
Supervisor Low (Intuitive)	Low KTS	$r = .245^*$	.05
<u>Dissimilar Group</u>			
Integrative Supervisor/ Analytic Subordinate (G4)		$r = -.283^*$	.05
Integrative Supervisor/ Intuitive Subordinate (G6)	KTS	$r = -.993^*$	.05
Intuitive Supervisor/ Integrative Subordinate (G8)		$r = -.810^*$	.05
<u>Dissimilar Group</u>			
Intuitive Supervisor/ Analytic Subordinate (G7)	LMX	$r = -.750^*$	.05
<u>Similar Group</u>			
Analytic Supervisor/ Analytic Subordinate (G1)	TKIM	$r = -.214^*$	.05
	M-Others	$r = -.219^*$	.05
<u>Dissimilar Group</u>			
Intuitive Supervisor/Analytic Subordinate (G7)	TKIM	$r = .835^{**}$	.01
	M-Others	$r = .886^{**}$	.01
	M-Task	$r = .932^{**}$	.01
Intuitive Supervisor/ Integrative Subordinate (G8)	M-Others	$r = .932^*$	.05

Note: Not Hypothesized; r = correlation result.

Additionally, the CSI difference score is analysed utilising one-way analysis of variance (ANOVA) in an attempt to identify the differences between the CSI groups and other variables. From ANOVA it was found that the CSI groups were significantly different in relation to KTS. The summary of differences among the CSI groups is illustrated in Table 47. There are combinations of results among the groups where similar groups showed a considerable difference to other similar groups but this difference was not as compelling as the differences among the dissimilar groups. Most of the differences originated from dissimilar groups with dissimilar groups or dissimilar groups with similar groups.

Table 47: Summary of ANOVA and Post Hoc Test of CSI Groups

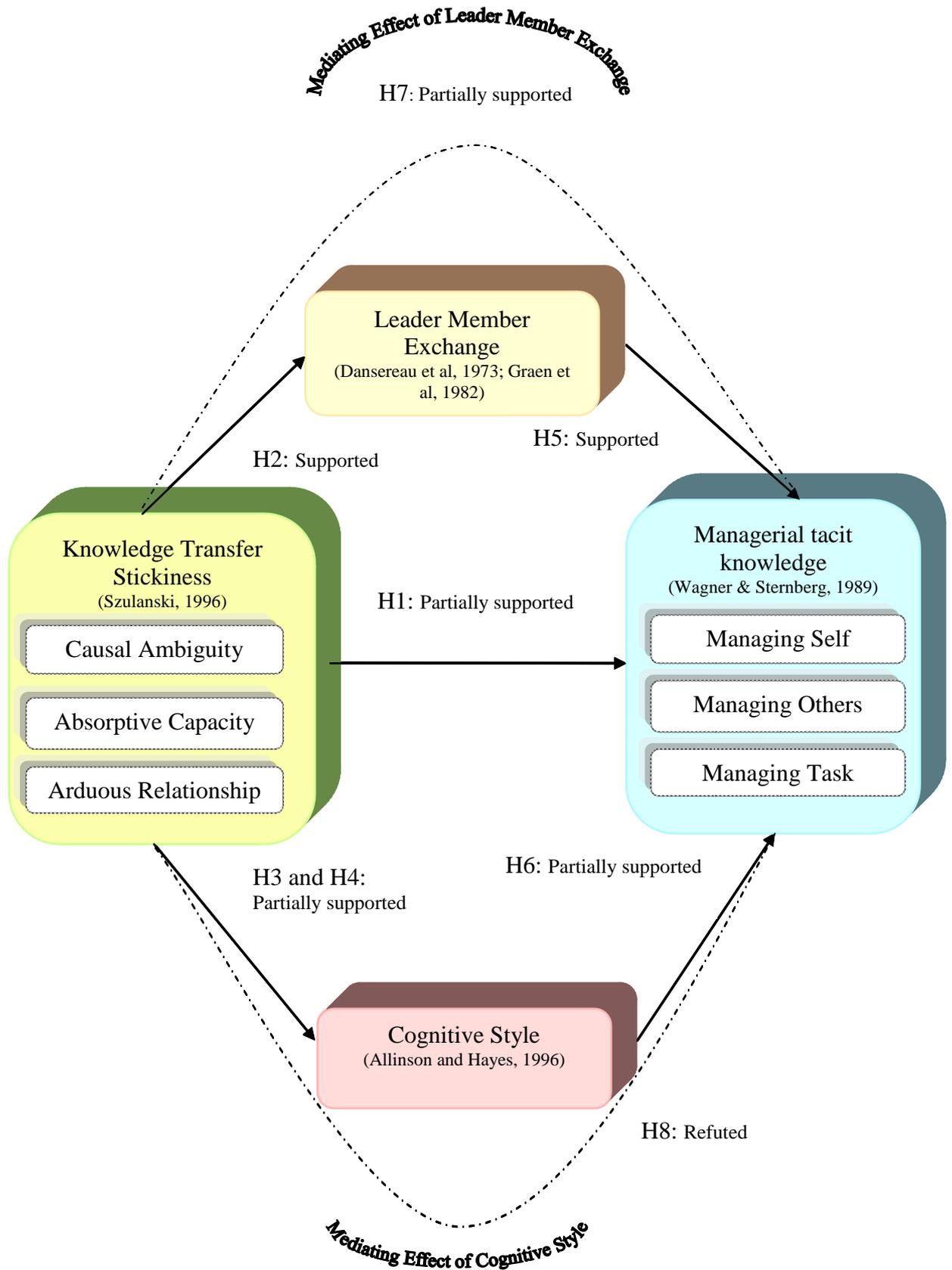
CSI Groups is significantly different in relation to KTS		
Post Hoc Test (LSD)	<u>Similar Group</u> Integrative Supervisor/Integrative Subordinate	<u>Similar Group</u> Analytic Supervisor/ Analytic Subordinate
		<u>Dissimilar Group</u> Analytic Supervisor/ Intuitive Subordinate
	<u>Dissimilar Group</u> Intuitive Supervisor/ Analytic Subordinate	<u>Dissimilar Group</u> Analytic Supervisor/ Intuitive Subordinate
	<u>Dissimilar Group</u> Intuitive Supervisor/ Integrative Subordinate	<u>Dissimilar Group</u> Analytic Supervisor/ Integrative Subordinate
		Integrative Supervisor/Integrative Subordinate
		Intuitive Supervisor/ Analytic Subordinate

This chapter has revealed the result from the survey data and the findings from the study hypotheses. Testing the research hypotheses involved various analytical techniques; namely, independent t-test, correlation, regression, hierarchical multiple regressions and one-way analysis of variance. The analysis established that some hypotheses were supported, some were partly supported and one was refuted.

For simplicity, an overall summary of the findings and the relative strength of these findings are represented in the schematic diagram below (Figure 26).

The findings fulfilled the first research aim by explaining the model on the relationship between knowledge transfer stickiness, leader member exchange and managerial tacit knowledge. Moreover, the findings also satisfy the research objective in further understanding leaders' role in effective managerial tacit knowledge transfer in examining the mediating effect of LMX. Finally, the research target to investigate cognitive style effects on knowledge transfer stickiness is also achieved. A detailed discussion and the implication of the results is provided in the following chapter.

Figure 26: Summary of Hypothesis Testing in Schematic Diagram



9 DISCUSSION AND CONCLUSION

9.1 Introduction

This chapter examines the results presented in Chapter Eight with respect to the proposed research hypotheses. Knowledge transfer relations in the organisation which, in turn, produce a competitive organisation as an outcome, represent an issue which has been identified as requiring further study (Nonaka and Takeuchi, 1995; Teece, 1998; Holthouse, 1998; Bryant, 2003; Morales et al, 2008). Consequently, the present study proposes a knowledge transfer relationship by looking into the role of interpersonal relationships, particularly leader member exchange and cognitive style as aspects of individual difference in influencing relationships in the workplace, with subsequent consequences for outcome of managerial tacit knowledge.

The chapter first discusses the results of the hypotheses testing. These tests started with the examination of the contribution knowledge transfer stickiness has made to managerial tacit knowledge, leader member exchange theory and cognitive style. The other key area of the contribution is the role that leader member exchange has in managerial tacit knowledge transfer. These sections leading to the roles of knowledge transfer stickiness and leader member exchange refer to the main relationships postulated in this study. Secondly, the chapter discusses the implications and the contributions of the study, as well as its limitations and makes suggestions for future research.

9.2 Discussion of Hypothesis Testing

This section discusses findings from the hypothesis testing undertaken to answer the three research aims comprising seven research questions. Firstly, the target of this section is to fulfil the primary research aim which intends to develop a theoretical framework between the variables; namely knowledge transfer stickiness, leader member exchange, cognitive style and managerial tacit knowledge. Thus, there were 5 research questions and 6 hypotheses to be answered.

Secondly, research aim two and three, which is an attempt to determine leader member exchange and cognitive style influence as a mediator in the relationship between knowledge transfer stickiness and managerial tacit knowledge, was answered through research questions 6 and 7. Finally, the research also intends to further understand the effect of match/mis-match of cognitive style on managerial tacit knowledge transfer between supervisor and subordinate.

9.2.1 Managerial Tacit Knowledge Transfer

Research question 1 attempt to examine the relationship between knowledge transfer stickiness and managerial tacit knowledge between individuals (refer to Chapter 1, section 1.6.1). In an attempt to answer this research question, hypothesis 1 was tested. H1 indicates that there was a significant difference between the groups of supervisors and subordinates in their managerial tacit knowledge. The finding was consistent with Tan and Libby (1997) and Nestor-Baker (1999), who found that experts and novices in the same professional context were significantly different in their level of accumulated managerial tacit knowledge, where most of the expert is the supervisor and novice is the subordinate in this particular study.

Since the result shows the difference in managerial tacit knowledge between the supervisor and subordinate, the subsequent analysis was conducted according to these two categories, supervisor and subordinate.

Managerial Tacit Knowledge Transfer among the Supervisors

The result failed to provide support for the relationship between knowledge transfer stickiness and managerial tacit knowledge among the supervisor. One possible explanation for this finding is that supervisor sometimes think it is difficult to articulate their knowledge or phrase their insights in a way that subordinate can relate to. The supervisor may think that particular knowledge is self-evident, whereas for others it is in fact difficult to understand. This situation occurs as sharing expertise is limited by their cognitive and mental representation (Hind, 1999; Pfeifer and Hind, 2002). It is suggested that when individuals increase their level of expertise, they tend to oversimplify their mental representations due to the ability to process information rapidly, view the task holistically and they tend to avoid details (Langer and Imber, 1979); as a consequence they may omit to mention several steps in a particular task.

Another possible explanation of this result can be found in the study on knowledge communication barriers where expert individual tends to favour their own opinion instead of practising knowledge transfer (Yaniv and Kleinbeger, 2000). Other research identified that the knowledge transfer barrier among experts might face a syndrome known as *Not-Invented Here (NIH)* when knowledge from others is sometimes rejected because it originated elsewhere (Katz and Allen, 1982). In contrasts, Menon and Pfeffer (2003) identify that experts prefer an outsider's opinion to internal knowledge. They argue that managers value outside knowledge because it has higher status, it is scarcer (difficult access) and it is less scrutinised for errors than internal knowledge.

However, the analysis of knowledge transfer stickiness and managerial tacit knowledge subscale indicates a significant association between knowledge transfer stickiness and managing others. This result suggests that supervisor perceived that their skill in managing others is affected by stickiness, because lack of absorptive capacity of the recipient and high arduous relationship between them will influence the skills of managing others (Wagner and Sternberg, 1986). However, their managerial tacit knowledge that specifically concerns managing self and managing task is not affected by knowledge transfer stickiness. This is because managing self does not involve interaction with their subordinate; it is tacit knowledge that is related to self-motivation and self-organisation (Wagner, 1987). Similarly, managing task is also a part of tacit knowledge that involves the self in effective ways of performing certain job (Wagner, 1987).

Further correlation between subscales of both variables shows a significant positive linkage between causal ambiguity and managing self. The supervisor perceived that causal ambiguity is affecting their self-management because they have to work hard in order to motivate themselves due to high ambiguity. Therefore, their tacit knowledge concerning managing self is affected because their self-motivation and self-organisation is increased when their level of uncertainty increases. This finding is not consistent with the finding in prior research which suggests that the difficulty in transferring knowledge occurs from causal ambiguity of the knowledge itself (Szulanski, 1996; Szulanski 2002; Szulanski and Jensen 2004).

This study found that absorptive capacity was positively related to managing others. The supervisor affirms that lack of absorptive capacity of the subordinate was connected to managing others. As mentioned in literature review, knowledge transfer stickiness

occurs when the recipient lacks absorptive capacity in knowledge transfer (Cohen and Levinthal, 1990). This lack of absorptive capacity leads to an inability to exploit outside knowledge in valuing, assimilating and applying new knowledge (Szulanski, 1996; Szulanski and Jensen, 2004). This is also congruent with the findings in Cohen and Levinthal (1990). They assert that stickiness will limit transfer when the recipient has a lack of absorptive capacity. They point out that the intensity of effort in knowledge acquisition will influence the absorptive capacity of the recipient, because effort is required to assimilate new knowledge with existing knowledge. In this case, it can be concluded that the supervisor perceived that the subordinate lacks effort in absorbing and understanding the knowledge.

The finding also reveals that the arduous relationship also negatively influences managerial tacit knowledge transfer among the supervisors, particularly in TKIM and in managing others and managing task. These findings indicate that the supervisor perceived that the higher the level of arduous relationship, the less likely it is that managerial tacit knowledge will be transferred. This is because knowledge transfer requires an interaction between the source and the recipient. An arduous relationship can be perceived as emotionally laborious and distance the relationship in the exchange (Szulanski, 1996), thus it can be considered as the main barrier to knowledge transfer (Argote, 1999). In the event arduous relationship exists in the transfer exchanges, it will negatively affect managerial tacit knowledge transfer.

Arduous relationship also shows a significant negative association with managing others and managing task. In this situation, a lack of rapport between the supervisor and subordinate will lead to less tacit knowledge transfer concerning managing others and managing task. This finding is supported by Szulanski (1996; 2000); Baum and Ingram

(1998) and Szulanski and Jensen (2004) who reported that an arduous affiliation between the source and the recipient will have an unfavourable affect on knowledge transfer.

Managerial Tacit Knowledge Transfer among the Subordinates

The results confirm a direct negative correlation between knowledge transfer stickiness and managerial tacit knowledge. From this result in can be interpreted that the higher the level of knowledge transfer stickiness the lower the level of managerial tacit knowledge transfer of the subordinate. For the knowledge transfer stickiness tested in this study (consisted of causal ambiguity, absorptive capacity and arduous relationship), which was recommended by Szulanski (1996), it was found that subordinate ratings on knowledge transfer stickiness were more closely related to managerial tacit knowledge than with the supervisor rating.

This is evident from the significant relationship between both variables and their subscales. Knowledge transfer stickiness is significantly negatively related to all managerial tacit knowledge subscales, namely managing self, managing others and managing task. The result revealed that subordinate perceived that their managing self, managing others and managing task is more likely to increase when the transfer stickiness has decreased.

The result is in support of prior research by Szulanski (1996) and Szulanski and Jensen (2004) which noted that the difficulties occurred in the circumstances that the knowledge was highly tacit (ambiguous) and imperfectly understood. Moreover, this finding is also consistent with Murray and Hanlon (2010) who regarded tacit knowledge as highly ambiguous and hard to transfer.

In particular, it can be confirmed that the decrease in causal ambiguity of subordinate is likely to affect the increment of managing self, managing others and managing task transfer. The finding was consistent with prior research which suggests that the ambiguity of knowledge can conflict with clear communication (Hedlund and Zander, 1993). Similarly, other research indicated that tacit knowledge involves the use of unusual language; thus the meaning is poorly interpreted (Inkpen, 2008).

Similarly, an increase in absorptive capacity of subordinate is likely to enhance the managing self, managing others and managing task transfer because the transfer become easier. This finding is congruent with Cohen and Levinthal (1990). They suggest that transfer difficulties will appear when there is a lack of absorptive capacity. However, the findings related to arduous relationship revealed a negative relationship only with managing self. Thus, this result indicates that the greater the arduous relationship or emotional distance, the less managing self is transferred. Arduous relationship between the source and recipient will lead to a distant relationship; thus it affects the transfer of knowledge, particularly managing self, in this context. This was also found in previous studies (Von Krogh, 1998; Lehner and Lehmann, 2004).

That is why previous studies argue that an arduous relationship will add to the complexity of the transfer (Szulanski, 1996; Szulanski, 2000; Szulanski and Jensen, 2004). In line with this finding were Baum and Ingram's (1998) study which showed an arduous relationship between a source and a receiver will have an unfavourable affect on knowledge transfer.

9.2.2 The Role of Leader-Member Relations in Knowledge Transfer

Research question 2 is concerned with the relationship between knowledge transfer stickiness and the quality of leader member exchange (refer to Chapter 1, section 1.6.2). Result confirmed a negative relationship between knowledge transfer stickiness and leader member exchange as presented in hypothesis two. It can be concluded that a negative relationship in this study indicates that the leader member exchange has affected the difficulties in tacit knowledge transfer. In other words, when the quality of leader member exchange is low, the transfer difficulty is high.

This result is in line with prior studies presented in Chapter Three. It was proposed that informal knowledge transfer occurred through relationships between peers, colleagues, mentors and supervisors (Lahti et al, 2002), interaction with other people is a major element in knowledge conversion (Stover, 2004) and tacit knowledge transfer very much relies on face-to-face interaction (de-Alwis and Hartmann, 2008). Consistently, LMX theory promotes relationship-building and exchanges that require interaction and socialisation between individuals (Scandura et al, 1986; Graen and Uhl Bien, 1995) where it will lead to high quality leader member exchange.

As mentioned in the literature, the factor required in knowledge transfer such as trust (Penley and Hawkins, 1985; Tsai and Goshal, 1998; Cross and Prusak, 2000) also found to be similar to trust dimension in leader member exchange. The current study further enhances the relationship between knowledge transfer and LMX. It was found that causal ambiguity, absorptive capacity and arduous relationship, all of knowledge transfer stickiness subscales is highly negatively related to leader member exchange.

One possible explanation of this situation is that when the difficulty is high in tacit knowledge transfer, the level of respect, trust and obligation between the individual is very low. In interpersonal exchange, in this study involves knowledge exchange, individuals involved need to trust each other, mutually respect one another and feel responsible to fulfil certain obligations (Dienesch and Liden, 1986; Graen and Scandura, 1987; Graen and Uhl-Bien, 1995; Uhl-Bien et al, 2000; Maslyn and Uhl-Bien, 2001). Congruent with this circumstance, from the perspectives of knowledge transfer studies, high arduous relationship, low quality relationship in LMX study, will affect knowledge transfer, especially tacit knowledge (Baum and Ingram, 1998; Argote, 1999). Apart from that, another possible explanation is related to causal ambiguity in the source of tacit knowledge and lack of absorptive capacity in the recipient also contributing to high transfer stickiness (Von Krogh, 1998; Lehner and Lehmann, 2004). The causal ambiguity might arise because when the source and recipient have unfriendly interaction, they have difficulties in clarifying any ambiguity. In term of absorptive capacity, the recipient might feel it is hard to absorb knowledge received from managers that is not well trusted and respected.

9.2.3 The Role of Cognitive Style in Knowledge Transfer

In this section, the result presented answers to research question 3 which examines the relationship between knowledge transfer stickiness and cognitive style (refer to Chapter 1, section 1.6.3).

It was argued that leaders' role in knowledge transfer stickiness is affected by the level of stickiness, as Szulanski (2004) found that a managers' role is only required with a high level of stickiness. Their result was also supported in Li and Hsieh (2009). Therefore, this study conducted the analysis according to the level of knowledge

transfer stickiness. The result asserts that cognitive style was significantly different in the individuals who perceived a low level of knowledge transfer stickiness as compared to the individuals who perceived a high level of knowledge transfer stickiness. From the result from H3 it can be concluded that the individuals who perceived a low level of knowledge transfer stickiness varied in their cognitive styles, especially among the analytic and integrative styles. This finding is consistent with Szulanski and Jensen (2004) and Li and Hsieh (2009).

This finding corroborates the ideas of Hayes and Allinson (1998), who suggest that an individual's cognitive style can influence their mental models. For example, an analytic individual focuses on 'hard data' and adopts the sequential and step-by-step approach in information processing as compared to intuitive individuals who are more concerned about 'soft data' which emphasises immediate judgement. This result may be explained by the fact that in low knowledge transfer stickiness, analytic style managers experience uneasiness when they experience few difficulties because they are more concerned about the detail and systematic approach, and even a small difficulty will distract them. On the other hand, their integrative-style colleagues might perceive that a low level of stickiness does not affect them, because they are not really concerned about the details and can easily make decisions. However, the two cognitive styles are not significantly different with a high level of knowledge transfer stickiness. It seems possible that this result is due to analytic and integrative individuals both perceiving that high stickiness is affecting their actions.

Hypothesis four postulated a relationship between cognitive style and knowledge transfer stickiness, in particular their high and low levels of stickiness. This assumption was drawn following the result from hypothesis three. These findings further support

the idea that cognitive style is related to knowledge, which was rooted in the learning studies domain (Kolbs, 1985; Honey and Mumford, 1986; Sadler-Smith, 1996; Allinson and Hayes, 1996). It was found that a low level of knowledge transfer stickiness is positively related to cognitive style (total score) and integrative style, while a high level of knowledge transfer stickiness was shown to be related to analytic style. This result confirmed that those tending towards the lower end of the integrative style correlates with lower level stickiness scores. Similarly, those who tending towards high ends of stickiness, correlates with high end of cognitive style which is analytic style.

It may be that these individuals were influenced by their mental models (Hayes and Allinson, 1998). Their study findings expand our understanding on the effect of information processing on cognitive style, where it was determined that an analytic individual focuses on systematic and detailed information processing in arriving at decision making, whereas the intuitive individual shows that they emphasise general views, look at information holistically and arrive at decisions on the premise of their 'gut feeling'.

Correspondingly, this study found that cognitive style also affected the level of knowledge transfer. It can be concluded that, due to different information processing among different cognitive styles, managers with analytic style perceived that a high level of stickiness was influencing their action. On the other hand, the integrative managers perceived that a low level of stickiness was consistent with their preferences.

9.2.4 The Role of Leader-Member Relations on TKIM

Research question 4 attempts to examine the relationship between the quality of leader member exchange and managerial tacit knowledge (Chapter 1, section 1.6.4). The result from hypothesis five confirmed that there was a highly significant positive relationship between the quality of leader member exchange and managerial tacit knowledge, as expected. Leader member exchange was found to be associated with managerial tacit knowledge as a whole as well as with the entire subscale. The findings suggest that an individual with high quality leader member exchange is more likely to have high managerial tacit knowledge including managing self, managing others and managing task.

In other words, it can be understood that managers with high quality leader member exchange are able to motivate and organise themselves properly; they prioritise their tasks according to the most important goals and allocate their time accordingly (Sternberg et al, 2000). With regard to managing others, managers with high quality leader member exchange provide favourable work schedules, and support their employees (Graen and Uhl-Bien, 1995) and they are skilful in the interpersonal relationship with superior, colleagues and subordinate (Wagner and Sternberg, 1986). In relation to managing task, high quality leader member exchange managers are able to perform specific task excellently, for example good communication skill in the presentation (Wagner, 1987).

This finding accords with our earlier observations, which showed that tacit knowledge is related to leadership (Tan and Libby, 1997; Hedlund et al, 2003). Tan and Libby (1997) identified that top managers had a high level of accumulated managerial tacit knowledge as compared to top staff among auditors. Similarly, Hedlund et al (2003)

provided evidence that managerial tacit knowledge was related to leadership behaviour in the military leadership. The result has extended the knowledge of the association between managerial tacit knowledge and leadership, particularly LMX. The result has fulfilled the aim of research question four.

9.2.5 The Role of Cognitive Style on Managerial Tacit Knowledge

The fifth question is to investigate whether there is a relationship between cognitive style and managerial tacit knowledge and the result has fulfilled this question's aim. It was found in the testing of hypothesis six that there is no relationship between cognitive style and managerial tacit knowledge as a whole.

On the contrary, the integrative and analytic styles were found to be related to managerial tacit knowledge. The integrative style was found to be positively related to managerial tacit, and it can be concluded that a high integrative style is more likely to accumulate high managerial tacit knowledge.

Perhaps this is due to differences in the nature of information processing and mental model of the integrative managers. The integrative managers will need to think on their feet and make decisions more quickly. To deal with situations that require quick decision making, the integrative managers have to have high managerial tacit knowledge in order to perform excellently at work. Again this circumstance is likely to suit the integrative managers who more often rely on values and emotions to guide them through actions (Hayes and Allinson, 1998).

Conversely, an analytic style individual indicates a negative relationship with managerial tacit knowledge which can be understood by a highly analytic individual

being more likely to accumulate less managerial tacit knowledge. Analytic managers maybe inclined to collect, absorb, analyse and process information in detail before arriving at a decision. They have to evaluate the information, tend to make decisions on a logical and structured basis, and thus their way of thinking does not require gut feeling (Hayes and Allinson, 1998). Analytic manager are likely to use all the information and evidence in action, and as a result, they not really referring to their tacit knowledge.

The finding is consistent with Hayes and Allinson (1998). In their study on matching people with work situations, they argue that people tend to perform excellently when their cognitive style matches their information processing. Their result indicates that individuals are comfortable to work in the situation where their work requires an action that suits their cognitive style. For instance, the analytic individual will be happy and perform well if their work needs them to conscientiously evaluating the information, providing enough time for assessing all the perspectives, and estimating all the relevant factors affecting the problem before arriving at a careful decision. This style is representative of analytic managers. On the other hand, the intuitive individual is more likely to feel uncomfortable if they are positioned in that particular job.

The findings are also congruent with the evidence found in learning style study where it was found that intuitive and analysts observe and reflect on their experience differently, and adopt different approaches in creating new ideas (Allinson and Hayes, 1996). This study also produced a result which corroborates the findings in Kim's (1993) study which suggest that a mental model is related to individual conceptions of 'know-how' and 'know-why'. The findings of this study further our knowledge on this relationship, specifically on the association between cognitive style and managerial tacit knowledge.

9.2.6 Managerial Tacit Knowledge Transfer and LMX as Mediator

Hypothesis seven was postulated in Chapter 4 in order to fulfil research question six on the mediating role of LMX. Interestingly, it was found that LMX partially mediated the relationship between high knowledge transfer stickiness and managerial tacit knowledge. It can be concluded that high quality leader member exchange facilitates managerial tacit knowledge transfer by reducing the level of knowledge transfer stickiness and consequently higher levels of tacit knowledge can be transferred.

Interpersonal relationships that occur through the process of knowledge transfer rely to a great extent on the aspect of respect, trust and obligation between individuals involved. The source of the knowledge must be highly respected by the recipient of the knowledge in order for the knowledge to be absorbed. This particular source also has to be trusted by the recipient, so that they openly accept the knowledge without any hesitation (Argyris, 1982; Mayer et al, 1995; Cross et al, 2001; Abram et al, 2003; Levin and Cross, 2004).

Subsequently, the recipient of the knowledge feels obligated to pay back the source for their willingness in transferring their knowledge. Through this repeating interaction, closeness and agreeableness, which could be termed high quality leader member exchange between them, will gradually build a conducive environment for the transfer of tacit knowledge (Graen and Uhl-Bien, 1995; Szulanski, 1996; Argote, 1999).

Without the aspects of respect, trust and obligation (LMX dimensions) in the knowledge transfer relationship, the process of transfer will be sticky, difficult and only a little managerial tacit knowledge can be delivered. Thus, we can conclude that high quality leader member exchange through its dimensions of respect, trust and obligation

positively affect the interaction between knowledge transfer stickiness and managerial tacit knowledge by providing a good premise for the transfer. The present findings seem to be consistent with prior research which found that leadership of CEO is required in intra-firm best practice transfer, particularly with a high level of transfer stickiness (Szulanski and Jensen, 2004). Therefore, the present finding provides evidence on the mediation effect of LMX in managerial tacit knowledge tacit knowledge transfer. This supports the views of Cavusgil et al (2003) who suggest that maintaining mutual trust and close interaction contributes to successful tacit knowledge transfer.

On the other hand, this study found that LMX does not influence managerial tacit knowledge transfer when the stickiness is low. This is also consistent with Szulanski (2003), who suggested that the CEO's involvement is not necessarily required with a low level of stickiness. In this present study, when managerial tacit knowledge transfer stickiness is low, the issues of close interaction, respect, trust and obligation appear to be irrelevant. Perhaps, the reason for this situation is that the managers felt that their managerial tacit knowledge transfer was easy and therefore less dependent on respect, trust and obligation.

9.2.7 Managerial Tacit Knowledge Transfer and CSI as a Mediator

This mediation test was conducted in order to answer research question 7, which concerned the influence of cognitive styles on managerial tacit knowledge transfer. The result from hypothesis eight did not support the expectation that cognitive style will mediate the relationship between knowledge transfer stickiness and managerial tacit knowledge transfer. It can be concluded that the individual experienced managerial tacit knowledge transfer stickiness in the workplace regardless of their cognitive style. As a

result, the findings were unable to provide evidence for our understanding of the influence of cognitive style in knowledge transfer.

Even though it was found that cognitive similarity between supervisor and subordinate increased the level of interaction (Suazo et al, 2008) and the supervisor was also well respected (Allinson et al, 2001), the evidence from this study was unable to confirm that this close interaction facilitated the tacit knowledge transfer. One possible explanation for this finding is related to the sample. The sample for this particular study was selected from the administrators in the Malaysian public sector, which is different from prior research. To the researcher's knowledge, there has been very little research on cognitive style conducted in the public sector, particularly in Asian countries.

For instance, previous studies on cognitive style were conducted in the education profession (Armstrong, 2004), business students (Murphy et al, 1998), law students (Doucette et al, 1998), computing students, management students, management lecturers, managers from industry (Armstrong, 1999), entrepreneurship (Armstrong and Hird, 2009), managers in large construction company, PhD workshop participants, management student teachers, miscellaneous managers (Allinson and Hayes, 1996) and working professionals who were going to pursue a PhD and employees in the county government of New Mexico (Suazo et al, 2008). Most of these studies were conducted in Western countries.

Due to the difference in the sample selected, the finding was unexpected. This difference is clearer in a comparison the mean sample of the study. For example, Armstrong's (1999) study showed that the sample mean of his study is 40 ($M = 40$) for the supervisor and 45 ($M = 45$) for the subordinate, whereas this particular study

indicated the sample mean was 49.5 ($M = 49.5$) which shows a tendency to being significantly more analytic.

Another possible explanation for this unexpected result is related to cultural differences. In line with with the cultural differences previously discussed in Chapter 7 (7.2.4), the findings might also be affected by cultural differences. Cross-national research by Allinson and Hayes (2000) asserted that UK managers are more intuitive than Hong Kong managers. Additionally, the result on cognitive style was affected by cultural differences, which is also in line with prior research (Allinson and Hayes, 2000; Sadler-Smith et al, 2000; Savvas et al, 2001). Furthermore, it was found that cognitive style is not universal (Nisbett et al, 2001).

9.3 Further Analysis

This particular study further analyses the influence of LMX as a mediator in the relationship between knowledge transfer stickiness and managerial tacit knowledge with special attention to cognitive style as a basic context. This assumption was made on premise that LMX mediate the relationship between knowledge transfer stickiness and managerial tacit knowledge in hypothesis seven. However, hypothesis seven was examined without considering any cognitive style in the context of individual differences.

Further analysis on the mediation effect of LMX on the relationship between knowledge transfer stickiness and managerial tacit knowledge by individual cognitive styles offers convincing evidence. As expected, it was found that LMX affected the relationship between high level of knowledge transfer stickiness and managerial tacit knowledge among the integrative and analytic style managers. LMX partially mediated the

relationship between managerial tacit knowledge transfer among the integrative and analytic managers particularly in high level of knowledge transfer stickiness.

It can be concluded that managers with integrative and analytic cognitive styles perceived that their managerial tacit knowledge transfer was affected by the quality of LMX when the transfer difficulties is high. In other words, it can be said that in a situation where managerial tacit knowledge transfer stickiness increases, LMX will facilitate the stickiness by lowering the level of stickiness; as a consequence higher managerial tacit knowledge can be transferred.

From the knowledge management field, it was understood that transfer of knowledge involves many difficulties, and it is increasingly hard when its involving tacit knowledge (Szulanski, 1996; Inkpen, 2008). High quality leader member exchange means that both integrative and analytic managers are involved in a close relationship, or are highly respected and trusted by and obligated to one another (Graen and Uhl Bien, 1995). In this state of close interaction, they manage to transfer managerial tacit knowledge even though in high level of difficulties, for instances high causal ambiguity, lack of absorptive capacity and high arduous relationship.

Both of the managers with integrative and analytic style perceived that high quality leader member exchange affected the managerial tacit knowledge transfer, particularly in a situation where the stickiness was high. On the contrary, different cognitive style manager both perceived that high quality leader member exchange does not affect the managerial tacit knowledge transfer in low level stickiness. Therefore, it can be concluded that cognitive style does not affect knowledge transfer stickiness.

9.4 The Effect of Cognitive Similarity on KTS, LMX and TKIM

9.4.1 Cognitive Similarity and Knowledge Transfer Stickiness

This study also conducted an additional analysis with regard to cognitive similarity between supervisor and subordinate. From the analysis, it was found that the group of supervisors who are more intuitive than the subordinates was positively related to low level of knowledge transfer stickiness. It can be noted that knowledge flows easily from the more intuitive supervisors.

This finding is consistent with prior research which noted that different cognitive style individuals tend to process information differently. As for the intuitive individual, they are more flexible in making judgement and receptive to new ideas (Hayes and Allison, 1998). In relation to this study results, the intuitive supervisor may be more flexible and receptive to new ideas and pay less attention to ranking and organisational position, and as a result generate good knowledge transfer activities with less difficulties.

An additional result from the cognitive similarity group indicated that the group of integrative supervisors and analytic subordinates was negatively related to arduous relationship. The result can be interpreted as the increase in difference score between integrative supervisor and analytic subordinate being more likely to decrease the arduous relationship. In other word the more the supervisor is diverse from subordinates, the lower the arduous relationship between them. Similarly, the group of integrative and intuitive subordinate also shows a negative association with arduous relationship. Thus, it can be understood that higher differences between integrative supervisor and intuitive subordinate are more likely to reduce the arduous relationship between them.

Consistently, the intuitive supervisor and integrative subordinate confirmed the negative relationship with knowledge transfer stickiness. Therefore, it can be concluded that increase in differences is likely to reduce the level of knowledge transfer stickiness. This finding showed similar result with previous studies. For instances, Allinson et al (2001) found that intuitive leaders are more nurturing, more liked and respected by the analytic members. As they stated in their explanation “*leaders see themselves as being less dominant, and member are more dominant, the more analytic members are than their leader*”, (Allinson et al, 2001, p.213).

On the other hand, the result seems to be in contradiction with the ‘similarity-attraction’ paradigm (Bryne, 1971). The author suggests that similarities in personal attributes or other characteristics between individuals are linearly related to interpersonal attraction: similarity increases attraction while dissimilarity arouses denial. Regardless of this inconsistency result, Winch’s theory was that certain dissimilarities in personalities, may in fact assist interpersonal desirability. Winch’s theory recommends that a noteworthy relationship could be achieved through the reciprocal need gratification (Winch et al, 1954).

With regard to the finding of this present study, the integrative supervisor who shows flexibility in work decisions and evaluation, impartiality and high receptiveness to new ideas, attracted analytic subordinates and were highly respected. Therefore, in this situation, the level of arduous relationship between the supervisor and subordinate will be reduced as a result of this interaction.

Comparatively, their companion analytic supervisors showed systematic and task-orientated characteristics, less tolerance and more dominance, which may limit the

subordinates' participation in problem solving. As a consequence, an 'unfriendly' relationship was created between the supervisor and subordinate. Thus, this circumstance increases the level of arduous relationship between the supervisor and subordinate.

It was also found that the CSI groups are significantly different in knowledge transfer stickiness scores. These differences can be put into three categories: between the similar groups, between similar groups and dissimilar groups, and between dissimilar groups and dissimilar groups. Firstly, similar groups scored significantly differently on knowledge transfer stickiness, particularly between analytic supervisor /analytic subordinate and integrative supervisor/integrative subordinate. With regard to similar groups, the analytic group scored higher in knowledge transfer stickiness, while the integrative group, which tended to be closer to intuitive, scored lower in knowledge transfer stickiness. Secondly, there is the finding on difference score between similar groups and dissimilar groups. It was found that integrative supervisors and integrative subordinates scored with only a small difference from the intuitive supervisor, analytic subordinate group. Thirdly, findings on the difference scores among the dissimilar groups were the group that consists of integrative supervisor and analytic subordinate indicated a higher score on knowledge transfer stickiness as compared to the group of intuitive supervisors and integrative subordinates. Similarly, the intuitive supervisors and analytic subordinates group scored lower than the group of analytic supervisors and intuitive subordinates. This might be because the intuitive and integrative supervisor is more dominant than their analytic subordinate.

These differences were consistent with a previous study which suggests that different cognitive styles are influenced by their information processing (Hayes and Allison,

1998). As previously discussed, an analytic individual prefers a systematic and detailed approach in judgement, while intuitive and integrative individuals are more comfortable with values and emotion in their actions.

9.4.2 Cognitive Similarity and LMX

Dissimilar groups, intuitive supervisors and analytic subordinates, indicate a negative relationship with LMX. The result shows that the higher the difference, the more likely it is that the level of LMX will be lower. Here, this particular result is coherently in-line with Byrne's (1971) similarity-attraction paradigm. As Byrne proposed, similarity increases the success of interaction, while dissimilarity generates conflict.

Dansereau (1975), Graen and Uhl-Bien (1995), Liden and Maslyn (1998) for instance, indicate that mutual respect, reciprocal trust, loyalty and obligation are the essence of relationship between the leaders and members. By valuing this dimension in the relationship, leader and member will create harmonious and close interaction between them which will proceed to a high quality leader member exchange.

In this study, the result seems to support the notion. When the supervisor and subordinate are mismatched, their relationship will be affected. The dissimilarity between them limits their aspect of respect, trust and obligation due to different cognitive styles and this relationship leads to a cold and unfriendly situation. It was difficult for both of the supervisor and subordinate to get along together because of their views, opinion and might be working style were dissimilar. This is shown in Hayes and Allison (1998) study, which asserts that the cognitive style influences the way individuals process their information, which will clearly affect their views and perspective.

9.4.3 Cognitive Similarity and Managerial Tacit Knowledge

The similar groups of supervisors and subordinates, particularly analytic supervisors and analytic subordinates, were found to be negatively associated with the managerial tacit knowledge and managing others subscale. The results confirmed that an increase in similarity was more likely to reduce managerial tacit knowledge and managing others. Since both of the members were analytic, their information processing was concerned with 'hard data'. They require ample time for analysing data, and considerable information is needed in order to arrive at a sound decision (Hayes and Allison, 1998); they might pay less attention to the aspect of practical intelligence or tacit knowledge. This is also supported by the finding of this particular study which found that analytic individual is negatively associated with managerial tacit knowledge. Accordingly, it is reasonable to conclude that when the analytic supervisor and analytic subordinate match together, they emphasise the analytic aspect of information processing (which can also be termed explicit knowledge), they are likely neglected their tacit knowledge. The evidence from Armstrong et al (1997) also indicated that similarity between student and research supervisor led to less empathy in the relationship.

Dissimilar groups, specifically intuitive supervisors and analytic subordinates, revealed a positive association with managing others, managing task and managerial tacit knowledge. In addition, intuitive supervisors and integrative subordinates showed a positive association with managing others. Hence, it can be understood that greater differences are more likely to increase managing others. It was confirmed that dissimilarity in cognitive style between individuals may lead to encouraging outcomes. For instances, in an experiment on the performance in complex task by pairs of accounting students, Cheng et al (1998) determined that pairs that are heterogeneous in their cognitive style are able to produce a higher quality of decision compared to their

homogenous dyad colleagues. In 1986, Garlinger and Frank clearly distinguished that mismatching field-dependent learners and field-independent teachers was beneficial in an educational context.

Furthermore, it was concluded that homogeneity of style restricted creative problem solving because the integration of diverse insights, views and approach of processing information will generate innovatory solutions (Leonard and Strauss, 1997).

As in the result of this present study, the mismatch between the supervisor and subordinate will assist in the free flow of new idea generation, and less attention will be paid to explicit knowledge. Greater emphasis placed on idea generation will consequently enhance the focus and application of tacit knowledge residing in the managers' minds.

9.5 Summary of Significant Findings

- 1) Knowledge transfer stickiness has a significant negative relationship with managerial tacit knowledge, particularly among the subordinate managers, while the supervisor managers show a significant negative relationship between knowledge transfer stickiness and managing others.
- 2) Knowledge transfer stickiness has a significant negative relationship with the quality of leader member exchange, where in the high quality LMX the transfer stickiness will reduced.
- 3) A low level of knowledge transfer stickiness is positively related to cognitive style as a whole and also to integrative style. Conversely, analytic-style

managers showed a positive association with a high level of knowledge transfer stickiness.

- 4) The quality of leader member exchange indicates a highly significant positive association with managerial tacit knowledge.
- 5) There is no association between cognitive style and managerial tacit knowledge, however the integrative-style managers noted positive relationship with managerial tacit knowledge, whereas analytic-style managers indicate negative link with managerial tacit knowledge.
- 6) The quality of leader member exchange influences the relationship between high level of knowledge transfer stickiness and managerial tacit knowledge, particularly by reducing the level of knowledge transfer stickiness to facilitate managerial tacit knowledge transfer among the managers.
- 7) Cognitive style does not influence the relationship between high level of knowledge transfer stickiness and managerial tacit knowledge.
- 8) The quality of leader member exchange influences the relationship between a high level of knowledge transfer stickiness and managerial tacit knowledge among the integrative and analytic managers.
- 9) Dissimilar match groups that consist of intuitive or integrative supervisors indicate a negative relationship with knowledge transfer and arduous relationship. Similarly, dissimilar groups that consist of intuitive supervisors have a positive association with managerial tacit knowledge. Similar groups, particularly analytic supervisors and analytic subordinates have a negative relationship with managerial tacit knowledge. Surprisingly, the correlation between intuitive supervisors and analytic subordinates showed negative linkages with leader member exchange.

9.6 Practical Implications

The findings contribute several practical management applications within particular organisational settings. Firstly, there is the importance of leaders building positive relationships with followers (high quality LMX) which are able to foster employees' willingness to transfer knowledge with other members in the workplace. It may be of particular importance to encourage these types of behaviour in public sector settings where the customers demand an excellent service.

Secondly, effective leadership training programs for managers are needed to reinforce the importance and techniques of leader member exchange in relationship development with superiors, peers and subordinates. For example, the manager can assist new employees to fit into the team so that the employee would not feel like stranger, especially when they begin to develop relationships with the manager and other co-workers.

Thirdly, since there is evidence indicating that there is a linkage between knowledge transfer stickiness and leader member exchange, then one of the implications in knowledge management field would be further to understand the key difficulties in managerial tacit knowledge transfer and find an applicable solution to these difficulties. Similarly in leadership fields, it would be positioning a right and appropriate leader in leading the managerial tacit knowledge transfer in the organisation. Moreover, the leaders' role should be one of the concerns in tacit knowledge transfer due to their influence, as found in this study.

The present study has shown that individual differences in the cognitive styles of supervisors affect supervisory relationships in the work place. Furthermore, it has

shown that allocating managers to supervisors on the basis of their individual cognitive styles may improve managers' perceptions of the level of their managerial tacit knowledge. A major recommendation, therefore, is to select diverse work teams especially for the task related to tacit knowledge or tacit knowledge transfer.

9.6.1 Contribution of the Study

The present research fills the gap in the work of knowledge management, which several researchers (Teece, 1998; Holthouse, 1998) had suggested for further research in the area of tacit knowledge transfer. Most of the researchers have focussed their attention towards knowledge transfer (Szulanski, 1996; Davenport and Prusak 1998; Argote et al, 2000; Szulanski and Jensen 2004) and they found that knowledge transfer within the organisation is important in order for the organisation to remain competitive.

However, very little research has been conducted particularly to examine tacit knowledge transfer within the organisations. The current study has made a theoretical contribution to the literature by establishing the theoretical framework linking between knowledge transfer stickiness, leader member exchange, cognitive style and managerial tacit knowledge. The main innovation of this conceptual model is that it brings together and predicts relationships between all the variables.

This is in particular furthers our understanding on the empirical evidence on the relationship between knowledge transfer stickiness and managerial tacit knowledge. Through the study findings also can be understand that knowledge transfer stickiness is related to LMX and cognitive style. Even though it was previously found that the leader's role is important in tacit knowledge transfer, from the finding it is clear that

leadership specifically LMX is important in tacit knowledge transfer. Interestingly, we also found that integrative style is related to managerial tacit knowledge.

Secondly, this particular study also fills the gap in the leadership research area by investigating the role of leader member exchange in influencing the relationship as an extension of Bryant's (2003) and Nonaka and Toyama's (2005) studies. It understood that interpersonal relationship particularly leader member exchange theory in knowledge transfer is important in facilitating managerial tacit knowledge transfer. In this study, high quality leader member exchange was noted further to enhance the transfer process by decreasing the level of transfer stickiness. The study also contributes to the literature of knowledge transfer by advancing the understanding of a specific mediating mechanism, particularly leader member exchange within the framework developed.

Thirdly, this study also extends further research on the effect of different combinations of cognitive style on work performance (Allinson et al, 2001). This study finding expands our knowledge on different combination of managers cognitive styles on managerial tacit knowledge transfer as well as knowledge transfer stickiness. The findings suggest that incongruence match between managers' cognitive styles is beneficial because cognitive style differences will likely decrease the level of knowledge transfer stickiness and provide a basis for tacit knowledge application, particularly among intuitive and integrative supervisors.

The other contribution of the study is methodological, because this study has measure LMX from the perspectives of supervisor as well as subordinates. Previous research in leader member exchange is far less common than individually-rated relationships. In

some research a leader has rated a number of exchanges with various members (Schriesheim et al, 1998). This approach of relationship measurement is not as reliable as it is not consistent with theory. LMX is a theory of differentiated relationships, and in order to assess the ability of knowledge transfer stickiness to predict this differentiation, there must be a leader for every member. This more reliably establishes the effects of knowledge transfer stickiness on the differentiation of LMX quality, as the rating of knowledge transfer stickiness will be different in each subordinate. The use of multi-source data is significant strength of this study research design.

9.6.2 Limitations and Suggestions for Future Research

While the current research made significant contributions from both theoretical and practical points of view, it has some limitation that should be noted when interpreting its findings. The limitations and some possible directions for future research are discussed below.

The proposed model is a preliminary test of a newly developed model that should rely on further refinement and testing. Particularly, the emphasis is on the managers in Malaysian public sector, which limits the extent to which the results may be generalised across other sectors. It is currently unclear how well the model and the findings will generalise beyond the study specific setting. Support for the developed model should be investigated in different settings to establish external validity. Future research could revalidate the measurement scales developed by similar reference populations, since the usefulness of the measurement scale come from its generalisability. Besides, it is suggested to replicate this study using qualitative approach because these findings were generated from survey data.

Another possible limitation of the study, however, is the subjects were managers based exclusively in the Malaysian Public Sector. Replications of the research are therefore needed in a variety of settings if the results and implications are to be established with confidence and generalised to other populations. Future research can also undertake the task of understanding the transfer of tacit knowledge in other professions besides management.

Even though data collected were from both supervisors and subordinates, the data used to analyse leader member exchange were individual data since the test of non-independence indicates that they should be treated as individual data. Consequently, further research should replicate this study by using dyadic data in order to examine the effect of dyadic data on the proposed model. It will further add to our understanding on the area of 'level of analysis' in leader member exchange study.

In relation to dyadic data, it is suggested that future research should be conducted using the social exchange theory in the interaction between leaders and members. Studies on leader member exchange assert that social exchange theory is the theory underpinning LMX. This is because leader member exchange is built on a reciprocal relationship between the leader and the member. For example, if the leader transfers their tacit knowledge to their member, they expect their subordinate to pay them back by executing the assignment properly. Thus, testing the social exchange theory in a similar study setting would be beneficial.

The current study also found that the internal reliability of the cognitive style index was not consistent with previous research. Test re-tests reliability of the cognitive style index in this study range from 0.45 to 0.58 (Cronbach's alpha) which was considered

rather low. Therefore, it was assumed that the cultural effects might be one possible variable influencing the reliability of the index. It is also possible that there were problems associated with the translation process from English to Malay even though a rigorous approach was adopted. It should also be noted that the study sample was significantly higher in term of mean score on the CSI than in previous studies. Consequently, there were very few intuitive managers in the sample. Thus, future research in Asian countries, particularly in Malaysia, is required in order to identify the factors influencing the reliability of the cognitive style index in similar settings.

9.7 Conclusion

This research aimed to develop a model that explained the relationship between knowledge transfer stickiness, leader member exchange, cognitive style and managerial tacit knowledge as an outcome. This model was tested by postulating eight hypotheses to examine the influences of all of these relationships. Administrative and diplomatic managers from the Malaysian Public Sector were selected for testing this model because they are entrusted to do most of the managerial work in implementing the government policy. A cross-sectional survey design was chosen, and data were analysed using t-test, correlation, multiple regression, hierarchical regression and one-way analysis of variance. Some hypotheses were supported, and some were refuted. These were discussed in this chapter.

The results supported expectations about the relationship of knowledge transfer stickiness, leader member exchange and cognitive style with managerial tacit knowledge. Interestingly, it was found that leader member exchange was identified as influencing the relationship between knowledge transfer stickiness and managerial tacit knowledge, whereby the level of knowledge transfer stickiness will decrease with the

existence of high quality leader member exchange, resulting in high tacit knowledge transfer. This finding fulfilled research aim two, which is to examine the mediating role of leader member exchange. However, cognitive style does not affect the relationship between knowledge transfer stickiness and managerial tacit knowledge; in other words it is not a mediator in this relationship. However, surprisingly, it was found that leader member exchange mediates the relationship between knowledge transfer stickiness and managerial tacit knowledge among integrative- and analytic-style managers.

Additional analyses on cognitive similarity were conducted to answer research aim three. Managers with different cognitive styles perceived knowledge transfer differently; where integrative managers are concerned, low level of stickiness does not influence them. Matching individuals with dissimilar cognitive styles was found to reduce the level of knowledge transfer stickiness.

Apart from that, dissimilar groups, particularly intuitive supervisors with analytic or integrative subordinates, show a positive association with managerial tacit knowledge. Conversely, matching dissimilar managers leads to a low-quality leader member exchange. The findings from this study have fulfilled the three research aims and eight hypotheses postulated from the theory.

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**Appendix
(QUESTIONNAIRE)**



THIS RESEARCH IS FOR MY DOCTORAL (PhD) THESIS THE RESEARCH SEEKS TO STUDY THE INFLUENCE OF LEADER-SUBORDINATE RELATIONSHIPS ON KNOWLEDGE TRANSFER

Dear Sir/Madam,

I am pursuing a PhD degree at the University of Hull's Business School in United Kingdom. I am doing a survey and I seek your kind assistance in completing this questionnaire. The study proposes to examine the role of leaders in the transfer of knowledge between senior managers to their subordinates in Malaysian public sector. Please complete the questionnaire labelled SM (Senior Manager) and please distribute the questionnaires labelled MI-G1, MI-G2, MO-G1 and MO-G2 to your appointed subordinates; in Grade M48/M44/M41. The criterion for your appointed subordinate is stated in the 'Note' on page 4 of this booklet.

There is no right or wrong answer. All your answers will be kept **CONFIDENTIAL** and participants will only be identified by assigned code names.

The survey will take about 30 minutes to complete. In exchange for your time, I will send an executive summary of my findings to those returning completed surveys. I would also be happy to present my findings to your organization upon request. If you would like to receive a copy of the executive summary or participate in a prize draw (3 x RM 150), please provide your email address below (or attach a business card).

Email address :

I am aware of your job commitments but your participation is very important to the study and is highly appreciated. Thank you for your valuable time.

Yours faithfully,
Zurina Abdul Hamid, PhD Candidate
Email: Z.B.Abdul-Hamid@2008.hull.ac.uk

Professor Steve Armstrong
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Please send your completed questionnaire in the prepared envelope assigned to your personal assistant before **28 of August 2010**.

For your information, my contact details are as follow:
Zurina Abdul Hamid
INSTITUT TADBIRAN AWAM NEGARA
INTAN Kampus Utama Bukit Kiara
Jalan Bukit Kiara, 50480 Kuala Lumpur
Telefon : 603- 2084 7444 Fax: 603- 2096 1403
E-mail: zurinaah@gmail.com Mobile: 013-383 0259
Please do not hesitate to contact me if you have any queries.

SECTION A (RESPONDENT PROFILE)

Please fill in the blanks or tick in the appropriate fields.

1. Age (years) _____
2. Gender

1	Male	
2	Female	

3. Ethnic

1	Malay	
2	Chinese	
3	Indian	
4	Others	

Please specify: _____

4. Current department's name: _____

5. Employment Grade

1	JUSA	
2	M54	
3	M52	
4	Others	

6. Highest Level of Education

1	PhD	
2	Masters	
3	Bachelor	
4	Others	

7. Working Experience

No	Working Experience in:	No. of years
1	Current division/unit	
2	Current organization	
3	Total work experience in public sector	

8. Number of subordinates under your supervision _____

9. Excellent Service Award" received

No	Number of award	(✓)	Year Awarded
1	Three times or more		
2.	Twice		
3	Once		
4	Never		

SECTION B: TACIT KNOWLEDGE TRANSFER

For the purpose of this survey, respondents will be asked to refer to the following definitions:

Knowledge transfer : the transmission of tacit knowledge from individual to individual

Tacit knowledge : work related know-how or experience that cannot be documented (e.g. implicit rather than explicit)

NOTE: This pack contains 5 sets of questionnaires. Please complete this questionnaire yourself (labelled "SM"). Please distribute the questionnaires labelled "MI-G1" and "MI-G2" to 2 of your **in-group** subordinates either from Grade M48, M44 or M41 and "MO-G1" and "MO-G2" to 2 of your **out-group** subordinates either from Grade M48, M44 or M41. The **in-group** subordinate can be defined as "**trusted assistant**" who is willing and motivated to perform a task that is beyond their job descriptions. The **out-group** subordinate can be defined as the "**hired hand**" who is interested in performing tasks within their job descriptions. Please write the name of your appointed subordinate in the form provided by the secretariat.

In this section, please indicate the approximate extent of knowledge transfer between you and your appointed subordinate (SUB) as noted above. Please tick the appropriate scale. Please use 'no opinion' sparingly.

No	Statement	SUB				
		SCALE	MI-G1	MI-G2	MO-G1	MO-G2
1	The limits of knowledge transfer activities are fully understood between us.	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
2	With the knowledge transfer we know why a given action results in a given outcome	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
3	When a problem surfaced with the knowledge transfer between us, the precise reasons for failure could not be articulated even after the event;	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				

No	Statement	SUB				
		SCALE	MI-G1	MI-G2	MO-G1	MO-G2
4	We normally transfer knowledge informally through discussions, socializations, etc	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
5	It is well known how the informal knowledge transfer interacts to produce output	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
6	Informal knowledge transfer always assists us in performing tasks	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
7	We know what people working in the knowledge transfer actually do	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
8	My subordinate have a <u>common language</u> to deal with knowledge transfer	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
9	My subordinate have a vision of what he/she is trying to achieve through the transfer	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				

No	Statement	SUB				
		SCALE	MI-G1	MI-G2	MO-G1	MO-G2
10	My subordinate have information on the state-of-the-art of knowledge transfer	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
11	My subordinate have a clear division of roles and responsibilities to implement the knowledge transferred	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
12	My subordinate have the necessary skills to implement the knowledge transferred	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
13	My subordinate have the technical competence to absorb knowledge transferred	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
14	My subordinate have the managerial competence to absorb knowledge transferred	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				
15	It is well-known who can best exploit new information about knowledge transfer among my subordinate	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				

16	It is well-known who can help solve problems associated with knowledge transfer	Yes				
		Yes, but				
		No Opinion				
		No, not really				
		No				

No	Statement	SUB SCALE	MI-G1	MI-G2	MO-G1	MO-G2
17	Communication between my subordinate and me	Very Easy				
		Fairly Easy				
		Fairly demanding				
		Very Demanding				
18	Collaboration between my subordinate and me	Is sought actively by my subordinate				
		Is well received but not sought by my subordinate				
		Is preferably-avoided by my subordinate				
		Occurs only if my subordinate has no choice				

SECTION C: LEADER-SUBORDINATE RELATIONS

This section requires you to explain the relationship between you and your subordinates that have been chosen in Section B. Please tick the appropriate scale.

No	Statement	SUB SCALE	MI-G1	MI-G2	MO-G1	MO-G2
1	Does your subordinate usually know where they stand with you.... does your subordinate usually know how satisfied you are with their job?	Rarely				
		Occasionally				
		Sometimes				
		Fairly Often				
		Very often				
2	How well do you understand your subordinate's job problems and needs?	Not a bit				
		A little				
		A fair amount				
		Quite a bit				
		A Great deal				

No	Statement	SUB SCALE				
		MI-G1	MI-G2	MO-G1	MO-G2	
3	How well do you recognize your subordinate potential?	Not at All				
		A Little				
		Moderately				
		Mostly				
		Fully				
4	What are the chances that you would use your power to help your subordinate solve their work problem?	None				
		Small				
		Moderate				
		High				
		Very High				
5	What are the chances that you would 'bail-out' your subordinate with your expenses?	None				
		Small				
		Moderate				
		High				
		Very High				
6	Your subordinate would have enough confidence in you that they would defend and justify your decision if you are not available to do so?	Strongly Disagree				
		Disagree				
		Neutral				
		Agree				
		Strongly Agree				
7	How would you characterize your working relationship with your subordinate?	Extremely Ineffective				
		Worse Than Average				
		Average				
		Better than Average				
		Extremely effective				

SECTION D: MANAGERIAL TACIT KNOWLEDGE

This section is concern with managerial tacit knowledge. **“Tacit Knowledge” can be understood as work related know-how that is acquired through experience and not directly taught; for example knowledge about how to motivate oneself in order to maximize accomplishment.**

This task presents work-related situations, each followed by a series of items that are relevant to handling that situation. For each situation, briefly scan all of the items and then rate the quality of each item on the 1 to 7 scale provided. Try to use the entire scale when you respond, and please use scale 4 sparingly. There are, of course, no "correct" answers.

Please respond to every item, and when you have finished, check to be sure you have not inadvertently omitted a response.

Situation 1

You are a deputy director of a state economic development agency that is involved in promoting tourism for your state. You have been with this agency since the beginning of your career, having spent thirteen years in a managerial role in human resources and two years in your present position.

Your agency has been losing market share of the tourism industry to other states steadily over the past five years. Your agency's strength in the past has been in introducing new and innovative programmes ahead of other states, but now it seems to be three steps behind other leading states in a rapidly changing market.

You believe that your lack of knowledge about the latest development in the industry limits your effectiveness. Your schedule is very busy, but you think it is important to catch up on, and keep up with, innovation that affects the industry.

Rate the quality of the following strategies for becoming more knowledgeable about new products and technology on a 1- to 7- point scale.

STATEMENT	Extremely						
	Bad					Good	
Ask for a leave of absence to pursue an advanced specialized degree	1	2	3	4	5	6	7
Order a news clipping service (news clipping services provide news from a large number of sources on a given topic).	1	2	3	4	5	6	7
Subscribe to several journals relevant to your operations	1	2	3	4	5	6	7
Subscribes to several consumer-oriented magazines that cover your industry	1	2	3	4	5	6	7
Begin attending trade shows in your industry.	1	2	3	4	5	6	7
Ask to sit in on weekly discussions on ideas for new programmes held by the Research and Development division.	1	2	3	4	5	6	7
Attend a series of specialized presentations by research scientists from outside the agency who are brought in by the Operations division.	1	2	3	4	5	6	7
Hire a staff member whose primary responsibility is to keep you abreast of current trends in your industry	1	2	3	4	5	6	7
Ask the Technology division to prepare monthly summary reports of innovative projects	1	2	3	4	5	6	7
Ask for weekly presentations for you and your staff on technical issues by staff in the Research and Development and Operations divisions.	1	2	3	4	5	6	7

Situation 2

An employee who reports to one of your subordinates has asked to talk with you about waste, poor management practices, and possible violations of both departmental policy and the law on the part of your subordinate. You have been in your present position only a year, but in that time you have had no indications of trouble about the subordinate in question. Neither you nor your department has an "open door" policy, so it is expected that employees should take their concerns to their immediate supervisors before bringing a matter to the attention of anyone else. The employee who wishes to meet with you has not discussed this matter with her supervisor because of its delicate nature.

Rate the quality of the following things you are considering doing in this situation on a 1- to 7- point scale.

STATEMENT	Extremely						
	Bad			Good			
Refuse to meet with the employee unless the individual first discusses the matter with your subordinate.	1	2	3	4	5	6	7
Meet with the employee but only with your subordinate present.	1	2	3	4	5	6	7
Schedule a meeting with the employee and then with your subordinate to get both sides of the story.	1	2	3	4	5	6	7
Meet with the employee and then investigate the allegations if an investigation appears warranted before talking with your subordinate.	1	2	3	4	5	6	7
Find out more information about the employee, if you can, before making any decisions.	1	2	3	4	5	6	7
Refuse to meet with the employee and inform your subordinate that the employee has attempted to sidestep the chain of command.	1	2	3	4	5	6	7
Meet with your subordinate first before deciding whether to meet with the employee.	1	2	3	4	5	6	7
Reprimand the employee for ignoring the chain of command.	1	2	3	4	5	6	7
Ask a senior colleague whom you respect for advice about what to do in this situation.	1	2	3	4	5	6	7
Turn the matter over to an assistant.	1	2	3	4	5	6	7

Situation 3

You have just completed your most important project ever, which involved automating the department's warehouses. You have worked many evenings and weekend days over the last six months on this project. You are pleased with your performance because, despite adversity, the project was completed at the projected cost and on time. Near the project's end, it seemed likely that you were going to need additional time and money. But, through hard work on your part, and by pushing some of your people very hard, you met both time deadlines and cost projections.

In a meeting, your supervisor (having been in his position for six months), brings up the topic of your performance on the project. Expecting lavish praise and perhaps even discussion of a possible increase in responsibility, you are stunned by his evaluation of your performance, which is entirely negative. He states that some of your subordinates have complained to him directly about their treatment at your hands in the last phase of project completion. He questions your ability to manage others, and wonders aloud about your ability to lead others. He says nothing positive about the fact that you completed the project on time and at cost under adverse circumstances, nor about how hard you worked on the project.

Rate the quality of the following things you might do in this situation on a 1- to 7- point scale.

STATEMENT	Extremely						
	Bad			Good			
Admit that you perhaps were too hard on your workers, but state that in your judgment, the importance of meeting the deadline and budget projection made your actions necessary.	1	2	3	4	5	6	7
Express disappointment with your performance appraisal, and state that you think it is one-sided.	1	2	3	4	5	6	7
Accept the criticism and explain how you will behave differently in the future.	1	2	3	4	5	6	7
Try to find out if anything else is behind this overly negative evaluation.	1	2	3	4	5	6	7
Begin looking for a new position.	1	2	3	4	5	6	7
Discuss with your supervisor specific examples of where he thinks you went wrong in dealing with the project, and how he would have handled it more effectively.	1	2	3	4	5	6	7
Ask your supervisor to give you a second chance, resolving to yourself to keep him better informed about your activities in the future.	1	2	3	4	5	6	7
Ask your supervisor to help you develop your skills at managing others.	1	2	3	4	5	6	7
Seek the advice of others you trust in the department about what you should do.	1	2	3	4	5	6	7
Admit you might have made some mistakes, but be sure your supervisor is aware of all that you accomplished and the adverse circumstances that you faced.	1	2	3	4	5	6	7

Situation 4

Rate the quality of the following strategies for handling the day-to-day work of a manager on a 1- to 7-point scale.

STATEMENT	Extremely						
	Bad			Good			
Think in terms of tasks accomplished rather than hours spent working.	1	2	3	4	5	6	7
Use a daily list of goals arranged according to your priorities.	1	2	3	4	5	6	7
Reward yourself upon completion of important tasks for the day.	1	2	3	4	5	6	7
Be in charge of all phase of every task or project you are involved in.	1	2	3	4	5	6	7
Take frequent but short breaks (i.e., a quick walk to the mail room) throughout the day.	1	2	3	4	5	6	7
Only delegate inconsequential tasks, since you cannot guarantee that the tasks will be done properly and on time unless you do them yourself.	1	2	3	4	5	6	7
Do only what you are in the mood to do to maximize the quality of your work.	1	2	3	4	5	6	7
Take every opportunity to get feedback on early drafts of your work.	1	2	3	4	5	6	7
Set your own deadlines in addition to externally imposed ones.	1	2	3	4	5	6	7
Do not spend much time planning the best way to do something because the best way to do something may not be apparent until after you have begun doing it.	1	2	3	4	5	6	7

Situation 5

You have been asked to give a talk to managers in the department on tips for good report writing.

Rate the quality of the following pieces of advice about report writing that you are considering including in your talk on a 1- to 7-point scale.

STATEMENT	Extremely						
	Bad			Good			
Write reports so that the main points will be understood by a reader who only has time to skim the report.	1	2	3	4	5	6	7
Explain, in the first few paragraphs, how the report is organized.	1	2	3	4	5	6	7
Use everyday language and avoid all jargon.	1	2	3	4	5	6	7
Work hard to convey your message in the fewest number of words.	1	2	3	4	5	6	7
Consider carefully whom you are writing for.	1	2	3	4	5	6	7
Write carefully the first time around to avoid having to rewrite.	1	2	3	4	5	6	7
Be formal rather than informal in your style.	1	2	3	4	5	6	7
Avoid visual aids, such as figures, charts, and diagrams, because they often oversimplify the message.	1	2	3	4	5	6	7
Use the passive rather than the active voice (e.g., write "30 managers were interviewed" rather than "we interviewed 30 managers").	1	2	3	4	5	6	7
Avoid using the first person (e.g., write "it is recommended" rather than "I recommend")	1	2	3	4	5	6	7

Situation 6

You have been assigned to revise the policy manual for your division of the department. You have six weeks to complete this assignment. The old policy manual was too vague, resulting in several individuals attending to matters only one need handle, and other important matters receiving the attention of no one. Responsibility for the new policy manual is completely yours. The assignment is somewhat of a "hot potato" because of the effects of division policy on the importance of particular management positions in the division. You believe that how this assignment turns out could have important positive or negative consequences for your career.

Rate the quality of the following courses of action you might take in terms of their leading to positive consequences for your career on a 1- to 7-point scale.

STATEMENT	Extremely						
	Bad					Good	
Decide right away if you can come up with a reasonable product that would be satisfactory to most - if not, try to get out of the assignment.	1	2	3	4	5	6	7
Learn as much as possible out your superiors' views on policy covered by the manual.	1	2	3	4	5	6	7
Stick with revisions your superiors favour or probably could be sold on.	1	2	3	4	5	6	7
Get feedback from your superiors on drafts of new policy under consideration.	1	2	3	4	5	6	7
Get feedback from those affected by the policy manual on drafts of new policy under consideration.	1	2	3	4	5	6	7
Form a committee with representation from every department that will share responsibility for the assignment.	1	2	3	4	5	6	7
Find out, if you can, why you, specifically, were chosen for this assignment.	1	2	3	4	5	6	7
Use this opportunity to reduce the power of those in the division who do not support you, as long as you can avoid being obvious about it.	1	2	3	4	5	6	7
Avoid mentioning by name individuals whose poor performance is the cause for a particular policy revision.	1	2	3	4	5	6	7
Don't worry if you miss the deadline for the new policy manual as long as you are making progress.	1	2	3	4	5	6	7

Situation 7

You are responsible for awarding a contract for new computer system for your office. As is true for most decisions, the information you have is neither perfectly-reliable nor complete.

Rate the importance of the following pieces of information in making your decision to award the contract to the Jackson Computer System on a 1- to 7-point scale

STATEMENT	Extremely						
	Bad			Good			
	1	2	3	4	5	6	7
The Treasury reports no major complaints about the company.	1	2	3	4	5	6	7
The bid of the company is RM 3,000 less than that of any other bid (approximate cost of the system is RM65, 000).	1	2	3	4	5	6	7
The company advertises their system as being the most reliable system you can buy for the price.	1	2	3	4	5	6	7
Former customers whom you have contacted personally are favourably impressed with the company and its product.	1	2	3	4	5	6	7
The company's estimate of cost of operation of the system was lower than that of competing companies.	1	2	3	4	5	6	7
The company is new.	1	2	3	4	5	6	7
The company promises a very quick installation.	1	2	3	4	5	6	7
The company has provided letters from former customers attesting to the quality of their system.	1	2	3	4	5	6	7
The company has done good work for your department in the past.	1	2	3	4	5	6	7
Another department similar to your department has recently purchased the same system from the same company you are considering awarding the contract to.	1	2	3	4	5	6	7

Situation 8

You are looking for a new project to tackle in the coming year. You have considered a number of possible projects and desire to pick the project that would be best for you.

Rate the importance of the following considerations when selecting new projects on a 1- to 7-point scale

STATEMENT	Extremely						
	Bad			Good			
The project is the one my immediate superior most desires to be completed.	1	2	3	4	5	6	7
Doing the project would require my developing skills that may enhance my future career success.	1	2	3	4	5	6	7
The project should attract the attention of the local media.	1	2	3	4	5	6	7
Doing the project should prove to be fun.	1	2	3	4	5	6	7
The risk of making a mistake is virtually nonexistent.	1	2	3	4	5	6	7
The project will require my interacting with senior executives whom I would like to get to know better.	1	2	3	4	5	6	7
The project is valued by my superior even though it is not valued by me.	1	2	3	4	5	6	7
The project will enable me to demonstrate my talents that others may not be aware of.	1	2	3	4	5	6	7
The project is in an area with which I have a lot of experience.	1	2	3	4	5	6	7
The project is the one I most want to do.	1	2	3	4	5	6	7

Situation 9

You and a co-worker jointly are responsible for completing a report on a new project by the end of the week. You are uneasy about this assignment because he has a reputation for not meeting deadlines. The problem does not appear to be lack of effort. Rather, he seems to lack certain organizational skills necessary to meet a deadline and also is quite a perfectionist. As a result, too much time is wasted coming up with the "perfect" idea, project, or report.

Your goal is to produce the best possible report by the deadline at the end of the week. Rate the quality of the following strategies for meeting your goal on a 1- to 7-point scale.

STATEMENT	Extremely						
	Bad			Good			
Divide the work to be done in half and tell him that if he does not complete his part, you obviously will have to let your immediate superior know it was not your fault.	1	2	3	4	5	6	7
Politely tell him to be less of a perfectionist.	1	2	3	4	5	6	7
Set deadlines for completing each part of the report, and accept what you have accomplished at each deadline as the final version of that part of the report.	1	2	3	4	5	6	7
Ask your superior to check up on your progress on a daily basis (after explaining why).	1	2	3	4	5	6	7
Praise your co-worker verbally for completion of parts of the assignment.	1	2	3	4	5	6	7
Get angry with him at the first sign of getting behind schedule.	1	2	3	4	5	6	7
As soon as he begins to fall behind, take responsibility for doing the report yourself, if need be, to meet the deadline.	1	2	3	4	5	6	7
Point out firmly, but politely, how he is holding up the report.	1	2	3	4	5	6	7
Avoid putting any pressure on him because it will just make him fall even more behind.	1	2	3	4	5	6	7
Offer to buy him dinner at the end of the week if you both meet the deadline.	1	2	3	4	5	6	7
Ignore his organizational problem so you don't give attention to maladaptive behaviour	1	2	3	4	5	6	7

SECTION E: COGNITIVE STYLE INDEX

People differ in the way they think about problems. Below are 38 statements designed to identify your own approach. If you believe that a statement is true about you, answer **T**. If you believe that it is false about you, answer **F**. If you are uncertain whether it is true or false answer **?**. This is not a test of you ability, and there are no right or wrong answers. Simply choose the one response which comes closest to your opinion. Work quickly, giving your first reaction in each case, and make sure that your respond to every statement. Indicate your answer by completing filling in appropriate scale opposite the statement:

T True	? Uncertain	F False
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	STATEMENT	T	?	F
1	In my experience, rational thought is the only realistic basis for making decisions.			
2	To solve a problem, I have to study each part of it in detail.			
3	I am most effective when my work involves a clear sequence of tasks to be performed.			
4	I have difficulty working with people who 'dive in at the deep end' without considering the finer aspects of the problem.			
5	I am careful to follow rules and regulations at work.			
6	I avoid taking course of action if the odds are against its success.			
7	I am inclined to scan through reports rather than read them in detail.			
8	My understanding of a problem tends to come more from thorough analysis than flashes of insight.			
9	I try to keep regular routine in my work.			
10	The kind of work I like best is that which requires a logical, step-by-step approach.			
11	I rarely make 'off the top of the head' decisions.			
12	I prefer chaotic action to orderly inaction.			
13	Given enough time, I would consider every situation from all angles.			
14	To be successful in my work, I find that it is important to avoid hurting other people's feelings.			
15	The best way for me to understand a problem is to break it down into its constituent parts.			
16	I find that to adopt a careful, analytical approach to making decisions takes too long.			
17	I make most progress when I take calculated risk.			
18	I find that it is possible to be too organised when performing certain kinds of task.			
19	I always pay attention to detail before I reach a conclusion.			
20	I make many of my decisions on the basis of intuition.			
21	My philosophy is that it is better to be safe than risk being sorry.			
22	When making a decision, I take my time thoroughly consider all relevant factors.			
23	I get on best with quiet, thoughtful people.			

